Connected Health: The Drive to Integrated Healthcare Delivery
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Executive Summary
Executive Summary

This report documents the findings of a year-long international study of connected health, entailing extensive interviews of health leaders, surveys of physicians and case studies across eight countries: Australia, Canada, England, France, Germany, Singapore, Spain and the United States.

These national health systems are diverse, with models varying from predominantly single payer health services to systems of competing insurers and providers. But all of these countries’ health systems—and, indeed, all those in developed countries—are under similar financial pressures, not just from current global economic conditions and rising healthcare costs, but also from changing populations that are posing new challenges in meeting increased and more personalized demands for care.

To improve quality and access while getting a grip on cost, these health systems are all, in one form or another, taking action to integrate healthcare.

Integrated healthcare
Integrated healthcare delivery links multiple levels of care management, coordinates services and encourages professional collaboration across a range of care delivery. Integrated healthcare is not about structures or common ownership or bearing insurance risk; it is about networks and connections—often between separate organizations—that focus the continuum of healthcare delivery around patients and populations.

The models of integrated healthcare vary in emphasis and focus. In some countries, the approach to integrated care entails contracts with private providers; in others, legislation is encouraging groups of coordinated healthcare providers to form new organizations to provide care to defined populations. Whatever the approach, the objective is to ensure that the most appropriate and efficacious care is provided where and when it is needed, offering the potential of achieving better health outcomes while controlling costs. Common among all these approaches are significant initiatives to share information on quality, costs and outcomes across healthcare delivery—the core of connected health.

Connected health
Connected health is an approach to healthcare delivery that leverages the systematic application of healthcare information technology to facilitate the accessing and sharing of information, as well as to allow subsequent analysis of health data across healthcare systems. But connected health goes beyond the management of patients’ clinical data to encourage communication and collaboration among all of the various stakeholders involved in a patient’s health.

Connected health is achieved with a range of information and collaboration technologies. Electronic medical records and other clinical applications, data repositories and analytic tools, connected biomedical devices and telehealth collaboration technologies all enable connected health. Most importantly, those solutions must rest on a foundation of technology and data standards and security that ensures the confidentiality of personal health information.

The ambition of connected health is to connect all parts of a healthcare delivery system, seamlessly, through interoperable health information processes and technologies so that critical health information is available when and where it is needed. By structuring and exchanging healthcare information to center care delivery around the patient or a defined population, connected health facilitates improved care coordination, disease management, and the use of clinical practice guidance to help reduce errors and improve care. In so doing, connected health is a key enabler of integrated healthcare delivery. Figure 1 represents the connected health ecosystem.
Our research framework

Our global research shows that there is no single way to achieve the high performance information sharing at the center of connected health. The journey to connected health begins from a starting point that is usually unique to an individual country or health system. Structure, finance, size and cultural issues—including public and professional attitudes to privacy—all play a part in shaping the journey. However, despite these differences, it is clear from our case studies that the journey to connected health can be regarded as comprising three key stages of organizational and systems development, each requiring greater healthcare IT functionality. Increasing functionality, in turn, brings greater levels of value to clinicians, organizations and patients.
We identify the three stages of the connected health journey as:

- **Healthcare IT adoption**—the planning, construction and use of a digital infrastructure.
- **Health information exchange**—the exchange of captured health information between clinicians, across administrative groups and with patients.
- **Insight driven healthcare**—the use of advanced analysis of data to better inform clinical decision-making, population health management and the creation of new care delivery models.

Through our research, we have learned that there are 17 key functionalities of connected health that drive value through these three stages of the journey. These include electronic entry of patient notes, clinical decision support, electronic referrals, ordering and prescribing, communicating with other physicians or patients via secure email and the capture and analysis of data for improvement of clinical care protocols. The 17 functionalities can be thought of as being in four groups of connections:

- Between clinical practitioners within an organization.
- Between clinical practitioners in different organizations.
- Between clinical practitioners and patients.
- With sophisticated data analytics.

As functionality and breadth of adoption across the health system increase, so does the potential for increased benefits. The use of more of the connected health functionalities enables the creation of greater levels of value:

- **Clinical efficacy**—early benefits from healthcare IT adoption and HIE include reductions in duplicate diagnostic tests, quicker access to vital patient information at the point of care and reduced administrative costs.
- **Shared knowledge**—deepening HIE and connectivity can help reduce medical errors and improve care quality, for example through drug interaction alerts, greater use of evidence-based care protocols and new capabilities in managing population care, which increase the potential for preventative and low-cost care for chronic conditions. These additional benefits require deliberate policy changes, clinical workflow redesign and innovation.
- **Care transformation**—advanced analysis of data captured and exchanged in the first two stages informs clinical decision-making, population health management and the creation of new care delivery models, including patient self-management and better care coordination across settings.
Although there is close alignment between the stages of the journey, the groups of connected health functionalities and the levels of value creation, our research demonstrates that each demands careful, dedicated planning, management and expertise if the benefits of connected health are to serve the interests of clinicians, healthcare organizations, patients, payers and society as whole.

Progress toward connected health
The national progress made in developing connected health in each of the eight countries that are included in our study varies a great deal, in terms of where each country is on the journey and the levels of value being created. To assess progress at the national level, we conducted extensive secondary research on connected health programs and initiatives in each of the eight countries and interviewed first-hand more than 160 healthcare leaders, including government officials, clinicians, health information specialists, academics and analysts.

In addition, to gain an on-the-ground assessment of each country’s progress toward connected health, we surveyed more than 3,700 physicians in the eight countries, asking them about the prevalence and use of many of its functionalities, as well as about perceived benefits and challenges. The findings from the survey enabled us to develop the Accenture Connected Health Maturity Index, comparing the relative progress of each country with regard to its adoption of healthcare information technology and the exchange of information between different clinicians and organizations. The index was developed separately for primary care and for secondary care.

The results show wide discrepancies in development between countries and between sectors within countries. For example, while England is a leader in primary care, it lags behind in secondary care. In the United States, maturity of secondary care connected health is well ahead of that in primary care. While many national or regional health systems do have several components in place and routinely in use, no country has developed all of the components fully.

Evidence of the benefits from healthcare IT adoption and from the system-wide exchange of data is emerging from several of the healthcare systems that we studied. But there are major barriers that can stand in the way to connected health. These barriers include:

- **Systems and policies**—including the absence of coherent strategies, misaligned financial incentives and a lack of adequate interoperability standards.
- **Organization and management**—including prohibitive costs, lack of collaboration between organizations, technical limitations of existing systems and poor project management.
- **Clinicians and end users**—including physician resistance to technologies and changes to working practices that burden their productivity or add to costs.
- **Patients and the public**—including concerns over privacy and data security and a lack of appropriate regulation.

Many health service organizations around the world are overcoming these barriers using a range of tools, including strategic planning and change management, extensive stakeholder engagement, clinical governance, policy development, legislative changes and financial incentives, among others. Drawing on in-depth case studies, we present examples of health systems that have worked to overcome the barriers and, by doing so, moved closer to realizing the benefits of connected health.

The dynamics of successful connected health
From analysis of our research findings, we identify six key dynamics that characterize those systems and organizations that are successfully progressing on the journey to connected health by creating the new relationships and practices that will ensure value optimization:

1. **Vision and leadership focused on improved health outcomes**—Connected health is a means to an end. Clarity about the benefits of the end state is essential before building the healthcare IT infrastructure. Connected health must be part of a clear vision about improved quality, enhanced access to care and better control of costs, which is communicated to, and embraced by, all stakeholders in the healthcare delivery organization.

2. **Strategic change management**—Connected health is not a tactical intervention in an organization or system. Development of connected health entails significant carefully orchestrated organization-wide transformation that aligns directly to mission and vision and that can affect culture, management and clinical systems, behavior and patient-provider-payer interactions, well beyond the changes required in technology alone.

3. **Robust technology infrastructure**—Connected health builds upon robust healthcare IT infrastructure that is compatible with organizational vision and objectives and governed by clear standards of health information interoperability and exchange. In the absence of coherent healthcare IT architecture that is expressly designed to ensure interoperability, ad hoc solutions typically fail to realize promised returns on investments.

4. **Co-evolution**—Connected health development strikes the right balance between strong leadership and vision from the top and the opportunity
for bottom-up experimentation and innovation to build ownership and change practices across the organization. Global experience demonstrates that top-down approaches alone fail to build clinical buy-in and bottom-up approaches alone seldom achieve system-wide interoperability – both of which are needed for success.

5. Clinical change management— Connected health succeeds best when change to frontline healthcare delivery works in parallel with strategic change management (dynamic 2) at the organizational level. Sophisticated analytics can identify needs for change and provide an evidence base that can help re-shape clinical decision-making and healthcare protocols. Without a strong framework of clinical governance, peer review and performance management across the system, clinical changes can be fragmented, disruptive and inefficient.

6. Integration drives integration— Connected health entails a virtuous cycle, fostering clinical and business process integration, which in turn places new demands on new technologies and needs for parallel service delivery development. This requires organizations to put in place project management processes that orchestrate the five dynamics listed above, and to continually reassess their roles, what services they provide and how those services need to be developed, extended and connected. There is little scope for integrating different levels of care if the organizations or systems of each are disconnected, either technologically or clinically.

The success achieved so far in the eight countries of our study is the result of the national-level vision for connected health, including related policy and regulatory initiatives, as well as the operational initiatives implemented within individual health systems and organizations. To measure their progress, we have mapped the innovations and efforts in the eight countries against the six dynamics of connected health success. The figure below summarizes our analysis:

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**Figure 3 - State of the connected health dynamic-country comparisons**

<table>
<thead>
<tr>
<th>Vision and leadership</th>
<th>Australia</th>
<th>Canada</th>
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<td>Co-evolution</td>
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- **= recognized need/initial steps**
- **= progress being made**
- **= strong performance**
- **= sustained excellence**

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We believe that the six dynamics of connected health success provide a solid basis for planning and embarking upon the connected health journey. The journey begins with intensive analyses of external uncontrollable factors and of an organization’s own internal, manageable capabilities. To help healthcare leaders undertake that continuing assessment, we have structured a diagnostic template based on the six dynamics, including external, contextual factors that need to be monitored and questions about internal organizational capabilities that have to be tested and retested.

The future of connected health
The dynamics of connected health create a virtuous cycle of integration that will shape the future of both connected health and healthcare. The beginnings of major change are already underway, including:

- Integrated systems that blend electronic medical records with methods of communication, remote care and process management to build seamless systems and workflows.
- Redirection of healthcare interventions away from expensive hospital settings through the use of telemedicine, remote care and mobile health.
- Engagement of citizens in their health and wellness through a variety of connected health tools including the creation and use of personal health records. There is great potential to transform the role of patients in their own wellbeing through shared decision-making, active engagement with care teams, condition monitoring and chronic disease management.
- Genomics, which will offer the possibility of personalizing treatment and wellness plans, present clinicians with a powerful range of analytical and diagnostic tools, and enable managers to coordinate care, target resources and improve public health outcomes.

These changes and others will drive greater integration of healthcare, which can ensure that the most appropriate and efficacious care is provided where and when it is needed and offer the potential of better health outcomes and greater control of costs.

Moving forward on the journey
We strongly advocate that organizations or systems that are embarking on the connected health journey begin with a clear assessment of their own current healthcare IT functionalities and a detailed analysis both of their own internal, manageable capabilities and of the external uncontrollable economic and political factors that will influence their journey. We believe that the six dynamics of connected health success that we identify from our global research provide a solid basis for such analysis.

Our research also demonstrates that “biting off more than one can chew” can result in failure. The manageable change and planned incremental action that we observed in the more successful national and system initiatives should encourage those who recognize that the journey forward is made one step at a time. Overly ambitious plans—especially if they are undertaken without first establishing a sense of ownership across the organization and especially with physicians—can be a mistake.

Unlike some other journeys, the march to connected health and toward more integrated healthcare will not cease. Health information will likely remain fragmented in dispersed organizations for some time to come, irrespective of how care is organized or financed nationally. But new clinical developments, technology advances and the growing needs and demands of patients will constantly present new challenges and possibilities for healthcare delivery systems and organizations. Connected health is not a one-time investment; it is a permanent and evolving part of operations, which requires sustained financial backing, technical expertise, organizational change and political will.

Our study clearly demonstrates that connected health offers massive opportunities for forward-thinking healthcare leaders to achieve the aims of increased quality, sustained access and managed cost. And this report shows that there are many organizations on the journey from which we can learn.
Our methodology in brief
In this study, Accenture set out to determine the distinguishing characteristics of advanced connected health systems and to gather and share insights from today’s leaders.

Our study consisted of four strands of research. First, we undertook a literature review, assisted by researchers at the New York Academy of Medicine, to examine what other researchers have done in the field to date on the subject of healthcare information technology and "connected health," and we conducted in-depth secondary research to assess progress in planning and implementing connected health across eight countries. The eight countries were: Australia, Canada, England, France, Germany, Singapore, Spain and the United States.

Second, we commissioned Ipsos Mori, an international market research agency, to help conduct 160 interviews with health system leaders across the same eight countries. Between them, these experts brought a range of strategic perspectives on the topic. The experts included:

- Government officials involved in regulating, funding and/or delivering connected health.
- Clinicians and clinical organizations involved with healthcare delivery.
- Payer/commissioner organizations that are responsible for healthcare funding.
- Healthcare information technology executives tasked with developing technological frameworks for connected health systems, as well as purchasing and managing those systems.
- Academics and analysts with a broad view of the national picture.

These expert interviews provided us with overall insights into the adoption of healthcare IT solutions, and particularly how far the exchange and use of health information has progressed in different countries and regions. The interviews also examined the barriers and enablers to further progress, and explored experts’ views on the future vision and desired outcomes for connected health in each country.

Third, working with M3 Global Research, we conducted an online survey of more than 3,700 physicians in the eight countries (500 each in Australia, Canada, England, France, Germany, Spain and the US, and 200 in Singapore). We drew respondents from a panel composed of primary and secondary/specialist care doctors who have registered to take part in market research. Primary care physicians are those from general practice and family medicine. Secondary care physicians included specialists in a number of fields including surgery, neurology, endocrinology, rheumatology, oncology and cardiology. The survey enabled us to measure the actual level of “connectedness” in each country, by providing comparative data on physicians’ use of different functionalities of connected health. The survey also captured attitudinal data on the perceived benefits of connected health with respect to several dimensions of quality, access and cost, and explored physicians’ views on the barriers and incentives to encourage adoption and use.

Finally, we conducted further in-depth secondary research and consulted with academic experts and other subject matters experts to compile a list of health systems and organizations that are widely seen to be leading the way in connected health. Then, working in partnership with the Altarum Institute, a US-based health system research organization, we developed 10 case studies of connected health systems that represent the benchmark for current good practice. These case studies were based on extensive secondary research and interviews with senior executives across the health systems that brought a broad range of political, strategic, technical and clinical experience. The case studies helped us to better understand the link between the adoption and use of electronic medical records (EMR) and health information exchange (HIE) solutions, and the resulting benefits which accrue to health systems, to the patients they serve and to populations.

This research has provided us with deep insights into the critical success factors for organizations to deliver more effective, efficient and affordable healthcare through the use of healthcare IT. Altarum's project director, Dan Armijo, contributed to chapter 1 on “Making the Case for Connected Health.”

The case studies are: Denmark, Indiana HIE (United States), Lombardia (Italy), Intermountain (United States), Madrid (Spain), Kaiser Permanente (United States), Hong Kong, Midi-Pyrénées (France), Scotland and Singapore.

The core Accenture team that conducted the research were: Julie McQueen, Greg Parston, Lisa Larsen, Henry Kippin, Hayley Saldanha, Corinne Levey, Amy Berk, Simon Kaiser and Heather Heathfield.

The team was advised by Prof. Denis Protti of the University of Victoria and Dr. Alan Garber, formerly of Stanford University.
1. Making the Case for Connected Health
1. Making the Case for Connected Health

Healthcare leaders around the world are looking for new ways to improve the quality of healthcare delivery and expand access to vital services for increasingly diverse and demanding populations. At the same time, they are trying to get a grip on the rising costs of healthcare.

National health systems are diverse, with models varying from predominantly single payer health services in countries like the United Kingdom and New Zealand, to systems of competing insurers and providers, such as in Germany and the United States. But most countries' health systems—certainly those in developed countries—are under similar financial pressures, not just from current global economic conditions, but also from changing populations that are posing new challenges in meeting increased demands for care. People are living longer and, with older age, are suffering more chronic ailments that require sustained but not necessarily intensive care. People are also demanding better, more personalized and more convenient services from their health providers. At the same time, the costs of healthcare itself are being driven constantly upwards by new clinical and pharmaceutical interventions and by new medical technology and equipment.

Across all these national systems, a common thread is apparent: they are all, in one form or another, taking action to integrate healthcare.

Integrated healthcare
Integrated healthcare delivery links multiple levels of care management, coordinates services and encourages professional collaboration across a range of care delivery. Integrated healthcare is not about structures or common ownership, but rather about networks and connections—often between separate organizations—that focus the continuum of healthcare delivery around patients and populations. It is clinical and financial accountability to a defined set of patients or a population that ties together delivery organizations.

Models of integrated healthcare vary in emphasis and focus. In some Spanish regions, for example, the government has contracts with private providers to provide both primary and secondary care at a fixed price. In Swedish counties, a similar arrangement has been extended to include social care, a model akin to one adopted by some English health service commissioning agencies. In the United States, legislation is encouraging groups of coordinated healthcare providers to form accountable care organizations, which provide care to defined populations and are held accountable for quality, cost and overall care. In Australia, national and state programs are seeking ways of integrating primary care, bringing together general practice, nurses, allied health professionals and visiting medical specialists; in Canada, similar provincial programs are focusing on integrating care for families and the elderly.

By ensuring that the most appropriate and efficacious care is provided where and when it is needed, these kinds of integrated care schemes offer the potential of achieving better health outcomes for individual patients and better health for the wider community. Integrated care offers the further prospect for governments and healthcare systems to ensure service capacity meets the needs of their population while achieving better control of costs.

Although countries with very different health systems are pursuing different strategies toward integrated care, those that are leading the way also have in common significant initiatives to harness the power of connected health to support their progress. Sharing information on quality, costs and outcomes—the core of connected health—is essential to integrated healthcare delivery.
Connected health

We define connected health as an approach to healthcare delivery that leverages the systematic application of healthcare information technologies to facilitate the accessing and sharing of information, as well as to allow subsequent analysis of health data across healthcare systems.

Recent rapid advances in healthcare IT provide the potential for innovation and integration through sharing information across systems, and between different healthcare providers. These advances have some basic components: electronic medical records (EMR) that allow providers to capture and store patient care information electronically, and enables clinical decision support systems (CDSS) and computerized physician order entry (CPOE); health information exchange (HIE); and analytics; and technologies that directly engage patients. All of these are important building blocks in improving overall healthcare quality and efficiency.

Leveraging the value of these technologies requires strong incentives and a clear policy framework, and we are seeing a number of governments beginning to provide this. In the United States, for example, recent healthcare legislation and direct financial incentives for providers are driving healthcare IT adoption. In the Netherlands, a recent law establishes that e-prescribing shall be mandatory by 2012. And a legislative review in Singapore to enable HIE between institutions triggered the creation of a national electronic health record (NEHR) in just 18 months. Today, more than 95 percent of primary care physicians in New Zealand, the Netherlands, England, Australia, Spain, parts of Italy and all of the Scandinavian countries use an ambulatory care electronic health record.

The ambition of connected health is to connect all parts of a healthcare delivery system, seamlessly, through interoperable health information processes and technologies so that critical health information is available when and where it is needed. By structuring and exchanging healthcare information to center care delivery around the patient or a defined population, connected health facilitates improved care coordination, disease management, and the use of clinical practice guidance to help reduce errors and improve care.

In so doing, connected health is a key enabler of integrated healthcare delivery. The leaders of today’s successful health systems and organizations understand this and know that progress toward the long-term outcomes of quality, access and cost control cannot be achieved without the creative leveraging of healthcare IT and the systematic development of HIE.

Making the right connections

Our global research shows that the journey to connected health begins from a starting point that is usually unique to an individual country or health system. Structure, finance, size and cultural issues—including public and professional attitudes to privacy—all play a part in shaping the journey. But from these different starting points, we can identify three stages:

1. **Healthcare IT adoption**—the planning and construction of a digital infrastructure for capturing patient data, built on decentralized approaches to data collection through electronic medical records and patient health records.

2. **Health information exchange**—which allows organizations to promote the exchange of captured health information between clinicians and across administrative groups, within a strong governance framework that aims to improve care coordination via better accessibility to higher quality, more structured data.

3. **Insight driven healthcare**—during which advanced analysis of data captured and exchanged in the first two stages can better inform clinical decision-making, population health management and new care delivery models, including identifying when alterations in clinical protocols are needed, virtual care provision, telemedicine and other electronic tools that empower healthcare consumers.

Although the gains of improved quality, access and cost control are optimized in the third stage, benefits accrue through all three stages—benefits that, however small, can induce further developments and support organizational change. The journey from healthcare IT adoption to insight driven healthcare is sequential, in that each stage builds on prior capabilities, but the journey is not always linear. Each stage can influence developments in the others. For example, building information exchange between legacy healthcare IT systems in separate healthcare institutions can lead to more standardized templates for data collection which were first developed in the adoption stage.

From our research, we have identified 17 key functionalities of connected health that drive value across these three stages of the journey. These can be thought of as being in four groups of connections: those between clinical practitioners within an organization; between clinical practitioners in different organizations; between clinical practitioners and patients; and with sophisticated data analytics. The groups of connections also largely coincide with the three stages of the connected health journey. These connected health functionalities are presented in Figure 4.
## Figure 4 - The functionalities of connected health

### Connected clinical practice
- Hospitals/physician offices use electronic tools to reduce the administrative burden of health care delivery (e.g. e-scheduling or e-billing)
- Physicians capture patient data electronically
- Physicians receive electronic alerts/reminders while seeing patients (e.g. prompts regarding contraindications or preventative care)
- Physicians use clinical decision support systems (CDSS) to help make correct diagnostic treatment decisions at the point of care

### Connected to clinical practitioners in other organizations
- Physicians communicate electronically with clinicians in other organizations (e.g. via secure email)
- Physicians are notified electronically of patients’ interactions with other health organizations (e.g. admission to hospital)
- Physicians send or receive referrals electronically to/from health professionals in other organizations (e.g. for specialist appointments)
- Physicians electronically access clinical data about a patient who has been seen by a different health organization (e.g. hospital, laboratory)
- Physicians send prescriptions electronically to pharmacies (e-prescribing)
- Physicians send order requests electronically (e.g. for tests)
- Physicians receive clinical results electronically that populate patients’ electronic medical records

### Connected to patients
- Patients can book/change/cancel appointments with their physicians online
- Patients can communicate with their physicians electronically via secure email or video conferencing
- Patients can electronically access their own medical information (e.g. lab results, medications, imaging results, etc)
- Patients can monitor and record their own health indicators and share information with their physicians or with other approved clinicians

### Connected to analytics
- Healthcare organizations capture and analyze care data and use this to identify needs for improvement in clinical care protocols and clinical outcomes across the organization
- Public health agencies use system-wide clinical data for population health reporting, allowing them to carry out analysis to monitor trends and manage disease in the population
Realizing value from connected health
The effective use of healthcare IT to advance quality of care, expand access and control costs takes many forms. At their center lies the ability of technology to expand access to health information, improve the integrity of health information and organize and present that information so that a variety of stakeholders can execute their roles in the system more efficiently and effectively.

The benefits that can accrue from connected health systems—even in the early stages of the journey—are many. Evidence of the benefits from healthcare IT adoption and from the system-wide exchange of data, is emerging from several of the healthcare delivery systems that we studied. They show that connected health facilitates’ care coordination and integration, disease management, reduction of clinical errors and the use of care protocols and clinical practice guidelines, as well as providing opportunities for administrative and clinical cost savings. As system functionality and breadth of adoption increase, so does the potential for increased benefits.

We identify three levels of value creation, from early, relatively small returns to producing value through care transformation. While the third level may be the ultimate end goal, many health systems start with business cases that target early value as a means of demonstrating quick wins and building stakeholder buy-in.

The three levels of value creation are:

- **Clinical efficacy.** Many benefits of EMR adoption for physicians and patients materialize almost immediately. These “early value” benefits can include reducing administrative activities and costs, eliminating duplicate lab and radiology tests, improving patient safety through 24/7 access to comprehensive, legible medical records and speeding up access to patient medical histories and vital information at the point of care to improve the patient experience and support clinical decision-making. At this level, strong vision and leadership is vital to make sure any initial disruption to workflows or “bedding in” of systems is translated into a gradual ROI and visible improvements in patient care.

- **Shared knowledge.** Deepening HIE and connectivity can help reduce medical errors and improve care quality. Examples include such patient safety benefits as drug interaction alerts, sophisticated tools to enhance clinical decision-making through evidence-based care protocols, and innovations and new capabilities in population care, which increase the potential for preventative and low-cost care for chronic conditions. Improving efficiency and systematically reducing waste and duplication can create significant cost savings. At this level, benefits realization requires more deliberate policy changes, workflow redesign and a willingness to innovate on the part of clinicians.

- **Care transformation.** The greatest level of value is created by analyzing rich data sets to accelerate clinical research and to improve diagnostic and treatment protocols. Health analytics enables comparative performance review and management that can improve the quality of care and the coordination of disease management along the continuum of care. This in turn enables deeper integration, facilitating new models of patient-led care through self-management, the use of mobile technologies, and care coordination across settings. Critical to this level is the ability to harness and mine the data to drive improvements and to share successful practices that add value across the system.

Evidence of the benefits from healthcare IT adoption and from the system-wide exchange of data, is emerging from several health systems that we studied. The appendix includes descriptions of the connected health activities of 10 health systems that are leading the way in implementing healthcare IT and already realizing value from their investments.

Through these case studies, we have learned that while some benefits materialize early, the potential to create more value and to transform care delivery increases as the breadth of adoption and functionality of healthcare IT increases, as represented in Figure 5.

The cost of investment in electronic medical records and HIE—in money, time and, in the early stages of the journey, even in small losses of productivity—is not insubstantial. Policymakers, health system leaders and clinicians need to approach benefits creation proactively and with a long-term view. The most successful health systems target and celebrate early wins, but maintain a focus on the long-term value of care transformation.
Our case studies showed that the realization of value from coordinated healthcare IT investments takes many forms: increased administrative efficiency; improved management of clinical processes (reducing unwarranted variation, individualizing care, more regular use of evidence); better patient engagement, enabling shared medical decision-making; better management of population health objectives; and fostering a learning environment through advanced data analytics. Each connected health organization or system that we studied focused on realizing a particular subset of these benefits. The focus of each initiative was largely determined by the primary stakeholders leading the effort, the availability of funding, the policy and funding environment and the perceived likelihood of success. But the greater benefits only accrue with increased functionality and information systems integration.
Summarizing the benefits of connected health is complex because of the multitude of stakeholder interests involved, the variations in maturity and functional emphasis across “successful” efforts and the relative absence of robust system-wide ROI studies.

Attributing specific cost, quality and patient outcomes to activities that would not have been possible without a corresponding healthcare IT investment is always difficult, given the influences on organizations and systems of many confounding environmental factors. Value can be misattributed, unintended consequences missed, the impact of conflicting incentives overlooked and the true drivers of value misunderstood. For example, simple HIE offers improved information access that can foster better patient care coordination, which in turn should improve the quality of care delivered, which should result in improved clinical outcomes for individual patients and, in aggregate, improved population-level health indicators. Within all of these linkages, if one is just looking for corresponding changes in population-level metrics, it is certainly possible to misattribute changes, or the lack of them, to particular healthcare IT capabilities. Effective evaluation of healthcare IT programs requires an approach that recognizes this, captures both dynamic and cumulative impacts along the value chain and uncovers missed opportunities.

The countries we studied showed varying levels of maturity in managing and measuring value realization. Some connected health projects have been proposed, planned and implemented without a consensus about the performance gains expected or the direct mechanisms to achieve these and only limited means to oversee investment progress. Clearly, there are also many complexities in monitoring performance in a multi-stakeholder environment where priorities and policies are subject to change, baselines move, program leadership changes hands, technology and evidence evolves, and so on. Furthermore, it is quite common for these types of complex programs to suffer from limited mechanisms to oversee the investment (are we getting the value we intended?), a failure to portray lessons learned adequately (what underlies providers’ reluctance to use a certain function?) and an inability to manage the achievement of performance objectives effectively across organizations and time. Understanding the value of particular connected health investments in such a fluid environment can be extremely challenging.
The benefits to different stakeholders
The value of connected health is optimized through the coordinated efforts of many stakeholders. While all stakeholders benefit, it is useful to view the specific advantages from the different perspectives of the clinician, the organization/system, the patient, the insurer or payer and the wider population or society as a whole. The management decisions from which the benefits of connected health derive often take into account implicit tradeoffs between the different stakeholders’ interests.

It is important for healthcare leaders to help the various stakeholders understand what it takes to maximize benefits from connected health investments. Incremental development and small, early wins—particularly at the first stage of healthcare IT adoption—are important to securing organization-wide ownership and commitment to continued development. However, the greatest value of connected health lies in the long term changes to clinical processes and health that the stages of HIE and application of health information analytics bring. There are many points along the journey to connected health where compromises will be made to adjust for the impact of intervening variables (such as policy changes, funding limitations, technical issues of interoperability in view of dissimilar platforms, semantics, etc.). In reality, these compromises can mean it takes longer for a fuller range of benefits to be realized. Those that have been remarkably successful demonstrate a deep understanding of the time requirements of the value chain, the importance of managing expectations accordingly and the need to plan their activities over the long term.

Value to clinicians
Integrated and well-organized patient information can make providers more effective in a number of ways. One of the most important is the opportunity to use their time with a patient more efficiently, diagnose accurately, explore treatment options together, and help with patient education.

“We have access to many more types of decision support than we did on paper. Now, we all use order sets that are developed regionally with an evidence basis to guide people towards best practices... We have things like drug allergy alerting and drugs interaction alerting, maximum dose alerting—and that all happens at the point of care, so when I enter an order I am warned about those things immediately. It does not have to wait for a pharmacist to notice or a nurse to notice an issue and call me.”

—Ben Broder, M.D., Ph.D., Kaiser Permanente SCAL, Systems Solutions and Deployment, Inpatient EMR Physician Lead

Another significant area of benefit to providers is the ability to query and analyze the complete population of patients for whom they and their colleagues are responsible. Because the impact of healthcare IT on patient outcomes and costs of care are difficult to measure and may take several years to come to fruition, the ability to generate patient registries is seen as an early proxy measure for the impact on quality of care. Although they can be paper-based, organizations with electronic health records are considerably more likely to have registry capabilities.

Patient registry functionalities support better care by identifying candidates for preventative tests and vaccinations, tracking the management of certain chronic conditions and identifying patients who may not be complying with treatment regimes. In this way, providers can manage the health of populations of patients more effectively and report performance on quality measures. Kaiser Permanente, a US-based integrated delivery system, has developed a Panel Support Tool, which links evidence-based care guidelines to Kaiser’s EHR, highlighting gaps in care for individual patients and analyzing performance across panels of patients and care teams.

The program has increased adherence to evidence-based care and improved outcomes for patients with a variety of chronic conditions. It has also enhanced continuity of care, and reduced reliance on resource-intensive office visits.

Value to healthcare organizations/ systems
As patient-centric views of data allow more efficient and coordinated action across the health system with HIE, the aggregations of that data allow organizations to measure system-wide performance and see how far it is improving. Connected health systems can generate valuable performance information to improve workflow, safety and efficiency within health systems. Our study of connected health initiatives in Hong Kong and Intermountain Healthcare found several examples of system-wide improvement efforts, all fostered by the collection, measurement and reporting of clinical practices. These efforts, and others, highlighted the need to make complementary organizational changes to leverage healthcare IT systems, track performance and quality measures, encourage the use of reminder systems and checklists for providers, and offer constant feedback on performance.

Organizations can also benefit from adopting new models of care delivery. In Denmark, for example, the Odense University Hospital, which has reached stage 6 on the HIMSS maturity model\(^1\), has been working with MedCom International in developing healthcare IT solutions to facilitate high-quality care in patients’ homes. For example, patients with COPD (often referred to as smokers’ lung disease) are equipped with a “briefcase” that allows live images and sound as well as data measurement to be monitored at home and quickly transferred to the hospital either via the Internet or a satellite connection. At the hospital, the doctor can evaluate and guide the patient as if the patient was present at the hospital. The data transmitted from the patient’s

\(^1\) http://www.himss.org
home enables the hospital to perform systematic monitoring and control the quality of the treatment. Early evaluations demonstrate key benefits: patients feel safe and comfortable at home, readmission rates are down by more than 50 percent, patient stays in hospital have been reduced by five days on average, the relationship between staff and patients is significantly improved and the overall cost of care is reduced.

The use of patient-physician secure email at Kaiser Permanente (KP) provides a competitive advantage for the organization. The impact of patients’ use of the secure email function has been gauged by measuring the impact on certain Healthcare Effectiveness Data and Information Set (HEDIS) measures, specifically for patients with diabetes, hypertension, or both. A study of 35,423 adult patients with those conditions in KP’s Southern California region compared the rates at which nine HEDIS measures were met two months after patients began using secure email with providers. They observed a 2.0 – 6.5 percentage point improvement on all nine measures. The association between use of email and HEDIS scores, as well as the 7 to 10 percent reduction in primary care office visits from members using secure messaging, suggests that secure email can help improve individual care experiences and the health of populations while also reducing per capita costs of care.

**Value to patients**

Connected health offers many benefits to patients. These range from fairly straightforward gains in coordination between providers that reduces patient frustration (being asked for the same information repeatedly or having to wait on the phone to schedule appointments) to the benefits that arise from advancing patient-centric information and processes. From a cost containment point of view, patients benefit from avoiding unneeded tests and treatments and unnecessary hospitalizations. Access to well-structured longitudinal patient information across organizations can improve diagnostic accuracy, decrease errors, reduce unnecessary procedures and facilitate the best possible treatment decisions.

"Originally the ‘killer app’ for GPs using computers was repeat prescribing because it removed handwriting issues which risked the wrong drugs being administered. ePrescribing now organizes all of the prescription information making that process much more streamlined. These days, though, one of the main advantages of healthcare IT for GPs is document management systems, meaning that lab results are available the next day, rather than it taking a week or 10 days to go through all of the paperwork.”

—Frank Sullivan, GP and Professor of Health Informatics, NHS Tayside

Patients will receive better medical care if they and their healthcare providers have access to robust decision aids and accurate information about previous encounters. In Scotland, for example, the Emergency Care Summary is receiving millions of accesses each year and is helping to ensure that clinicians have access to critical information—including basic patient details and a summary of prescriptions, allergies and adverse drug reactions—to help them deliver safe care within the emergency setting.

Similarly, in Hong Kong, the prevalence of errors—such as medication, prescription, transcription and transfusion errors—has been reduced following the implementation of the Clinical Management System (CMS) and electronic patient record (EPR). After comparing incidents of misidentifications in laboratory tests before and after introducing a barcode system, the number of incidents at one hospital had dropped from 132 to just two.

The most complex patients require team-based care, and the information flows possible in connected health systems allow such teams to function more effectively. In Kaiser Permanente’s multispecialty medical groups, for example, physicians and other clinicians share a vast clinical knowledge base that helps them to practice physician-led team-based care (comprising physicians, clinical pharmacists, nurses, care managers, medical assistants, technicians and others), and in so doing improve patient outcomes and reduce costs.

Patients also benefit from clinical quality improvement activities. For example, Intermountain Healthcare (IHC) has reported many examples of improved patient outcomes resulting directly from the more effective use of data and standardization of care. The proportion of cardiac patients receiving appropriate medications at discharge has increased by 50 percent to proportions of more than 90 percent. This has resulted in significant reductions in mortality and readmission rates of congestive heart failure and heart disease patients. IHC is now in the top 3 percent in the US for low readmission rates for heart attack, heart failure and pneumonia patients.

**Value to payers/insurers**

Connected health systems allow the performance of hospitals, physicians, nursing homes and other providers to be evaluated. Performance metrics can support value-based purchasing efforts and help to identify performance outliers and fraudulent activities, whether funded by government or independent insurers. Comprehensive and accurate patient information also supports efficient care delivery through improvements in care management, which can keep patients out of high cost settings like hospitals and emergency rooms. Widespread investment in healthcare IT also fosters improvements in administrative efficiency. Given the economic burden of growing healthcare costs, these capabilities are of considerable value to healthcare payers and insurers.
Indiana Health Information Exchange's (IHIE) Quality Health First (QHF) program, for example, operates as a clinical quality and value-based reimbursement service. Combining data from insurance providers with data within the virtual patient record, QHF provides quality reporting and an integrated pay-for-performance program across multiple payers in the state. The program is both intended to generate revenue from participating payers and provide quality-based information to participating physicians through monthly reports. Insurance providers reap financial benefits from the improved health of their populations, while providing funding both for the operations of QHF and to supply incentive payments to providers who improve their quality of care.

Using information contained in electronic health records (EHR), Lombardia’s data warehouse enables analysis for administrative purposes such as healthcare planning, resource planning, and epidemiological analysis. The total investment in healthcare IT capabilities in Lombardia over 10 years was between €800 million and €1 billion. A 2010 study for the European Commission found an overall positive socio-economic impact of the healthcare IT platform over 10 years. In 2007, about five years after the region-wide expansion of the system began, annual net benefits were first realized. By 2010, cumulative net benefits were estimated to be about €143 million.

Value to society as a whole
The aggregation of health information across organizational boundaries offers many possibilities for improving population health. Patterns of illness can be revealed, disease outbreaks and rare patterns of adverse events can be detected and public health indicators can be measured. For example, the Public Health Emergency Surveillance System (PHESS) is a core early component of IHIE’s initiatives. PHESS collects information from Indiana hospital emergency departments to support analysis to identify bioterrorism, disease outbreaks and other public health emergencies.

Population-level views also enhance the ability of the system to detect unwarranted variation in clinical practice, as well as evaluate the comparative effectiveness of treatments related to population characteristics not always adequately explored during clinical trials. These uses can uncover significant relationships between risk factors, treatments and outcomes and can also support the mass identification and contact of patients when needed (for example, in the event of a medication recall). In Hong Kong, for example, when thousands of patients had received a batch of contaminated medication in 2009, the Health Authority was able to identify 35,000 patients and contact 2,000 chemotherapy patients (who were most at risk) within a day.

Because they can help organizations to compare effectiveness data, connected health systems can accelerate the creation of empirical medical evidence of the link between specific clinical interventions and observed patient outcomes. Through analyzing those relationships across thousands of patients, connected health systems enable a wide array of evidence to be gathered about competing treatment approaches, prevention strategies, the frequency of certain complications, and the effect of management efforts on the progression of disease. The outcome will be increased average life spans and better quality of life.

Navigating the journey to connected health
The journey to connected health, the healthcare IT functionalities that are constructed along the way and the value that can be created are graphically represented in Figure 6. Although there is close alignment between the journey, healthcare IT development and value creation, each demands careful, dedicated planning, management and expertise if the benefits of connected health are to serve the interests of clinicians, healthcare organizations, patients, payers and society as whole.
<table>
<thead>
<tr>
<th>The stages of the journey</th>
<th>The functionalities of connected health</th>
<th>The levels of value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthcare IT adoption</td>
<td>Connected clinical practice</td>
<td>Clinical efficacy</td>
</tr>
<tr>
<td>Health information exchange</td>
<td>Connected to clinical practitioners in other organizations</td>
<td>Shared knowledge</td>
</tr>
<tr>
<td>Insight driven healthcare</td>
<td>Connected to patients</td>
<td>Care transformation</td>
</tr>
<tr>
<td></td>
<td>Connected to analytics</td>
<td></td>
</tr>
</tbody>
</table>

It is clear that health information will likely remain in fragmented and dispersed services and organizations for some time to come, irrespective of how care is organized or financed nationally. However, even in countries where progress on electronic medical records is slow or incomplete, we can see other functions being put in place, such as e-referrals or picture archiving and communications systems (PACS). The worldwide message seems to be one of seizing opportunity as well as implementing, or at least intending to implement, a deliberate strategy.

In the next chapter, we describe the different approaches that countries are taking on the connected health journey and assess their progress to date.
2. Progress Toward Connected Health
2. Progress Toward Connected Health

In this report, we focus specifically on the development of connected health in eight countries: Australia, Canada, England, France, Germany, Singapore, Spain and the United States. We have studied in depth the progress toward connected health in these countries through a mix of qualitative and quantitative interviews, reviews of published data and case studies of leading practice. We chose these countries because they all face similar challenges around how to improve quality, secure access and control cost—and, as is evident from the healthcare information technology strategies in place, they all look to healthcare IT as a critical means of addressing these challenges and are progressing quickly in its adoption.

During our study, we examined how these countries, with their very different health systems, are progressing in setting up connected health networks and systems, and how they are using the functionalities of connected health to support the growth of integrated care. In some countries, progress is more uniform on both fronts—connected health and integrated care—than in others; in other countries, there are great differences in the progress made in different regions or subsystems. All eight countries have chosen their own pathways for developing connected health. Each is at a different stage of the journey and is proceeding in its own individual manner. While it is difficult to place them definitively on a continuum of progress or to draw definitive normative judgments of success, we certainly can identify patterns of progress emerging within and across the countries.

This chapter provides an overview of the progress toward connected health in each of the eight counties and briefly contextualizes our findings against examples of global leading practice in other countries.
National approaches to connected health

The national approaches taken to develop connected health differ from country to country, although there are also significant levels of commonality. The approaches range from countries taking a “whole system” approach and seeking to execute high levels of control over the development of nationwide solutions, to countries in which development is “locally led” and connectivity is achieved from the bottom up. In the middle of these contrasting approaches is a “middle-out” approach, where central government provides an overarching strategic direction but the solutions are developed locally.
Below is a brief overview of the connected health approaches in the eight countries we have studied, grouped under the three broad clusters: whole system, middle-out and locally led.

- **Whole system**: Singapore and England initially have focused on development of a single solution for HIE, underpinned by a national EHR system. They have channelled large amounts of funding into a single body with responsibility for developing the solution and driving its adoption across the health system. While Singapore is progressing according to plan, the English National Programme for IT (NPfIT) has encountered great difficulty. As a result, the current strategy in the English National Health Service has been altered to one that seeks local solutions rather than a single nationally imposed system.

- **Middle-out**: In Canada, Germany, Australia and France, a national strategy has set the overarching direction for development of connected health but without building and imposing a national solution. Professor Enrico Coiera of the University of New South Wales has termed this the “middle-out approach” — a third way between the top-down approach which had characterized the NPfIT in England and the bottom-up approach of HIEs in the United States. In these countries, local political bodies such as regional authorities and/or individual organizations design and develop solutions in line with a national strategic framework for greater connectivity and centrally defined interoperability standards.

- **Locally led**: The United States and Spain, both of which have highly decentralized health systems, have adopted approaches that rely heavily on local innovation as core to a national strategy. Independent provider organizations or local health networks in the US and regional bodies in Spain develop their own local strategies and systems in a “bottom-up” fashion. To encourage health information exchange, the federal government in the United States and the central government in Spain are working toward developing a national set of standards for interoperability within and between systems.

These eight countries have also opted for quite different HIE solutions or architectures. Each solution is unique, but can be classified against three different models for the exchange of clinical data:

- **The centralized model**: In this model, also called the warehouse model, patient medical data is collected from local sources but stored in a central repository. All information exchanges are routed through the central repository.

- **The federated model**: In this model, also called the decentralized model, individual organizations or sub-systems have control of the healthcare record. The individual systems are linked through record locator services that enable them to exchange information.

- **The hybrid model**: This model is a mix of the centralized and federated architecture. The patient medical data is usually stored and managed at organizational or regional levels, but information exchange is enabled through a central hub.

In practice, however, the distinction between the three models is not clear-cut, and there are vague areas between the categories.
<table>
<thead>
<tr>
<th>Country</th>
<th>Approach</th>
<th>Headlines</th>
<th>Funding</th>
<th>Standards</th>
<th>Enablement/Incentives</th>
<th>Architecture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>Middle out</td>
<td>Plans for a personally controlled EHR by 2012</td>
<td>Mix of funding from federal, state and territory</td>
<td>National body, NEHTA, is taking a lead in developing standards</td>
<td>Practice incentive payment program</td>
<td>Hybrid</td>
</tr>
<tr>
<td>Canada</td>
<td>Middle out</td>
<td>Goal for a pan-Canadian EHR by 2016, but as yet progress is limited</td>
<td>Significant national funding through the coordinating body, CHI, coupled with state and territory funding</td>
<td>Standards in place, but not universally used</td>
<td>Incentives largely through reimbursement</td>
<td>Federated</td>
</tr>
<tr>
<td>England</td>
<td>Whole system, until recently. Now moving to a locally-led approach</td>
<td>Plan initially focused on single build system, but England is now adopting a new strategy based on a staged-delivery model</td>
<td>Main funding into single coordinating body, but now likely to be decentralized</td>
<td>Standards in place set by the Department of Health</td>
<td>Quality and outcome incentives for GP Healthcare IT adoption</td>
<td>Originally centralized model, but moving to decentralized</td>
</tr>
<tr>
<td>France</td>
<td>Middle out</td>
<td>Recent re-launch of the Dossier Medical Personnel with a 3 year phase of extensive deployment</td>
<td>Boosted national funding provides the foundation for new momentum</td>
<td>Current lack of common set of standards</td>
<td>Incentives largely through reimbursement</td>
<td>Hybrid</td>
</tr>
<tr>
<td>Germany</td>
<td>Middle out</td>
<td>Following recent strategy re-fresh, the national electronic health card is to be rolled out with fewer mandated functionalities</td>
<td>Mix of federal budgets and contributions from health insurance funds</td>
<td>Standards in the process of development</td>
<td>Incentive program in place for primary and secondary care</td>
<td>Federated</td>
</tr>
<tr>
<td>Singapore</td>
<td>Whole system</td>
<td>Phase 1 of National EHR deployed in April 2011; subsequent phases not yet fully defined</td>
<td>Main funding into a single coordinating body, MOHH</td>
<td>Standards in place set by MOHH</td>
<td>Enablement scheme for GP adoption</td>
<td>Centralized</td>
</tr>
<tr>
<td>Spain</td>
<td>Locally-led</td>
<td>Some regions are world leaders in Healthcare IT, but variation in HIE across regions remains a challenge</td>
<td>Main funding from the largely autonomous regions</td>
<td>Minimum standards for interoperability set out by the Ministry of Health</td>
<td>Incentives in place but varies across regions</td>
<td>Federated</td>
</tr>
<tr>
<td>US</td>
<td>Locally-led</td>
<td>Uptake expected to increase with MU incentives, but as yet too early to see specific signs of success</td>
<td>Federal level ARRA stimulus funding coupled with statewide or organizational investments</td>
<td>National body, ONC, is taking a lead in developing standards</td>
<td>Incentives and penalties based on &quot;meaningful use&quot; criteria</td>
<td>Varies across different networks and systems</td>
</tr>
</tbody>
</table>
Connected health progress

The journey from healthcare IT adoption through health information exchange to insight driven healthcare is not a linear one. Each of the countries Accenture studied has made advances in each of the different stages simultaneously and on an iterative basis.

To assess progress toward connected health across the eight countries, we conducted interviews with health system leaders in each, including government officials, clinicians, payers, commissioners, healthcare IT executives and academics. We also surveyed 500 physicians in each country (200 in Singapore) to examine the prevalence and use of connected health functionalities and to gain their perspectives on the key benefits and obstacles to connected health development.

In the next section, we review the progress countries are making against the three stages of the connected health journey.

Stage 1: Healthcare IT adoption

Over the past few decades, technology has dramatically changed how healthcare is delivered around the world. Today, there are very few physicians—if any—who have not changed some of their ways of working as a result of the introduction of new healthcare information technologies. The extent to which actual EMR systems are in place and being used, however, varies significantly across and within the countries.

The results of our physician survey show that while many national or regional health systems have several connected health functionalities in place and routinely in use across the system, no country has developed all of the functionalities fully. We find no single pathway to connected health development. As shown in Table 2, however, the most frequently used functionalities within the connected clinical practice are electronic recording of patient notes and electronic tools to reduce the administrative burden of delivery. Basic decision support tools such as e-reminders and alerts are used relatively widely too, in particular within primary care in England and Australia. More advanced clinical decision support systems (CDSS) are used far less frequently; with the exception of Singapore and Spain, less than 20 percent of physicians across primary and secondary care stated they use this functionality. Considering as a group the four functionalities of connected clinical practice, healthcare IT adoption levels in primary care are higher than in secondary care, except in Germany, Singapore and the US, where they are closely aligned.

Looking at the eight countries' progress on healthcare IT adoption as a whole, there is still some way to go before physicians across primary and secondary care fully adopt healthcare IT within their practices. Considering the four functionalities together, adoption levels range from only 15 percent (among secondary care providers in England) to slightly more than 60 percent (primary care physicians in Australia and England). In comparison, nearly all Scandinavian primary care physicians use the full clinical functionality of their EMR, and most of their hospitals have a "semi-electronic health record" which retrospectively collects key patient clinical data.
Table 2: Healthcare IT functions used within the practice
Accenture survey question: How often do you perform the following functions?

- Results show percentage of physicians that use “routinely.”
- Note: 1= Primary care; 2= Secondary care. Purple shows the lowest score, Green shows the highest score across all eight countries for each of the functions.

<table>
<thead>
<tr>
<th>Healthcare IT functionalities</th>
<th>Australia</th>
<th>Canada</th>
<th>England</th>
<th>France</th>
<th>Germany</th>
<th>Singapore</th>
<th>Spain</th>
<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td>My organization uses electronic tools to reduce the administrative burden for delivering healthcare (e.g. e-scheduling or e-billing)</td>
<td>70%</td>
<td>44%</td>
<td>53%</td>
<td>47%</td>
<td>47%</td>
<td>25%</td>
<td>57%</td>
<td>57%</td>
</tr>
<tr>
<td>I enter patient notes electronically either during or after consultations</td>
<td>87%</td>
<td>26%</td>
<td>42%</td>
<td>29%</td>
<td>91%</td>
<td>16%</td>
<td>86%</td>
<td>47%</td>
</tr>
<tr>
<td>I receive electronic alerts/reminders while I am seeing my patients (e.g. prompts regarding contraindications or preventative care)</td>
<td>68%</td>
<td>12%</td>
<td>20%</td>
<td>13%</td>
<td>84%</td>
<td>7%</td>
<td>38%</td>
<td>16%</td>
</tr>
<tr>
<td>I use computerized clinical decision support systems to help make diagnostic and treatment decisions while I am seeing my patients (e.g. real-time access to evidence-based practice guidelines)</td>
<td>22%</td>
<td>12%</td>
<td>18%</td>
<td>11%</td>
<td>28%</td>
<td>13%</td>
<td>18%</td>
<td>18%</td>
</tr>
<tr>
<td>Healthcare IT adoption—average</td>
<td>62%</td>
<td>24%</td>
<td>33%</td>
<td>25%</td>
<td>63%</td>
<td>15%</td>
<td>50%</td>
<td>35%</td>
</tr>
</tbody>
</table>

Note: 1=Primary care; 2=Secondary care. Purple shows the lowest score, Green shows the highest score across all eight countries for each of the functions.

N=3727
The ability to generate patient registries is often seen as a proxy measure for the impact on quality of care. We asked physicians if their organizations were able to generate a number of registries electronically using their healthcare IT systems. On average, across the eight countries, we learned that approximately 60 percent of respondents were able to generate a list of medications taken by their patients and a list of patients by specific condition/diagnosis; and approximately 45 percent could generate a list of patients by lab result and patients who are due for tests. In addition, approximately a third of respondents were able to generate data on clinical quality of care. In each case, however, as Table 3 shows, there is significant variation across countries.

Table 3: Ability to generate registries and quality of care data

Accenture survey question: Are you able to generate the following electronically using your organization’s healthcare information technology systems?

<table>
<thead>
<tr>
<th></th>
<th>Australia</th>
<th>Canada</th>
<th>England</th>
<th>France</th>
<th>Germany</th>
<th>Singapore</th>
<th>Spain</th>
<th>US</th>
<th>Survey Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>List of medications taken by patients (including those prescribed by other doctors)</td>
<td>59.7%</td>
<td>48.4%</td>
<td>65.5%</td>
<td>56.4%</td>
<td>64.3%</td>
<td>69.6%</td>
<td>74.7%</td>
<td>65.3%</td>
<td>62.5%</td>
</tr>
<tr>
<td>Lists of patients by specific condition/diagnosis</td>
<td>60.9%</td>
<td>42.2%</td>
<td>67.1%</td>
<td>46.2%</td>
<td>75.2%</td>
<td>61.8%</td>
<td>58.3%</td>
<td>57.4%</td>
<td>58.4%</td>
</tr>
<tr>
<td>List of patients by lab result</td>
<td>47.7%</td>
<td>35.2%</td>
<td>61.2%</td>
<td>30.7%</td>
<td>55.0%</td>
<td>59.8%</td>
<td>41.5%</td>
<td>42.4%</td>
<td>45.7%</td>
</tr>
<tr>
<td>Lists of patients who are due for tests (e.g. mammogram) or preventative care (e.g. vaccinations)</td>
<td>44.9%</td>
<td>24.2%</td>
<td>54.9%</td>
<td>31.5%</td>
<td>62.1%</td>
<td>59.3%</td>
<td>49.3%</td>
<td>40.6%</td>
<td>44.8%</td>
</tr>
<tr>
<td>Data relating to clinical quality of care measures</td>
<td>31.7%</td>
<td>18.2%</td>
<td>56.7%</td>
<td>21.3%</td>
<td>30.4%</td>
<td>52.0%</td>
<td>31.5%</td>
<td>42.4%</td>
<td>34.3%</td>
</tr>
</tbody>
</table>

N=3727
Stage 2: Health information exchange

Compared to healthcare IT adoption across the countries surveyed, health information exchange with practitioners in other organizations is far less advanced across the board.

Table 4 shows the extent to which key HIE functionalities—connecting to clinicians in other organizations—are used across primary and secondary care. Of the countries surveyed, Spain is most advanced in the use of these connected health functionalities. While HIE varies significantly across Spain’s largely autonomous regions, overall slightly more than half of Spanish primary care physicians surveyed use HIE functions, in particular order requests, receipt of clinical results and referrals. Nearly half of primary care physicians in England connect with clinicians in other organizations, while those in Canada, France and Germany are far less advanced in their use of HIE functionalities, particularly when it comes to e-prescribing and e-notifications across the system. In secondary care, HIE is most prevalent in Spain, Singapore and the US and less advanced in Australia, Canada, France and Germany. Based on our wider research, it would appear that in all eight countries the use of HIE functionalities is still relatively limited and trailing far behind global leaders such as Denmark, Hong Kong and New Zealand.
Table 4: HIE functions used to connect with other practitioners

Accenture survey question: How often do you perform the following functions?

- Results show percentage of physicians that use “routinely.”
- Note: 1= Primary care; 2=Secondary care. Purple shows the lowest score, Green shows the highest score across all eight countries for each of the functions.

<table>
<thead>
<tr>
<th>HIE functionalities</th>
<th>Australia 1</th>
<th>Canada 1</th>
<th>England 1</th>
<th>France 1</th>
<th>Germany 1</th>
<th>Singapore 1</th>
<th>Spain 1</th>
<th>US 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>I communicate electronically with clinicians in other organizations (e.g. secure email)</td>
<td>15%</td>
<td>35%</td>
<td>12%</td>
<td>28%</td>
<td>32%</td>
<td>47%</td>
<td>29%</td>
<td>35%</td>
</tr>
<tr>
<td>I am electronically notified of my patients’ interactions with other health organizations (e.g. hospital admissions)</td>
<td>24%</td>
<td>6%</td>
<td>14%</td>
<td>11%</td>
<td>41%</td>
<td>9%</td>
<td>11%</td>
<td>13%</td>
</tr>
<tr>
<td>I electronically send or receive referrals to/from health professionals in other organizations (e.g. specialist appointments)</td>
<td>20%</td>
<td>12%</td>
<td>16%</td>
<td>16%</td>
<td>52%</td>
<td>19%</td>
<td>17%</td>
<td>21%</td>
</tr>
<tr>
<td>I have electronic access to clinical data about a patient who has been seen by a different health organization (e.g. hospital, laboratory)</td>
<td>24%</td>
<td>28%</td>
<td>27%</td>
<td>34%</td>
<td>51%</td>
<td>31%</td>
<td>23%</td>
<td>36%</td>
</tr>
<tr>
<td>I electronically send prescriptions to pharmacies (e-Prescribing)</td>
<td>6%</td>
<td>3%</td>
<td>10%</td>
<td>7%</td>
<td>11%</td>
<td>14%</td>
<td>5%</td>
<td>17%</td>
</tr>
<tr>
<td>I receive clinical results electronically that populate my patients’ electronic medical record</td>
<td>84%</td>
<td>40%</td>
<td>35%</td>
<td>37%</td>
<td>90%</td>
<td>38%</td>
<td>61%</td>
<td>43%</td>
</tr>
<tr>
<td>I electronically send order requests (e.g. lab, radiology or diagnostic tests) to other health organizations</td>
<td>28%</td>
<td>17%</td>
<td>14%</td>
<td>22%</td>
<td>46%</td>
<td>43%</td>
<td>12%</td>
<td>21%</td>
</tr>
<tr>
<td>Health information exchange—average</td>
<td>29%</td>
<td>20%</td>
<td>18%</td>
<td>22%</td>
<td>46%</td>
<td>29%</td>
<td>23%</td>
<td>27%</td>
</tr>
</tbody>
</table>

Note: 1=Primary care; 2=Secondary care. Purple shows the lowest score, Green shows the highest score across all eight countries for each of the functions.

N=3727
Stage 3: Insight driven healthcare
As the eight countries are still in the relatively early stages of their connected health journey—and most are still building momentum around their strategies—it is perhaps unsurprising that insight driven healthcare is as yet also patchy, in particular when it comes to how healthcare IT is used to optimize value in the wider system.

At present, most value from HIE is harvested at the organizational level. As shown in Figure 9, physicians who share patient data do this mainly within their own organization to improve clinical care processes and clinical outcomes. Across all the eight countries surveyed, nearly 70 percent of physicians state that this is the case—a number that rises to more than 80 percent for England, Spain and Germany. Clinical data is shared far less for the purposes of system wide improvement or population health reporting and disease management. Singapore, Spain and England are leading the field in this regard, each with nearly 70 percent of physicians from primary and secondary care stating that they share patients’ clinical data with other organizations, including public health authorities, to improve protocols and patient care across the system and for population health reporting and disease management.

Figure 9: The purposes for which clinical data is shared, by country
Accenture survey question: To what extent are the clinical patient data you collect electronically used in the following ways?

Note: chart shows the percentages of physicians across primary and secondary care who stated they share clinical data “to a great extent” or “to some extent.”

N= 3727
One of the key means of creating value with connected health is through analytics: using aggregated clinical data to identify need or opportunities for the management and improvement of administration, clinical processes and public health. To enable sophisticated analytics, individual patient data needs to be systematically collected and stored in a format that is easily accessible and enables interrogation. This in turn, requires data to be entered in a structured, ideally coded, way. To shed light on the extent to which the eight countries are able to apply analytics to drive improvements, we asked physicians to indicate how they currently enter data in their medical record systems.

As shown in Figure 10, most data is collected in either an unstructured or somewhat structured format. With the exception of England and Singapore, less than one quarter of respondents enter their patient data in a coded format. There is still much to be done before any of the eight countries as a whole will be able to apply analytics to the extent we see among the world national leaders or among subsystems within some countries. New Zealand, for example, has an electronic population health index—a system that includes a comprehensive database of nearly 20 years of health data. Along with the more recently introduced health practitioner index, this rich data has informed public policy decisions and enabled advanced health research to contribute to clinical and administrative improvements. Similarly, in the US, the integrated healthcare provider Intermountain has an enterprise data warehouse that contains 30 years of medical records. Using this knowledge base, it is able to support the aggregation and analysis of clinical outcomes related to patients and the care provided across the system.

Figure 10: How patient data is currently entered in the system: Accenture physician survey

Accenture survey question: Please indicate which statement most closely describes how you currently enter data in your electronic system.

![Data entry survey chart]

N= 3727
Physicians’ perception of benefits
As part of our survey, we asked physicians to give their perspectives on the benefits of connected health systems. Figure 11 summarizes their responses.

Although all eight countries are at a relatively early stage on their connected health journey, there is clearly a real appetite for change among physicians. It is notable that internationally more than 60 percent of providers expect improvements in patient outcomes, diagnostic accuracy, treatment decisions, medical error rates, cross-processes, care coordination and data availability for research.

Figure 11: Perceived Benefits of EMR/HIE: Accenture physician survey
Accenture survey question: To what extent is the use of electronic medical records and health information exchange enabling the following benefits? Chart shows percentage of respondents answering positively, negatively, no impact or don’t know?

N= 3727
The survey compared the extent to which physicians use the 12 different functions of healthcare IT adoptions and HIE with their perception of the benefits. The results showed that physicians who are routine users of a wider range of healthcare IT functions have a more positive attitude toward the benefits these technologies bring. The survey shows that, on average across all the countries, as physicians start to use more functionalities, the more positive they are about the benefits. Eighty-seven percent of physicians using between nine and 12 functionalities on a routine basis believed there to be positive benefits from using healthcare IT.

Figure 12: Comparison of use and perceived benefits of healthcare IT*

Accenture survey question: To what extent is the use of electronic medical records and health information exchange enabling the following benefits? Chart shows percentage of respondents answering positively, negatively, no impact or don't know.

The survey compared the extent to which physicians use the 12 different functions of healthcare IT adoptions and HIE with their perception of the benefits. The results showed that physicians who are routine users of a wider range of healthcare IT functions have a more positive attitude toward the benefits these technologies bring. The survey shows that, on average across all the countries, as physicians start to use more functionalities, the more positive they are about the benefits. Eighty-seven percent of physicians using between nine and 12 functionalities on a routine basis believed there to be positive benefits from using healthcare IT.

*Functions include four 'connected to clinical practice' functions, seven 'connected to clinicians in other organizations' and one function related to 'connections to patients'.
Interestingly, but not surprisingly, physicians under the age of 50 were far more likely to believe that healthcare IT and HIE have a positive impact than were those aged over 50. There was a statistically significant contrast in attitudes among doctors over and under 50 years of age. Our survey found that doctors under 50 are more likely to believe that healthcare IT has a positive impact across a wide range of perceived benefits, including improved health outcomes for patients, increased speed of access to health services and reductions in medical errors. More than 72 percent of doctors under 50 think EMR and HIE will improve care coordination across settings and service boundaries. And, 73 percent believe these technologies will offer better access to quality data for clinical research. These numbers vary, however, for doctors over 50—only 65 percent and 68 percent respectively perceive the same benefits.

Figure 13: Comparison of perception of benefits among physicians that are under the age of 50 and those over the age of 50

- Reduced risk of litigation
- Increased speed of access to health services for patients
- Reduced numbers of unnecessary interventions/procedures
- Improved diagnostic decisions
- Improved health outcomes for patients
- Improved quality of treatment decisions
- Improved cross-organizational working processes
- Improved coordination of care across care settings/service boundaries
- Reduction in medical errors
- Better access to quality data for clinical research

N= 3727
The Accenture Connected Health Maturity Index

Our international research—including the many in-depth interviews with healthcare IT experts and the quantitative survey of 3,700 physicians—shows a rich tapestry of connected health initiatives in all of the eight countries studied in depth. While the countries are progressing in different ways and at different paces, the overall picture shows most of the countries still at a relatively early stage of their connected health journey, especially when it comes to the electronic exchange of information across the system.

Based on physicians’ indications of use of different healthcare IT and HIE functionalities, we have developed the Accenture Connected Health Maturity Index. The index is based on analysis of two elements:

- Progress related to healthcare information technology adoption and use. This analysis is based on the extent to which physicians make use of four key healthcare IT functionalities within their practices: administrative tools, electronic entering of patient notes, electronic alerts/reminders and computerized decision support systems. For each country, the average frequency of use score across these four functionalities is mapped across the x-axis.

- Progress related to health information exchange. This analysis is based on the extent to which physicians make use of seven key HIE functionalities to connect with clinicians in other organizations: electronic communications, e-notifications, e-referrals, e-access to clinical data about patients seen by a different organization, e-prescribing, receipt of clinical results to populate patients’ EMRs and electronic order requests. For each country, the average frequency of use score across these seven functionalities is mapped on the y-axis.

Figure 13 sets out the index for primary care in each of the eight countries. Overall, Spain is leading the field with an index score of 58 for healthcare IT use and 52 for connected health use. Healthcare IT adoption among primary care physicians in England and Australia is slightly ahead of Spain but HIE is less advanced, in particular in Australia. In the middle of the primary care field are France, Germany and the United States, although the general picture of lower levels of HIE is repeated. Finally, the take-up of healthcare IT and HIE is the lowest among primary care physicians surveyed in Singapore and Canada.
Within secondary care, healthcare IT adoption and HIE is generally less mature than in primary care as is shown in Figure 15. In England, this gap between primary and secondary care is particularly great: the country has the lowest scores when it comes to healthcare IT adoption in secondary care although HIE maturity is close to the levels of France and Germany. HIE among secondary care physicians in Canada and Australia is the lowest among the countries surveyed. As is the case in primary care, Spain is also leading the field in secondary care, although the US and Singapore are not far behind.

The sidebar provides a brief snapshot of each country’s progress in relation to healthcare IT adoption and HIE. While all countries are making progress, some are more advanced than others. However, most of the countries in our survey lag behind world leaders such as Denmark, Sweden and New Zealand, where nearly all primary care physicians use the full clinical functionality of their EMR, and most of their hospitals have a “semi-electronic health record” which collects key patient clinical data.

Figure 15: Connected Health Maturity Index—Secondary care
How countries are progressing in connected health: a snapshot

- With strong vision and leadership from national and regional governments and a pragmatic approach to systems development, Spain has achieved widespread adoption of electronic medical records (EMR) and a good level of health information exchange (HIE) across many of its regions. The challenge is to make this good practice consistent across all regions and achieve interoperability at the national level.

- England's National Programme for IT (NPfIT) was cancelled in 2011, but has nevertheless achieved some success over the last few years, including the creation of NHS broadband network (N3), the picture archiving and communication system (PACS), and patient records transfer between primary care practices. Further progress has been hampered by the failure of NPfIT to deliver the new integrated secondary care (hospital) EMR solutions. This failure has meant that most hospital trusts have an ailing patchwork quilt of systems, and connectivity across care settings is limited.

- In the US, there is significant variation in healthcare IT adoption levels across different states, networks and care settings. The level of health information exchange is generally low and occurs primarily within single organizations or networks, rather than across different organizations and settings. Large Integrated delivery networks are at an advantage as compared to smaller hospital systems and private physician practices, though the meaningful use incentives should stimulate wider progress.

- In Singapore, healthcare IT and HIE are more advanced in the secondary (public) setting. The national electronic health record, launched in 2011, will initially be used by a subset of public sector providers including acute hospitals, polyclinics and community hospitals. However, the government is committed to extending the use of the EHR to private sector general practitioners over time.

- In Australia, healthcare IT adoption varies significantly across different care settings, states and territories. The rate of uptake and use of healthcare IT among specialists and hospital clinicians is lower than that of general practitioners. Although there are pockets of good practice, health information exchange across sectors is still limited largely due to the somewhat fragmented nature of the health system. New initiatives like the Personally Controlled Electronic Health Record (PCEHR) and support from the National e-Health Transition Authority (NEHTA) will provide a stronger foundation for HIE going forward.

- In Canada, the extent to which healthcare IT is used across primary and secondary care is limited, though adoption is slightly more advanced in primary care than in secondary care. All provinces have agreed to a common EHR architecture, and there is a goal to create a pan-Canadian EHR by 2016. At present, though, the level of HIE across organizations and care settings is generally poor; HIE is often confined to a single hospital, a network of hospitals, or regional health authority or unit. Across this general picture of HIE, there are good examples of progress in some provinces.

- Healthcare IT adoption in France offers a mixed picture. Generally, the large urban regions are making faster progress than more rural and sparsely populated regions. GPs and small rural hospitals tend to lag behind the large urban hospitals. The national rollout of the Dossier Medical Personnel (DMP)—a voluntary, lifelong shared electronic health record—will form the cornerstone of the country’s connected health architecture, linking up with the existing electronic insurance card system already used by patients and practitioners.

- Use of healthcare IT within primary and secondary care settings is widespread in Germany, but mainly focused on administrative rather than clinical processes. Overall, the extent to which health information is shared across the system is relatively limited in both primary and secondary care settings. It is hoped that the electronic health card will set the foundation for greater HIE, especially if patients buy into the scheme and opt for the voluntary components that offer greater potential to foster stronger health information exchange.
3. Overcoming the Challenges
3. Overcoming the Challenges

While we have seen in the last chapter that all the countries in our study are proceeding on the journey to connected health, significant barriers and challenges continue to hinder progress. In discussions with health system leaders, we discovered that many of these challenges are common across the countries, though the level of impact may vary depending on the context and the stage of connected health development that a system has reached.

We categorize the challenges in four groups that relate to systems and policies, organization and management, clinicians and end users, and patients and the public. Many of the challenges are interrelated and some are common across different groups. For example, the misalignment of incentives for healthcare IT adoption and use is a system-wide issue that may require policy change, but it is also of huge concern to individual clinicians whose remuneration may be affected.

Our international survey confirms that physicians perceive the No. 1 challenge as cost to the organization. Indeed, some clinicians and managers believe that the costs of constructing healthcare IT systems and (perhaps even more expensive) managing the organizational and cultural changes that are required to get the most value from them are too high. This may be the case especially where the value or benefits that accrue in the earlier stages of development are seen as too limited or too distant. However, recent research on the impact of electronic health record (EHR) initiatives in a number of European countries found that investment in healthcare IT rarely exceeded 2 percent of organizations’ annual budget, suggesting affordability may not be an insurmountable barrier.

Health service organizations around the world are attempting to overcome the various challenges using a range of tools. These include strategic planning and change management, creative approaches to communication and stakeholder engagement, clinical healthcare IT governance and policy development, legislative changes, financial incentive mechanisms and monitoring systems that provide an evidence base for further connected health investment.

At the national or regional level, the experiences of many of the early adopters of EMR show what sorts of government actions can help systems and institutions overcome some of the major barriers to connected health and achieve tangible benefits. These include financial subsidies, enabling data protection legislation, technical support and designated coordinating bodies. Though critical success factors will depend on the context of each health system, lessons from other countries and health systems provide valuable learning.

In this chapter, we describe these challenges alongside examples of health systems that have acted to overcome them and, by doing so, moved a step closer to realizing the benefits of connected health.
Summary of challenges: System and policies

- Lack of coherent strategies linking healthcare IT investments to desired health outcomes.
- Balancing central leadership and local flexibility.
- Lack of an investment climate, exacerbated by the financial crisis.
- Misaligned incentives and payment systems that reward quantity rather than quality and efficiency.
- Fragmentation and lack of coordination in healthcare delivery.
- Lack of commitment to standards that enable interoperability across the health system.
- Infrastructural constraints (variances in network bandwidth, for example).
- Lack of structured clinical data for secondary uses.

Systems and policies

Lack of coherent strategies linking healthcare IT investments to desired health outcomes

The existence of a central vision and strategic plan for connected health, either at national or regional level, is a critical enabler of change. However, it is very important that the healthcare IT vision and strategy should not focus solely on information and communications technology but rather be part of a broader vision for healthcare. It is essential that healthcare IT investments are centered on improving health outcomes and are coordinated with other key strands of associated public service delivery (such as social and long-term care).

This broader vision needs to be communicated clearly and convincingly to all stakeholders to secure their buy-in. If, instead, key stakeholders are led or allowed to believe that healthcare IT is just about technology—rather than about improving health outcomes, quality of care, access and cost management—the evidence is that many will be reluctant to buy into it. England's National Programme for IT, for instance, was initially viewed as technology-centric rather than an outcome oriented program, and struggled to gain clinician and end user buy-in as a result. In Australia, by contrast, the government has developed and communicated a clear vision and set out the journey—what one expert called a "generational change in terms of healthcare delivery"—to achieve desired health outcomes. The e-health strategy launched in Australia in 2008 explicitly supports wider health reform goals of greater collaboration, coordination, quality and equitable access to care. Similarly, in France, the government has embarked on a number of reforms that aim to deliver more cost-efficient, integrated care, with healthcare IT as an essential enabler of change. In Spain, the e-health strategy is just one component of a much broader national quality plan for healthcare, which sets the direction for health service development across the country, working to high-level outcome targets and encouraging a range of changes.

"Not all the parties involved know what the goal is. Transparency is required to make the process work and the strategy needs to be clearly communicated."

− German health industry executive

Balancing central leadership and local flexibility

As we saw in the last chapter, many countries have implemented national strategies to drive and coordinate healthcare IT implementation. However, in some cases, national strategies and targets do not align well with local needs and resources. Some health leaders also noted that innovation could be stifled if local governments are not flexible and receptive to new ideas.

"You need to get the framework right at a national level, and then you allow local scope."

− Frances Blunden, Senior Policy Manager, NHS Confederation, England

Some national governments are addressing this issue by setting a national strategy or mandating national standards but at the same time allowing sufficient flexibility for regions or local institutions to take their own approaches to development of healthcare IT systems. In Scotland, for instance, the central government’s eHealth Directorate has worked with local organizations to create a “bottom-up” vision for connected health focused around outcomes that can be achieved through convergence of technologies. The directorate
provides central guidance on reference architecture and standardization to the local health boards, but it does not impose this as mandatory. The shared vision for connected health is sufficient in driving the standardization required for incremental interoperability between organizations.

Similarly, Canada Health Infoway (CHI), the federally funded coordinating body, has a mandate to develop a shared vision of a pan-Canadian electronic health record (EHR), but each of the provinces and territories has its own e-health organization setting the local agenda for e-health and driving healthcare IT developments. In the United States, the Office of the National Controller (ONC) is charged with setting the strategy and goals for connected health, implementing the Health Information Technology for Economic and Clinical Health (HITECH) Act, and establishing a framework for standards and interoperability. While, the American healthcare IT experts surveyed highly commend the work of the ONC, they recognize too that progress needs to be driven at the local level.

"The ONC has articulated the view that the role of the federal government is to set standards, set broad directions in policy and set reimbursement incentives, and not to micromanage incentives of any of those things."

–Mark Smith, President and CEO, California Health Care Foundation, United States

Lack of investment climate
Supplemental funding for healthcare IT implementation, ideally linked directly to health outcomes, is vital to the development of connected health in many countries. Research shows that in countries where healthcare IT adoption is high, the government has heavily subsidized infrastructural investments. However, in the current financial climate, making the case for sustained investment in healthcare IT is now more difficult than ever.

"Some organizations are seizing on these levels of austerity by looking at IT systems to make them more efficient. Unfortunately, some other organizations are actually just cutting funding in back office functions and IT and not investing."

–Phil Corrin, Deputy Director of Health Informatics, St Helens & Knowsley Teaching Hospitals NHS Trust, England

Recurring public budgets dedicated to connected health development are the exception at present; project-based financing is far more widespread.

Nevertheless, we have seen that, faced with severely constrained resources, some countries and systems have made great progress in developing connected health, especially in comparison to others that have spent much more for less success. Some health systems, such as Madrid, Lombardia (Italy), Singapore and Hong Kong, are achieving connected health by building on existing systems, avoiding the need for more costly systems re-engineering. In Madrid, for example, health information exchange has been enabled without the need for any fundamental systems redesign or configuration. By building an "integrated clinical information viewer" on top of existing systems, clinicians have a means to access patient data from primary and specialist care settings. In this way, Madrid has been able to develop its own tailored HIE infrastructure to improve access and make services more responsive to people's needs, without the need to build a costly new technology infrastructure.

Other health systems are managing cost constraints by taking an incremental approach to development. Indiana Health Information Exchange, for example, began with the development of basic public health monitoring and reporting services. This established relationships and technical connections with Indiana hospitals, laboratory and pharmacy services that later served as a framework for building and expanding its services. Similarly, the Hong Kong Hospital Authority (HKHA) has created a wide range of successful HIE tools, based on homegrown systems, developed module-by-module. Beginning with simple clinical support modules (including a discharge summary), over time, HKHA added appointment booking, laboratory, radiology and referral modules. Over the last 20 years, it has spent less than $350 million on healthcare IT (principally a clinical management system and electronic patient record system), yet has achieved great success in improving physicians' work flow efficiency, reducing hospital readmissions, medical errors and wait times for treatment, and enabling enterprise-wide analytics for population health management and disease surveillance purposes.

Misaligned incentives and payment systems that reward quantity rather than quality and efficiency
In most countries, the challenge is not simply investing initially in infrastructure or systems development but in achieving a longer-term realignment of costs and benefits that will ensure connected health initiatives are financially sustainable. Many studies have shown that it is payers who are the main beneficiaries of connected health (due to the reduction in redundant tests, fewer readmissions and so on). Yet it is generally hospitals and physicians that are expected to fund the implementation and support of clinical IT systems.

A willingness to differentially reward improved quality of care and efficiency is central not only to future sustainability but also to shared reaping of benefits from the investments made. In many countries, though, current physician payment schemes (for example, those based on fee for service) do not provide the appropriate incentives.
"There is a recognized need to change payment models for health care providers – one that focuses on quality as opposed to quantity. At the end of the day in a lot of ways, technology becomes the easy part. It’s policies, it’s standards and change in the ways things are being done that become the bigger challenges."
– Daniel Porreca, Executive Director HEALTHeLINK, United States

"The main barrier is the lack of incentive for connected health and, in many cases, a disincentive. For example, connected health between doctor and patient in actively managing disease, if done through portal or electronic messaging, a lot of those things may not be paid for today. If I decrease the number of office visits by patients, I’ve not only made a large investment in technology, but I’m also cutting revenue."
– US health system leader

As our physician survey shows, only approximately one in five physicians, on average, receive incentives for proactively managing patients with chronic conditions (though the numbers range from just 11 percent in the US to 44 percent in Singapore), less than 20 percent for using healthcare IT to achieve clinical quality of care targets or enhanced preventative care, and only 10 percent or less for coordinating care with other organizations or for conducting non-face-to-face consultations. However, the majority of physicians surveyed said that they would be more likely to use healthcare IT if they were incentivized to do so—for example, by coordinating care with other health providers (70 percent of respondents said they were very or fairly likely to use healthcare IT to do this); for providing preventative care (64 percent); for proactively managing patients with chronic conditions (62 percent); and for offering non-face-to-face interactions with patients, for example via email or telephone (57 percent).

Our physician survey shows that only approximately one in five physicians, on average, receive incentives for proactively managing patients with chronic conditions, less than 20 percent for achieving clinical quality of care targets or enhanced preventative care, and only 10 percent or less for coordinating care with other organizations or for conducting non-face-to-face consultations.
Financial incentives for using healthcare IT

Figure 16: Financial incentives for using healthcare IT

Accenture survey question: Do you receive any financial support or incentives to use healthcare information technology in relation to:

- Proactively managing patients with chronic conditions (e.g. diabetes, asthma)
- Achieving specific clinical quality of care targets
- Providing enhanced preventative care
- Coordinating care with other health provider organizations
- Non face to face interactions with patients (e.g. via email or telephone)

N=3,727

Some health systems are compensating physicians for new models of care delivery. In Denmark, for example, the government introduced payment innovations—namely, quicker reimbursement for physicians who use EMRs and financial incentives to primary care practices for phone call and email consultations—at an early stage. In Lombardia, from 2003 to 2004, GPs and pharmacists received financial incentives for actively feeding the Sistema Informativo Socio Sanitario (SISS) with data, promoting it with their patients and using it in patient consultations.

England’s NHS Quality Outcomes Framework is a good example of a national incentive scheme that rewards primary care providers for both quality measurement and quality improvement while also acting as a stimulus for healthcare IT adoption and use. Introduced in 2004, it represents one of the main sources of potential income for GP practices. It consists of 134 indicators spread across four domains—clinical, organizational, patient experience and additional services—which define the specific processes or outcomes that GP practices should achieve. It is widely acknowledged that this payment-by-results and pay-for-reporting incentive scheme would be difficult without healthcare IT systems in GP practices. The program is also credited with improving the quality of clinical data being captured.

In Hong Kong, data analytics and clinical outcomes is a growing area. Analysis is conducted on 10 parameters—mortality rates, clinical waiting time, surgical site infection, diabetic control, MRSA infection rates and so on—with a penalty and reward scheme in place, based on best outcomes or best improvement.

In general, though, there are still relatively few examples of successful outcomes-focused payment systems. Linking healthcare IT use to quality or outcome indicators is not easy, particularly when patient outcomes are realized only over the long term and are difficult to track. Nevertheless, there is widespread support from health system leaders to move toward focusing incentives on quality improvements.

"The more we can experiment with implementing outcomes-based payment systems, the better chance we have of realigning the incentives of healthcare providers and affecting healthcare sustainability. Provincial governments have an opportunity to set the foundation for this type of reform in negotiations with physician associations by moving away from volume-driven models to those that tie patient outcomes with care provided."

−Canadian health system leader

In some health systems, changes in payment models to promote quality and efficiency improvements may require an altogether more appropriate supporting business model. In the United States, the Affordable Care Act (ACA) encourages value-based healthcare in several ways. The act calls for implementation of demonstrations, pilots, and programs for accountable care organizations (ACO), patient-centered medical homes (PCMH), payment bundling and pay-
for-performance (P4P) initiatives. The U.S. Department of Health and Human Services has announced several efforts to help providers form these new coordinated care models. For example, one of these, the Medicare Shared Savings Program, will provide a share in savings achieved for the Medicare program to participating healthcare providers who become accountable for coordinating care for patients to specified quality standards. The higher the quality of care providers can deliver, the more shared savings they may keep.

"When financial incentives are all aligned with spending the money most wisely to get the most people towards the highest level of health, it actually changes every single decision that every single provider makes every single day."
– John Mattison, Chief Medical Information Officer (CMIO), Kaiser Permanente, United States

Fragmentation and lack of coordination in healthcare delivery

One of the keys to optimizing value from connected health is to integrate across care settings—particularly across primary and secondary care—to achieve better health outcomes. However, because healthcare delivery is extremely complex, it is not surprising to find fragmentation across organizational structures and funding mechanisms (for instance, the public–private–non-profit split), as well as across policy domains and administrative units (particularly the central–regional–local split). As a consequence, connectivity across care settings or across regions or localities within a country is often minimal at present.

The most significant and prevalent barrier is fragmentation of healthcare provision, where a wide range of providers—each with its own practices, processes, degrees of autonomy, motivations and IT systems—spread over vast geographic areas work to different political agendas and funding regimes. In England, for example, the longstanding separation of the hospital-based specialists from the community-based primary care physicians has hampered efforts at coordination for the chronically ill. In Australia, the national e-health strategy concluded that the health system structure—comprising "a wide range of largely autonomous public and private sector parties"—was the single most significant barrier to development.

Connected health provides the tools to facilitate integration. But in doing so, it demands significant cultural and organizational changes and, accordingly, a broader strategy for bringing about change in how health professionals and organizations work together. Part of government's role is to identify and use both direct and indirect levers for change to incentivize, penalize or encourage providers to adopt desired behaviors. Across many of the countries we studied, better care coordination has been a central element of health reforms.

"The central problem in Germany is the integration of ambulatory and secondary care. Physicians from different organizations don't have a shared insight on the diagnoses of colleagues."
– German health industry executive

Successful health systems are taking steps to encourage integration and promote collaboration and joint working. Some countries have created specific local entities responsible for forging connections between doctors, hospitals, laboratories, pharmacies and other healthcare groups, and facilitating the flow of information among these entities. Such a local body is particularly helpful where the providers themselves do not have a financial incentive to coordinate their efforts.

In 2009, the French government established 26 regional health agencies (named ARS) to coordinate the provision of primary healthcare and encourage collaboration between providers. Similarly, in Singapore, the Agency for Integrated Care has been created to act as a "national care integrator" to smooth the transition of patients between care settings by working with the primary, intermediate and long-term care sectors and support services.

Other countries have restructured the healthcare delivery system to improve coordination across care settings. For example, in Scotland, in 2004, the National Health Service removed the organizational layer that separated primary care from acute hospital and community hospital services. The formation of new vertically integrated health boards responsible for providing all aspects of care within a particular region is widely seen to have had a positive impact on the ability to execute Scotland’s national e-health strategy. The integration of multiple organizations into one body led to a natural and incremental rationalization of applications and infrastructure. This has facilitated the sharing of information between different care providers within each region, as they operate within a shared IT infrastructure and application landscape.

Many other countries are starting to form organizations similar to the PCMHs and ACOs emerging in the US. For example, many of England’s primary care trusts (PCTs) have been participating in integrated care pilots. These pilots are primarily designed to strengthen partnerships between the trust and local community and social welfare agencies to improve the overall coordination of care. In Torbay, in Southwest England, for example, health and social care functions have been integrated to serve the needs of an aging local population (of approximately 140,000)—perhaps a snapshot of the implications of demographic change across Europe. Torbay Care Trust is based on single point patient assessment, integrated
care teams and pooled health and social care budgets. Drawing on lessons from collaborative work with US healthcare provider Kaiser Permanente, the trust is now deepening its connected health approach using a tailored “pathway analytics and reporting system that will allow commissioners to redesign more efficient clinical pathways and model the costs of care better across their population.”

In the US, five leading integrated care systems—Geisinger Health System, Kaiser Permanente, the Mayo Clinic, Intermountain Healthcare and Group Health Cooperative—have broken down barriers by collaborating in the sharing of health information. The five health systems created the Care Connectivity Consortium in April 2011 to pioneer the effective connectivity of electronic patient information. The consortium will use standards-based healthcare information technology to share data about patients electronically. The goal of the consortium is to demonstrate better and safer care for patients through better data availability. If a patient from one system gets sick far from home and must receive healthcare in another system—or if any system sends patients to another—doctors and nurses at each of the consortium systems will be able to easily and quickly access invaluable information about the patient’s medications, allergies and health conditions, allowing them to provide the right kind of treatment at the right time and avoid unintended consequences like adverse medication interactions.

Lack of commitment to standards that enable interoperability across systems

The inability of disparate IT systems to “talk to each other” is an ongoing challenge for many health systems. Even in countries where adoption rates for EHR are relatively high, health information exchange (HIE) can be hindered by a lack of interoperability. There are two essential elements to making this data exchange happen. The first is the technical standards to which IT systems need to conform (syntactic interoperability) and the second involves using standardized data formats and common medical terminology to enable the meaningful exchange and analysis of clinical data (semantic interoperability). It is the latter that continues to present one of the biggest challenges in connected health development.

While progress is being made, in most countries—and within many regions—uniform standards have not yet been implemented. Given the “public-good” nature of HIE, many health system leaders believe that governments must take a lead in shaping the development of common standards and building consensus around them to enable EHR interoperability. Some countries have moved forward by creating a central coordinating body charged with the strategic leadership and oversight of connected health implementation and with power and influence to mandate national standards for healthcare IT development and HIE.

In Canada, for example, Health Infoway’s mandate is to “accelerate the development and adoption of modern systems of health information and to define and promote standards governing the health infrastructure to ensure interoperability.” After months of extensive consultations and collaborations with more than 300 stakeholders across Canada, the EHR Solution Blueprint provided a framework that defines standards and sets the conditions for developing interoperable EHR systems. In Australia, federal and state governments are working together through the National eHealth Transition Authority (NEHTA) to modify products to support interoperability between EHR and EMR systems. Similarly, in Singapore, the Ministry of Health Holdings plays such a role. MOH Holdings has engaged with the private sector and vendors via national standards bodies to improve the potential for interoperability, and is proactively working at international, national and local levels to develop standards.

Similarly, in the US, the ONC’s Standards and Interoperability (S&I) Framework is an investment by the federal government in a set of harmonized interoperability specifications to support national health outcomes and healthcare priorities. These include meaningful use, the Nationwide Health Information Network and the ongoing mission to create better care, better population health and cost reduction through healthcare delivery improvements.

Infrastructural constraints

In some countries, health system leaders noted that infrastructural constraints, such as lack of network broadband coverage, are holding back advancement. In Spain, for instance, while progress in connected health is extremely good in many parts of the country, some experts told us that some regions are finding that available Internet bandwidth is proving to be a problem and, in a few cases, health centers and hospitals do not yet have access to broadband technologies.

In the United Kingdom, British Telecom recently announced that it has doubled the capacity of the NHS Internet Gateway, the part of the health service’s N3 private broadband network that links hospitals, medical centers and GPs in England and Scotland. For the 1.3 million Gateway users, better Internet service makes it far easier to access healthcare applications such as the electronic booking service, electronic transmission of prescriptions (EFP), picture archiving and communications systems (PACS) and the NHS Care Records Service (NHS CRS). Similarly, Australia is moving toward the creation of a national broadband network (NBN), part of which will be dedicated to the health sector. NBN will provide a platform that allows people’s homes, doctors’ surgeries, pharmacies, clinics, aged-care facilities and allied health professionals to connect to affordable, reliable, high-speed and high-capacity broadband.
Lack of structured clinical data and analytical capabilities for secondary use

Many health systems have deployed EHRs with little forethought as to how the data contained in them would be used. As we noted earlier, sophisticated analytics requires data to be available in a structured, and preferably coded, way. The ideal is for all systems to be able to exchange data using the same messaging, format and content standards. All EHR content can then be automatically extracted and converted electronically without the need for human intervention. As one interviewee put it, “If you can’t reuse the data, you haven’t really achieved anything.”

“The gold standard of how data is exchanged is a machine-to-machine data mapped and coded process, where no human being needs to intervene for information to go exactly into the workflow used by a clinician, and then through to the patient, and where that data is full, complete and timely.”

—Trudi Mathews, Director of Policy and Public Relations, HealthBridge, United States

We found that in the countries studied, most patient data is collected either in an unstructured or partially structured format. With the exception of England and Singapore, less than one quarter of our physician survey respondents enter their patient data in a coded format. Moreover, we found little evidence of a widespread use of data warehouses. There is still some way to go before any of these eight countries catch up with world leaders in healthcare IT in applying analytics to accumulated data.

In creating its EHR system, Kaiser Permanente (KP), a leading US integrated health provider, devoted significant resources to standardizing data formats and medical terminology across the eight regions in which it works. KP is thus able leverage the data to evaluate performance and identify best practices continually. Today, KP has a permanent national team—the Convergent Medical Terminology team—which continues to devote time and effort to improving terminology, making it available to the US government for wider use.

“The analysis of data is even more nascent [than data sharing]. While we are starting to see some research efforts demonstrating the value of health information exchange supporting specific use cases, the instances of this sort of research using multi-stakeholder data in connected environments is still pretty limited.”

—Ted Kremer, Executive Director, Rochester RHIO, United States

Compared to other industries, such as financial services or retail, the use of data warehousing in healthcare is nascent. The difficulties in capturing and normalizing large volumes of high quality, reliable health data for analysis has hindered widespread adoption of health analytics. However, some leading health systems are realizing value from their investments. Intermountain Healthcare (IHC), for example, has a data warehouse that allows it to collect rich patient data, aggregate them and analyze clinical outcomes related to patients and the care provided across the system. To mitigate the risk of unreliable data—related to patient identification and missing or redundant information—IHC filters all data on its way into the system and only incorporates it into the data warehouse once it is free from errors.
Overcoming the challenges—Summary of potential approaches

**Policy and systems**

- Develop and communicate a clear vision and strategy for achieving desired health outcomes. Ensure that this is aligned with the aims of wider health reforms.
- Allow sufficient flexibility for regions or local institutions to take their own approaches to the development of healthcare IT systems, thereby encouraging innovation and ensuring local needs are met.
- Link investments directly to the achievement of health outcomes.
- Where funding is limited, maximize the potential of limited funding by building on existing systems or using an incremental approach to system development.
- Align incentives and payment systems to ensure quality and efficiency are rewarded over quantity. This may be in the form of an innovation rewards scheme where clinicians are compensated for new methods of delivery.
- Encourage integration and coordination across organizations and care settings by creating coordinating bodies to manage required cultural and organizational changes and by effectively incentivizing, penalizing or encouraging providers to adopt desired behaviors.
- Develop technical standards to which IT systems need to conform and use standardized data formats and common medical terminology to enable the meaningful exchange and analysis of clinical data.
- Develop the infrastructure required to enable connected health by working with service providers to ensure technological capabilities are available, such as adequate broadband coverage.
- Encourage the use of structured data, which uses the same format and content standards across all care settings and providers to enable the leverage of data effectively.
Summary of challenges: *Organization and management*

- The high cost of IT systems and associated implementation costs.
- Financial constraints on organizational investment in IT.
- Difficulties in building credible business cases.
- A lack of technical expertise to manage healthcare IT implementations.
- A lack of impetus or trust between organizations to share data with each other.
- Technical limitations to existing IT systems rendering them unable to interoperate.
- Poor healthcare IT planning and implementation.

*Organization and management*

**The high cost of IT systems and associated implementation costs**

The costs of purchasing and implementing EMR systems can be significant: there is the upfront investment, on-going maintenance, upgrades and licensing, training staff and, often, loss of productivity during the transition period. These costs can be prohibitive, especially for small primary care practices. Over time, many experts believe that smaller medical practices will consolidate into larger practices to take advantage of cost savings.

Governments are starting to adopt a variety of mechanisms, including a range of direct and indirect incentives, to promote uptake of healthcare IT. Incentives for adoption include subsidies, bonuses, tax breaks, grants or loans and co-funding mechanisms. In addition to subsidizing the cost of the IT systems, these financial incentive packages can “insulate” physicians from potential productivity disruptions while they are adopting healthcare IT.

In British Columbia, Canada, the Physician Information Technology Office (PITO) was established in 2006 for just this purpose. PITO reimburses 70 percent of the cost of the adoption and use of an eligible EMR. It also provides a support program that includes: pre-implementation planning; tools to assist in selecting an appropriate EMR; coordination during implementation to ensure all the elements come together at the right times; privacy and security tutorials; and post-implementation review.

**Difficulties in building credible business cases as a prerequisite for change**

Health system leaders emphasize that it is not just a matter of providing upfront or even ongoing funds for investments; it is critical to establish clear business cases with evidence-based considerations of return on investments. Specifically, healthcare IT investments must be linked to achievement of improved health outcomes and/or cost-efficiency.

“ I would like to see robust empirical research demonstrating the value of connected health, whether through administrative savings or quality improvement initiatives, because if the value isn’t there, we’ve all moved forward on an interesting premise.”

− Ted Kremer, Executive Director - Rochester RHIO

“The ROI (Return on investment) is an extremely complicated subject. The mix of factors is extremely complicated to work out. No methodology can be considered valid today.”

− French health system leader
In many health systems, although the need for change has been identified, little progress has been made in developing appropriate metrics or measuring the impact of connected health on the key goals of improved outcomes, quality, access and cost control.

The case for investment in healthcare IT is made more difficult by the relative lack of quantifiable evidence about the benefits of connected health, something that experts acknowledge is extremely difficult to measure, as we noted in Chapter 2. At the moment, experts are concerned that monitoring and evaluation activity is vastly under-prioritized, largely because the issues are so complex, and it is difficult to establish a causal link between healthcare IT investment and improvements in quality and efficiencies of care. Furthermore, many benefits do not necessarily fall to the entity that made the initial investment.

However, without robust evidence, it remains difficult for some health providers to make a strong business case for connected health. Experts agree that work is urgently required here.

"It is easy to measure how connected you are and the level of data you have, but the real benefits in terms of outcomes are harder to measure.... There are so many variables to take into account."

—Australian health industry executive

In Denmark, building a strong business case tailored to those who need to use the system is considered critical, and health leaders attribute much of the system's success so far to the fact that connected health initiatives only progress if it is clear how they will improve clinical or administrative processes.

"There is a clear business case every time we allocate public funds to health IT. During the past two years, we have fine-tuned the way in which we develop the business case and, for each initiative, we now seek to quantify expected savings and clarify when those savings are to be realized. But gains in quality improvements are of course difficult to quantify and so some of the cases are unavoidably somewhat diffuse. Nevertheless, the guiding principle for all our activity is that we only pursue those IT solutions that improve administrative and clinical processes or health outcomes."

—Vagn Nielsen, Head of Department, Ministry of Health, Denmark

In some cases, performance monitoring is being used to demonstrate successes and provide an evidence base for further healthcare IT investment. In England, the Department of Health (DH) is trialing telehealth services in three Whole System Demonstrator (WSD) pilots. The WSDs are large-scale trials involving more than 6,000 patients, which evaluate the effectiveness of telehealth and telecare against traditional care techniques. Though final results are yet to be released, early indications from the pilots are promising. The final evaluation of the program will provide evidence about how people responded to having home monitoring devices as well as quantitative data on outcomes. Patient-reported outcome measures are also being assessed, as is the impact on GP consultations. It is expected that with a clear evidence base, there will be a greater willingness on the part of the DH to implement the program more widely.

In the United States’ Beacon Community Cooperative Agreement Program, performance targets have been used extensively in the allocation of funding, and healthcare IT objectives are used as the foundations of these agreements. The aim of the program is to build and strengthen healthcare IT infrastructure and health information exchange capabilities to achieve measurable improvements in healthcare quality, safety, efficiency, and population health in 17 selected communities through the use of $220 million in cooperative agreements. These communities will have until 2013 to demonstrate how the meaningful use of healthcare IT, as defined under a recently issued federal regulation, can support practical cost, quality and population health improvements. If successful, the Beacon Community Program will provide practical insights about healthcare IT and identify other steps needed to promote and sustain healthcare performance improvements that reflect both community and national priorities.

Lack of impetus or trust between organizations to share data with each other

In many countries, health organizations resist sharing data due to the fear of "competition" for patients: some worry that sharing health information makes it easier for patients to move to other facilities or doctors.

This is particularly concerning for private sector clinicians who operate in a competitive business environment in which they must generate profit. There is a belief among private GPs in Singapore, for example, that keeping paper records is no longer exclusive to me, and the return of the patient is not assured. Because now the record is shared, it is no longer exclusive to me, and the return of the patient is not assured. If anything, it’s threatened."

—Colin Quek, Vice President of Operations, The Farrer Park Company, Singapore
"Hospital to hospital, [data sharing] is not encouraged because of hospitals competing with each other in many instances. So the exchange is limited to things that there are standards for, like images."

– Andrew Haw, Chief Information Officer, Circle, United Kingdom

When separate departments or organizations are brought together as part of a connected health program, a degree of trust between them, and in the information exchanged, is vital. Accordingly, it is essential to have ethical frameworks in place that govern the integrity of the exchange and use of data. Involving end users and demonstrating the value of connected health solutions are critical steps in fostering trust.

In some health systems, governments are taking steps to promote collaboration and shared goals through new partnerships and care delivery models. In Scotland, the integration of care provision across primary, community and acute care services on a regional basis has removed the sense of competition between organizations. This has contributed to a shared vision for improved health outcomes and a spirit of collaboration that the national eHealth Directorate advocates, and that helps to drive effective coordination of healthcare delivery. In Scotland, information governance is built around the shared principles of being a trusted person in a trusted setting and being authorized to access information on a need to know basis. In the United States, the HITECH legislation and financial incentives will work to help break down barriers between organizations and to drive innovations in clinical integration as healthcare providers and vendors work together to implement healthcare IT and realize the benefits from the meaningful use guidelines.

Technical limitations to existing IT systems rendering them unable to interoperate

In many countries it is not a lack of healthcare IT development that proves to be a barrier, but rather the existence of legacy IT systems that were developed before national interoperability and software standards were implemented. Many physician practices or hospitals have invested in the development of their internal systems only to find these systems do not meet new national standards and are not able to communicate with other systems. The past lack of an effective national e-health strategy or national standards and a strong independent healthcare IT market with multiple vendors offering different solutions and products are common reasons for this barrier.

In Spain, for example, the problem of legacy systems is largely the result of having developed systems at a regional level and finding that these are not interoperable nationally. Some regions, however, have responded by thinking creatively about systems that can “leapfrog” to HIE. In Madrid, for instance, the HORUS EHR viewer system has succeeded because it was built so that it sits on top of existing systems, minimizing the need for major systems reengineering. It creates a way of sharing information without the need to homogenize the data capturing and HIE infrastructure within individual systems. As a result, a high degree of connectivity has been achieved quickly and at a relatively low cost.

Similarly, in Lombardia, the approach has been to implement and then expand the SISS system as a modular system, allowing hospitals and GP offices to keep their existing IT systems. This “non-invasive” approach, which sets out to integrate rather than replace systems, was not taken without challenges. Initially, there were approximately 30 different systems in place in GP offices, some of which were being used by as few as two or three practices. Since 2004, the regional government has required GPs to use systems that are certified and compliant with SISS, and it is now working on expanding this requirement to labs, clinics and hospitals.

Poor healthcare IT planning and implementation and lack of technical expertise

Some health systems have experienced problems with healthcare IT planning and implementation, often due to underestimating the required budget and timescale. Unrealistic or ineffectively managed projects cause delay and can undermine confidence in connected health solutions.

In some cases, problems have arisen from the unsuitability or poor performance of vendor based EHR solutions. Anecdotal evidence from other research studies suggests that between one-third and one-half of vendor-based EHR implementations have ended in failure. Among the various instruments available to governments, product certification helps mitigate risks and increases the confidence of users that the purchased systems will indeed provide required capabilities, including interoperability.

In several countries, healthcare payers, ranging from governments to the private sector insurers, are now offering financial incentives for the adoption of certified health healthcare IT systems. In Denmark, for example, the national health system integrator, MedCom, has tested and certified all supplier systems since 2000. Certified suppliers must meet all messaging standards, presentation formats and functionality. And in the United States, under HITECH, eligible healthcare professionals and hospitals can qualify for Medicare and Medicaid incentive payments when they adopt EHR technology that has been certified by the ONC and use it to achieve specified objectives. In some cases, problems have been the result of a lack of technical expertise to manage the implementations.
"... I think that [health informatics] is an area where we should foster that skill set. We don't have enough people with those sets of skills ... and that's an area where government could take a role."

–Peter Williams, Department of Health, Victoria, Australia

In the US, an estimated 50,000 new healthcare IT professionals will be needed to help healthcare providers make the shift to electronic health records and meet meaningful use criteria. The federal government has invested millions of dollars to develop a skilled healthcare IT workforce, but private-sector groups also are stepping up efforts to help bolster the field of healthcare IT professionals. The American Health Information Management Association (AHIMA) has recently announced a new initiative, “HIM Jobs for America,” to support training and employment for healthcare IT professionals. The initiative will provide free training for health providers in underserved areas, helping to bridge the gap for small providers who have yet to qualify for meaningful use incentives.

In Singapore, MOH Holdings is responsible for undertaking strategic initiatives for the Ministry of Health, including the development of the national IT framework for Singapore’s public healthcare sector. Within this framework, MOH Holdings is managing the implementation of a national EHR for which it is commissioning external vendors. The government has played a key role in driving the development of the systems by adopting an “it will be done” attitude. This included creating a new department to implement the strategy and recruiting experienced people with the right skills to drive implementation.

Overcoming the challenges—Summary of potential approaches

Organization and management

- Develop incentives and co-funding mechanisms to help offset the initial high investments costs of an EMR—this may involve tax breaks, subsidies, loans or co-payment systems.
- Establish clear business cases with evidence-based considerations of ROI to demonstrate the potential of improved health outcomes and/or cost-efficiency.
- Promote collaboration through shared visions and work principles, and new delivery models that incent cross-sector coordination.
- Develop ethical frameworks to govern the integrity of the data exchanged.
- Create systems that integrate rather than replace legacy systems, resulting in a high degree of connectivity achieved quickly and at a relatively low cost.
- Develop realistic, well-managed plans to implement EMR systems effectively and take steps to mitigate potential risks (e.g. through use of certified healthcare IT systems).
- Improve health informatics expertise among clinical and administrative workforce.
Summary challenges: Clinicians and end users

- Physician reluctance to embrace new technology resulting from concerns about ease of use, changes to working practices, loss of productivity, income disruption, information overload and legal liability.
- Lack of awareness of clinical benefits.
- Physician concerns about data security, privacy and confidentiality.

Clinicians and end user challenges

In our survey of 3,700 physicians in the eight countries, we asked what they perceived to be the main barriers to EMR adoption and health information exchange. The survey confirms that physicians see a wide range of challenges on the journey to connected health. Overall, when asked to rank the top five barriers, more than 40 percent of physicians identified "IT systems that can't 'talk' to each other," "concerns about privacy and security of data," "cost" and "loss of productivity or excessive time spent inputting data" among their top five challenges. Overall, "lack of financial incentives" was fifth (34 percent of respondents). "Cost" ranked highest as the No. 1 challenge (14 percent of respondents), followed by "privacy and security of patient data" (13 percent) and "IT systems that can't 'talk' to each other" (12 percent).

Figure 17: Physicians' top ranking barriers to EMR adoption and health information exchange: Accenture physician survey

Accenture survey question: Please select the five main barriers to the adoption and use of electronic medical record systems and health information exchange in your organization.
Physician resistance to new technology based on concerns about cost, changes to working practices, ease of use, loss of productivity, information overload, legal liability and income disruption

Optimizing the value of connected health relies heavily on how readily clinical staff and health professionals take up and use new health technologies. Clinician resistance to new technology is a common and significant barrier in almost all the countries we studied, more so, it appears, than resistance from other stakeholder groups, such as health system managers, policymakers or patients.

Physicians can be intractable for various reasons. Some are concerned about time pressures and possible increased workload, citing non-intuitive systems that they believe hamper the speed and quality of care consultations. Some also fear that changes to their normal work processes and productivity will disrupt their income.

"Clinicians are very busy. They don’t have time for new processes. So anything you introduce has to be very transparent, very subtle, and have minimal learning and interactions needed for them to get things done. They are open to technology and change, but in a way that supports and enhances their business and doesn’t interfere with them.”

–Mark Gibson, Health Industry Exchange, Australia

“It’s often said that physicians were afraid of technology and that’s why they didn’t adopt these changes so quickly. It’s not that they were afraid of technology, but they are afraid of the technological burden and not benefiting from it. We must show benefits of the changes we are putting in place.”

–Dr. Robert Murphy, Chief Medical Information Officer, Memorial Herman Health System, United States

Some physicians worry that connected health will enable greater scrutiny of professional practice and lead to increased litigation. Others are concerned about “information overload” in their EMR system and fear losing their independence in making clinical decisions if they have to follow more evidence-based clinical guidelines.

"If I have the access to the NEHR and all the wealth of data for a patient spanning the last years, am I liable if I don’t look at page 50? Hence it’s key to establish the clinical duty of care in relation to how to ‘use and give information’ for each care setting and the accompanying care roles.”

–Patrick Chia, Ministry of Health Holdings

Communication, collaboration and change management processes are the keys to overcoming physician resistance. There is widespread agreement that good engagement needs to start early and continue throughout the change process. End users need to be consulted on planning and design elements to improve usability and increase their buy-in. And multi-disciplinary teams of clinicians, communication experts and technology specialists should be created to coordinate the process, with physicians taking a strong lead.

In Scotland, the secondment of medical and nursing staff into the IT team at the outset of projects has helped to ensure that solutions are designed and implemented to support clinicians and to link data effectively. This has also extended into implementation where the role of nurses in driving changes on the wards is felt to be critical to affecting change across the entire organization.

The Hong Kong Hospital Authority (HA) recognized early on that without the support of clinicians, healthcare IT ventures would be unsuccessful. The HA adopted an approach to clinical system development based on the recommendations of a complex, clinician-led governance structure. Hong Kong’s Clinical Informatics Program Steering Group, and its 44 functional groups, guide healthcare IT development across the HA. The end design of each system is meant to “fit like a surgical glove.” It should be intuitive to use, require minimal training and not seek to change clinical workflows drastically. The clinician-led functional groups assess clinical requirements for the various care departments and coordinate with other groups focused on IT requirements, implementation, clinical systems development, standards, policy and technology needs.

Given their relative inexperience in using healthcare IT, many health professionals require training to help them achieve optimal use of their systems. The most successful healthcare systems are prioritizing and incentivizing IT training and technical assistance for end users. Training is a significant component of the change management program aimed to further connected health.
In Denmark, since 2001, data consultants, employed by MedCom and funded by central government, have provided technical assistance to GP practices across the country. This has helped to strengthen the use of computers in primary care and, in particular, promoted the use of electronic communication to attain greater consistency in patient treatment through the timely exchange of clinical data. In addition, the health regions fund clinical “practice coordinators” for each specialty. Appointed physicians work two to three hours per month and coordinate requests for changes to the way the computer systems interact between providers and hospitals. Any concerns that physicians have as a group are brought forward to MedCom by these individuals.

**Lack of awareness of clinical benefits**

Increasing the use of healthcare IT also depends on getting clinicians and other stakeholders to understand the benefits in terms that are meaningful to them and that support overall health—rather than technological—goals. Physicians may not easily be persuaded to undertake change until they are presented with evidence to show how healthcare IT can be used to fill the gap between best practice and the care they are actually delivering.

“**It also helps if the health system can demonstrate some quick wins from adopting [healthcare IT], as well as managing expectations around what is and is not possible, in order to gain buy-in from clinicians. Things like the PCEHR are wonderful, but that needs to get us something in the next 12 months to two years, as opposed to building something for the future where we do not see any immediate benefits.”**

—Australian health industry executive

While many of the physicians we surveyed saw benefits—ranging from reduced medical errors to improved outcomes for patients—some doctors have yet to be convinced, signaling a need perhaps for governments and healthcare organizations to take a more educative or discriminating approach in making progress toward connected health.

Many successful health systems have built a momentum for change by taking an incremental approach and delivering—and demonstrating—value early. In Hong Kong, for example, when the health authority first considered introducing clinical IT systems into its public hospitals, it quickly demonstrated the benefit to clinicians by introducing a discharge summary function. Once the clinicians saw the benefit to them from streamlined workflows, they realized the other potential benefits of clinical IT systems across other elements of care. Additional functions have been added over time as clinicians have seen the need.

In making the case to clinicians, it is also important to give some forethought to how data will be used and how it will benefit patients and populations. Germany, for example, introduced a nationwide disease management program in 2003 for breast cancer, diabetes, coronary heart diseases, asthma and COPD, which today covers about 5.5 million patients. For all of those conditions, data are collected by GPs, sent to federal data centers and forwarded to all health insurance organizations. Based on this data, patients are monitored and, in the event of triggers, interventions can be started sooner. Doctors also get regular feedback on their patients compared with their peers.

**Physician concerns about data privacy and security issues**

Concern about privacy and data security issues ranked as the second most important barrier in our physician survey. Privacy and security policies differ between countries but can also be interpreted differently between regions and localities. Inconsistent privacy policies make sharing data more difficult because stakeholders may have different views and practices on what can and cannot be shared and with whom.

“**The problem lies in the fear of some professionals to provide information, because of their lack of knowledge about patient data protection laws.”**

—Spanish health system leader

As we will see in the next section, privacy and security concerns are an issue not just for clinicians, but for patients and the public as well. Below we take a look at various measures that health systems and organizations are taking to address these concerns.
Overcoming the challenges—Summary of potential approaches

Clinician and end user challenges

- Communication, collaboration and change management processes are the keys to overcoming physician resistance. Engage stakeholders early and communicate regularly through the process to gain acceptance of change.
- Consult end users on planning and design of systems and create multi-disciplinary teams (clinicians, IT specialists, strategic thinkers) to manage the implementation process.
- Prioritize and incentivize IT training for end users.

- Demonstrate benefits of healthcare IT in terms that are meaningful to clinicians and that support overall health—rather than technology—goals. This should be done through evidence-based means to gain most impact.
- Develop an enterprise-wide information governance strategy and architecture (including privacy policies, mechanisms to protect and secure patient data, audits).
Summary of challenges: *Patients and the public*

- Concerns about privacy and security of personal health information.
- Legislation that, while intending to protect people’s privacy, often restricts appropriate sharing and use of data.
- Encouraging patients to play a role in managing their own healthcare.

**Patients and the public**

**Concerns about data security, privacy and confidentiality**

Safeguarding patient information in a digital world is a significant challenge facing health organizations in all countries. The implementation of privacy and security measures is proving particularly challenging in the case of EHRs and constitutes a major barrier to EMR adoption and the system-wide exchange of information in many countries.

Some countries have adapted their connected health strategies to take account of these issues. In Germany and the Netherlands, for example, privacy concerns raised by patient forums and doctors’ groups have led to significant changes in the strategy for national e-health delivery and have affected the development of the smartcard scheme, which now offers less functionality than was first envisaged. In Australia, physician and consumer groups have raised concerns about the security of the national personally controlled electronic health record (PCEHR) system. The result is that the PCEHR currently in development offers only a summary record from which patients can remove any information they do not wish to have stored there.

To achieve high performance in connected health, healthcare organizations must make information governance a strategic priority. By creating a consolidated, enterprise-wide information governance architecture, organizations will be able to improve data privacy and data security. This, in turn, will enable them to implement health information exchange solutions that address physicians’ and patients’ concerns over data privacy, ensure compliance with regulatory and legislative requirements, maximize the clinical and administrative benefits of health information exchange and increase physician adoption.

Accenture’s information governance framework breaks the complexity of information governance into five interrelated components—data privacy, data confidentiality, data security, data quality and data integrity—each of which has its own set of processes, functions, standards and technologies, within one integrated model.²

Certain countries have already begun to take steps to alleviate and resolve privacy concerns. For example, in the United States, The Office of the National Coordinator for Health IT (ONC) created a Tiger Team that has been working on developing a comprehensive privacy and security policy framework for electronic health information exchange. The framework is intended to build on current law (Health Insurance Portability and Accountability Act) and is based on the fair information practice principles articulated by the ONC in its “Nationwide Privacy and Security Framework for Electronic Exchange of Individually Identifiable Health Information.” The Tiger Team has previously made recommendations on secondary use of data for research purposes, which stated that all entities involved in health information exchange should follow fair information practices when handling personally identifiable health information. Specifically, those policies should be open and transparent, limit collection use and disclosure of personal information, and have “reasonable security safeguards.”

We have observed that all countries are now putting in place mechanisms to facilitate some form of protection and security of patient data stored and transmitted by GPs’ and hospitals’ IT systems. The most common is the use of passwords or smartcards to access computers. In our physician survey, 80 percent of respondents stated that they used passwords or smartcards with their organization’s system. Forty-nine percent believed restricted access computers were in use, while 41 percent mentioned encryption of information within their own system and 37 percent encryption of transmitted data.

²For more information on healthcare information governance, see “Information Governance: The Foundation for Effective e-Health,” Accenture Institute for Health and Public Service Value
Figure 18: Measures to ensure security and privacy of personal data: Accenture physician survey
Which of the following do you believe are in place to ensure the confidentiality and security of sensitive data?

![Bar chart showing measures to ensure security and privacy of personal data.]

N=3,726
Healthcare organizations are adopting a number of other measures to help prevent medical data breaches. These include audits to monitor how data is used, stored and transferred, allowing patients to determine which data can be freely shared, considering which health professionals need access to patients’ personal information and educating healthcare providers on security issues.

In Madrid, the HORUS system has mechanisms to safeguard against the improper use of patients’ health data. Clinicians who are consulting with a particular patient have free access to that person’s data on the system (although patients are themselves able to request the partial deletion or hiding of particular aspects). Those accessing patient data outside of this pattern must justify their use of it on the system, and can only override system safeguards in certain emergency situations. The use of HORUS is continuously tracked, so system auditors can monitor who has accessed particular records, and assess any inappropriate usage.

In all the countries we studied, governments are striving to create coherent and consistent policies for the storage, exchange and access to patient health data. One of the most hotly debated issues is how patients’ records will be handled—and how patients want their records handled. Should they be able to opt in to a system of shared electronic records or should they have to opt out? And who will be the owners and custodians of the information—the patients themselves or the caregivers and facilities that created the data? Issues of data ownership also raise questions about the legitimacy of secondary uses of data, such as in research and audit.

In France, where privacy problems were one factor behind the failure of previous national healthcare IT schemes, the new Dossier Medical Personnel has been designed as a voluntary patient health record. Citizens can choose to control both the content of and access to their records. For instance, patients will be able to hide some information or ask a professional to do so. Each health professional is only authorized to view areas strictly relevant to their professional interests, using their secure ID card.

The majority of physicians who took part in our survey use some form of patient consent model for the storing and sharing of patients’ personal health data. More than one-third seek advance explicit consent for sharing health information with other health organizations, often in writing. Approximately 10 percent give patients the opportunity to opt out of having their information shared, while 8 percent choose to employ different options as appropriate. Significantly, though, almost one quarter of physicians (and a third in Spain and France) stated that they do not seek explicit patient consent, and one in five simply does not know if there are procedures in place for gaining consent. Only one in five physicians seek patient consent on each encounter, while more than 40 percent only seek it on the first encounter.
While many governments and health organizations are prioritizing information governance initiatives to improve data privacy and security, experts in some countries feel that the issues may actually be exaggerated—either by powerful privacy advocates or by those who wish to retain the status quo.

"Most patients already think that their information is being shared—much more than is the case... there is a minority who don’t want their information shared."

—Professor Michael Legg, Centre for Health Informatics and e-Health Research, University of Wollongong, Australia

Accenture research suggests that people may indeed be less concerned about privacy issues than many governments and health leaders think. In a 2010 survey of 14,000 citizens in 14 countries, we found that just over one-third of respondents, on average, were concerned about health providers holding personal health information about them on computer databases, while approximately 40 percent was concerned about the information being shared with other health providers.

"For all that we say ‘privacy is a big issue,’ if you ask a patient: ‘If I could exchange your data for your benefit with your caregivers to give you a better outcome, would you do it?’ Of course they would. There would be very, very few objections."

—Dr. John Halamka, Chief Information Officer, Beth Israel Deaconess Hospital, and Chief Information Officer, Harvard Medical School
Legislation that, while intending to protect people’s privacy, often restricts appropriate sharing and use of data

In some cases, strict legislation designed to protect the privacy and security of people’s personal data is getting in the way of benefit realization. While there is widespread acceptance that privacy and security of data is paramount, there needs to be a pragmatic balance between data protection and the benefits that can be derived from data sharing and use. Legislative change is sometimes required to enable physicians and public health authorities to access or exchange health information for the benefit of patients. In British Columbia, Canada, for example, to overcome obstacles relating to the secondary use of data, the government introduced legislative changes to authorize indirect collection of patient personal health information through the creation of “health information banks” to manage chronic diseases and for use in health service development, management, delivery, monitoring and evaluation.

Scotland has also made significant progress in enabling the secondary usage of data. The Scottish Health Informatics Programme (SHIP) is a national research platform involving a network of projects for collating, managing, disseminating and analyzing clinical data to carry out studies and analyze population outcomes. Information governance presents challenges for data aggregation. However a balance between pragmatic data management and supporting legislation in Scotland enables analysis of population health outcomes.

According to Scottish law, patients do not need to be told if their data are going to be used for direct clinical purposes or audit, although it is recommended good practice to make patients aware as to how their data may be used. Where patient identifiable information is to be used then the patient’s express permission needs to be sought, at which point a clinician who has a relationship with the patient communicates to them that the researchers want to get in touch.

Encouraging patients to play a role in managing their own healthcare

Healthcare IT can transform the role of individuals in managing their own health, for instance, by maintaining their own healthcare information in patient health records and sharing this with health providers as appropriate. Patient portals, online health risk assessment tools and remote monitoring devices can bring healthcare into the home setting, enabling early detection of problems that might otherwise require treatment in more expensive care settings.

Many of the health system leaders to whom we spoke believe that patients should be empowered to manage their own healthcare. As previous Accenture research shows, people feel a strong sense of responsibility for their own health and want a greater say in their treatment. They also actively seek out information themselves that will help them lead healthier lives and make better decisions about their healthcare.
Overcoming the challenges—Summary of potential approaches

Patients and the public

- Develop tailored strategies that cater to local opinions on privacy, and adapt the systems accordingly. In addition, all systems must have a mechanism built in to protect patient privacy.

- Strike a pragmatic balance between data protection and the benefits that can be derived from data sharing and use.

- Legislative change is sometimes required to enable physicians and public health authorities to access or exchange health information for the benefit of patients.

- Develop systems, such as portals, mobile technologies and remote monitoring devices, to encourage patients to take an active role in managing their own health.
4. The Dynamics of Successful Connected Health
4. The Dynamics of Successful Connected Health

We have learned from our research that the journey to connected health, from healthcare IT adoption to health information exchange to insight driven healthcare, is long and far from easy. Countries at different stages of the journey show that the starting point and the environment in which they operate are vitally important in determining how to progress. In countries where healthcare's political governance is regionalized, connected health developments have followed similar localized patterns. Where central governments have traditionally implemented whole-system change, we also can see similar attempts to connect healthcare providers as part of a single system. A national culture and the relationship between government and its citizens are also influencing factors. Accenture's previous research into citizen perspectives on healthcare quality has shown that the balance of trust, confidence and communication between citizens and government can vary tremendously across nations.

Of course, priorities on the ground are also a key variable. Building a connected health infrastructure must compete with myriad other pressures facing healthcare systems and organizations, such as the need for more clinicians, the ever increasing number of new medications and medical technologies, maintenance of modern medical facilities and sustaining access to care for demanding populations, while containing costs. Tradeoffs between these pressures are extremely difficult, particularly during a time of severe economic constraint. All of them pose their difficulties, yet all have to be met for health systems to remain viable and maintain high performance.

Our research shows that, globally, health information is likely to remain in fragmented and dispersed services and organizations for the foreseeable future, regardless of how care is organized or financed nationally. As a result, new governance, processes and technologies need to be brought to bear to connect the now separate healthcare organizations and delivery channels and to allow the levels of healthcare IT interoperability.

Our case studies and conversations with global health leaders have shown that, far from being insurmountable, the barriers to connected health can be overcome by learning the lessons of leading-edge practices and examining how other systems and countries have met similar challenges. From the analysis of our research findings, we have identified six key dynamics that characterize those systems and organizations that are successfully progressing on the journey to connected health by creating the new relationships and practices that will ensure healthcare IT interoperability and help drive better, more integrated healthcare delivery for citizens.
Figure 20: Connected health dynamics

**Integration drives integration**

Connected health leads to a virtuous cycle, fostering clinical and business process integration, which in turn puts new demands on new technologies.

- **Vision and leadership focused on improved health outcomes**
  - Clarity on the objectives and benefits of the “end state” before building the healthcare IT infrastructure.

- **Clinical change management**
  - Connected health succeeds best when change to frontline healthcare delivery works in parallel with strategic change management at the organizational level.

- **Strategic change management**
  - Carefully orchestrating change across the organization that aligns directly to a mission and a vision.

- **Co-evolution**
  - Striking the right balance between strong leadership and vision from the top, and room for bottom-up experimentation and innovation.

- **Robust technology infrastructure**
  - Should be compatible with organizational vision and objectives, and governed with clear standards of health information interoperability and exchange.
Dynamic 1 – Vision and leadership focused on improved health outcomes

Globally, health leaders consistently tell us that “it’s not just about the technology.” For a digital infrastructure to truly translate into the kind of value creation we describe in Chapter 1, a clear sense of “what we are doing” and “why we are doing it” must permeate the organizations that make up the healthcare system and guide the initiatives of leaders, managers and clinicians. From what we have learned, we believe this vision must ultimately be about creating connected health solutions that become a sophisticated means to create the ends of improved quality of care, enhanced access for citizens and better cost control over the long term. It is not just about building a better IT system on time and on budget. It is about setting objectives that reflect a clearly articulated future state of health and healthcare.

In Madrid, for example, the starting point for creating the region’s healthcare IT programs was a political one: a policy that would allow citizens to choose their own healthcare professionals, regardless of their location. To meet this objective, professionals had to be able to depend on a shared means of identifying patients and quick access to essential health information at the point of care. Connected health became the key means to achieve this “freedom of choice” policy.

Understanding the current context—in terms of both one’s own organizational positioning and an informed awareness about potential healthcare IT cost and benefit—is the starting point. Healthcare systems are multi-faceted and complex. They comprise a wide range of different stakeholders—doctors, nurses, allied health professionals, managers, patients—all of whom have different interests and needs. This makes it essential for leadership to understand what those interests are and how they differ, and then to clearly communicate the vision to each of the different stakeholder groups. In particular, leaders must make a meaningful case for each stakeholder group and be able to articulate the value of information sharing in clinical, social, administrative and economic terms, as required. Failure to consider individual stakeholder needs—especially those of the people who actually need to make the change—can bring a risk of limited uptake of healthcare IT solutions, create anxiety and loss of respect for leaders and project implementers, and ultimately result in failure to achieve the required value or return on investment.

Where leadership and vision has been pragmatic, patient and strong, we are seeing real change happening. As the processes of connected health development proceed, an evolving and strengthening vision of organizational purpose can drive deeper integration and continual system improvement. For health leaders at US healthcare provider Kaiser Permanente, for example, the development of its HealthConnect EHR was framed in terms of the organization’s desire to transform the overall quality of its healthcare delivery. Rethinking information technology was part of a much broader strategy to create ways to build care around the patient and to drive organizational excellence, within a fiercely competitive healthcare market. But before any decisions about technology were made, it was deemed critical to develop a shared organizational vision—the Blue Sky Vision—that would unite all leaders, clinical teams, and system users around a common goal.

Inspiring and effective leadership with a clear strategic direction is critical in ensuring successful execution and minimizing risk in connected health implementation. A key ingredient for success is the complete and unqualified support of the senior executive team. This has to start at the very top of the organization. Without a committed top leadership structure driving and supporting the change activities, there is risk of discord and negative impact to organizational culture, failure to obtain buy-in from stakeholders and overall loss of productivity. In the case of Kaiser, the implementation of HealthConnect had strong support from the chief executive and the entire board of directors. It was positioned as the No. 1 priority in the business plan for three years, and it linked the achievement of development and deployment milestones to every health plan and hospital executive’s performance goals and compensation. Progress was reported to the board each quarter, and progress against plan was a pre-condition for approval of other capital expenditures, such as new facilities.

In many cases, healthcare IT adoption and information exchange have also been hampered by a lack of leadership in addressing the concerns of the public. For citizens, concerns over data security and privacy are real. Where leadership has been effective in demonstrating and communicating the benefits of connected health in improving health outcomes and the safeguards being put into place by governments and healthcare organizations, we have seen much greater public enthusiasm about the potential of connected health. We noted in Chapter 3, that Scotland has been particularly successful in overcoming patient concerns about the collection and use of data through public engagement. This ethos has also driven the work of France’s Asip Sante, a central agency tasked with overseeing and steering e-health implementation. The original EHR model (the Dossier Medical Personnel), which was based on a single health record held on a central computer server, had led to concerns over healthcare practitioners being able to access patients’ full record. More recently, though, the public has been engaged in the creation of the new DMP. Citizens can now choose which provider holds their main record, and the central DMP contains only demographic data and indexes that point to local systems where more detailed information is held. While this process of engagement has hindered progress somewhat, it does mean there is now strong public backing and a formal body (the DMP Public Interest Group) through which the public can channel their views.

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Clear vision and leadership from the top also means putting the legislative and policy frameworks in place that allow healthcare integration to thrive. This is about creating a secure and firm basis for health information exchange, but one within which patients and doctors feel protected. In this regard, Denmark’s experience is instructive. In 2005, the government amended the Processing of Personal Data Act, which protects citizens in respect to the processing and free movement of their personal data. In 2005, the act was amended to permit physicians and pharmacists to access every patient’s medication data, enabling the clinicians to have a more comprehensive historical profile to review before dispensing medication and thus improving patient safety.

Finally, perseverance, organizational stability and continuity of direction are important, especially in an industry that often experiences frequent changes in leadership, as well as the effects of political change. Our study has shown that, in leading countries and regions like Denmark, Singapore and Lombardia, as well as in delivery systems like Kaiser Permanente and Intermountain, continuity of leadership and persistence in direction and message are key factors of success. In Lombardia, the creation of Lombardia Informatica two decades ago helped to drive the design and execution of healthcare IT systems in the region. With strong and stable leadership at the helm, the region has maintained a consistent vision, direction and commitment to long-term improvement, supported by similarly stable political leadership in the region, which has enabled a long-term perspective and consistent investment.

Dynamic 2 – Strategic change management

Creating high-performing connected health systems is about organizational transformation, affecting culture, management and clinical systems, behavior and patient-provider-payer interactions. It is an exercise in managing people, processes, relationships and incentives, as well as technology. By focusing too narrowly on the development of technological infrastructure or capability, health leaders risk paying insufficient attention to the need to change clinical and administrative behaviors, to reshape collaborative relationships and to create a culture of change and innovation, all of which are fundamental to introducing new patterns of integration successfully across and within healthcare organizations.

"We talk a lot about technology, but most of the challenges relate to changing attitudes, processes, recognition, clinical leadership and governance. That is a harder road to move down, but it is the critical one for success."

– Peter Williams, Advisor E-Health, Policy and Engagement, Department of Health, Victoria, Australia

Around the world, experts have told us that the evolution of healthcare IT capabilities and organization-wide change management must proceed in parallel. Where technology deployment moves at a rapid pace, the need for coherent and holistic change management is even greater. Connected health leaders must simultaneously shape tomorrow’s ways of working and help people make the transition to it, while continuing to meet the challenges and practice demands of today. This is a long process, a permanent evolution—one that will not end with a long-lasting set of defined solutions.

Building organization development and change management capability is crucial. These are not part-time jobs, assigned to people with other full-time responsibilities. These skills are usually constructed in the form of dedicated professional teams who facilitate, guide, challenge and help train people across the organization. But everyone needs to be involved in making change happen.

An important aspect of ensuring organization-wide involvement is clear evidence of the need for change and of its tangible gains. Strategic change management harnesses data analytics to produce the business intelligence—both explanatory and predictive—that can identify needs and opportunities for change in systems and processes and the positive results of change. Especially as the benefits of connected health begin to take effect, regular examination of changing business performance can provide insights that affect business planning, decision-making and the direction of change.

The leading international systems and organizations show us that identifying and achieving tangible gains are key to successful strategic change management. There are two essential elements to this success: clinical engagement and manageable change.

Taking an in-depth look at our 10 case studies of health systems and organizations that are leading the way in connected health, we found that they all have worked extremely hard to engage their clinicians and frontline staff from early in the process to increase end user buy-in and speed adoption.

Consistent and repeated communication about the strategy or project and the desired end goals and objectives is vital. Without it, the value of what organizations are trying to achieve may not be recognized, stakeholders may not be aware of or engaged in the process, innovation and creative ideas are unlikely to be shared, and the required education and training would not be
delivered successfully. Moreover, clinician leaders who do embrace the change can contribute to the project vision through their advocacy and demonstrated use, and by creating a sense of urgency, around the need for adoption.

But clinician engagement is not simply about communication. It entails clinicians’ active involvement in planning change and guiding its implementation with their peers and colleagues. Singapore, which is in the early technological stages of a drive toward integrated primary and secondary care, has involved clinicians from the beginning, not only in establishing goals and business cases for the program, but also in leading clinical transformation teams that work with healthcare IT architecture teams and with business teams to develop the clinical requirements for the National Electronic Health Record (NEHR) system. Similarly, in Madrid, by systematically and consistently engaging and educating the clinical and political community, the health authority has been able to develop the HORUS health information viewer system in a way that is “owned” by its multiple stakeholders.

Clinical engagement involves a strong focus on education and training to prepare the organization and healthcare IT users for upcoming changes. Education and training form the foundation upon which initial adoption occurs, but continues over the longer term, ensuring sustainability and optimal use. Without successful execution of comprehensive education and training plans, few, if any, project goals can be achieved.

Organizations that invest significant time and resources on clinical engagement and education as part of strategic change management demonstrate incredible buy-in and clear benefits across their organizations.

Here others can learn from Kaiser Permanente, which spends a significant proportion of its overall budget on training, clinical and administrative workflow redesign and cultural change.

One expert told us that, during the establishment of its HealthConnect EHR system, the organization has spent an estimated two-thirds of its overall $4 billion expenditure to date on change management processes, with the remainder spent on technology. Such ratios are common among those who succeed.

At Kaiser Permanente, not every doctor switched over to the HealthConnect EHR system without difficulty. The transition was a culture shock for many, particularly those doctors who had been using paper records for 30 or 40 years. Some were more resistant to change than others and struggled to adapt their work practices to the new system. Kaiser developed “Pathways to Proficiency” as a grassroots initiative that originated from a local physician who identified the problem. The HealthConnect optimization team then became involved and helped to design the program, which identified clinicians who were struggling with the new EHR and new systems. These clinicians were bought in for a two-day course (mandatory for a few people), and Kaiser hired workflow experts to improve optimization, usability and time efficiency. The coaching they received on using the system has helped to improve their proficiency and saves significant time in providing care in ambulatory settings.

“\nIt is important not just to train people to use the system but to ‘move the curve,’ and by continually improving the standard of user ability, ensure the system’s utility is made full use of. It is important to identify those users who have been ‘forgotten’ and are falling behind and use programs like Pathway to Proficiency to get them up to speed.”

–Ken Murtishaw, Southern California Regional Manager, Systems Solutions and Deployment, Kaiser Permanente

Similarly, Intermountain Health Care (IHC) created the Advanced Training Program (ATP), which has endured for many years, to continually nurture a culture of outcome measurement, process improvement and reduce practice variation to realize the benefits of ubiquitous health information. IHC offers its clinical staff and leaders training that specifically aims to facilitate the study and improvement of clinical processes to achieve better performance. ATP incorporates lessons on quality improvement theory, measurement and tools, healthcare policy and systems, and leadership, with hands-on projects that focus on improvement concepts. All IHC administrators and clinical leaders have to graduate from the program, further spreading a culture focused on the core strategy. Attendees come from around the world, and some have created their own spinoff programs based on ATP.

The second critical element of identifying and achieving tangible gain involves managing change on a scale that individuals, organizations and systems can handle. Where top-down, whole–system reengineering has been attempted at a national level, we have seen as many failures as successes. Failure seems to come not from limitations on the capacity or capability of healthcare IT systems, but from the degree of accompanying human change that is possible.

From our international observations at national and regional levels, we have not seen success on the journey to connected health where systems exceed population or subscriber numbers that exceed 10 million. This seems to pertain both to organizations and to geographies. In countries larger than that number, connected health development focused on smaller regional, state, provincial or subsystem “chunks” does seem to succeed better. Our surveys with health leaders around the world confirm this finding. Projects that are too big do not seem to work too well on the journey to connected health. When policymakers and health leaders have identified manageable targets and tangible, medium-term
outcomes, rapid progress is possible. We call this “chunkability,” and often this is about generating responsibility and momentum at a local or regional level to make progress on the national journey. One example—in the US is the proposed network of regional networks, bound together by national standards, certification processes and incentives to form the National Health Information Network.

It is also important to make sure that change is manageable and tolerable within organizations. Many of the successful connected health developments that we have studied have been achieved through incremental or step-by-step programs. Indiana Health Information Exchange (IHIE), for example, has taken an incremental approach to development, stacking new lines of service on top of pre-existing lines of service, positioning itself to continually propose, anticipate and respond to emerging models of quality improvement and care provision. Following this approach, IHIE has continually expanded and matured its services from its initial, relatively simple information exchange to a system with advanced analytic capabilities.

Ongoing monitoring and evaluation is essential to understand and manage progress toward the desired future state. This enables organizations to spot gaps, identify risks and improve processes. It is crucial to have in place the systematic process for review of progress, for learning lessons and for correcting performance. We know from Singapore, for example, that reflexive, continual monitoring and performance management can be a major contributor to success. Everything about connected health is up for constant revisiting and review in Singapore, and “bite size chunks” are watchwords. MOH Holdings has been able to enroll physicians into an EMR program through piloting processes, demonstrating benefits, being adaptive to GPs’ values and frontline needs and being willing to change systems and protocol as the program proceeds.

Dynamic 3 – Robust technology infrastructure

A robust information and communication infrastructure is a fundamental building block of connected health—providing the technical foundation for health information exchange that can drive integration and transform system performance. Robust means sound, reliable, capable and continually fit-for-purpose, which also means adaptable and reflexive. Healthcare IT infrastructures must align with the health system’s overarching healthcare vision and objectives and must be flexible enough to adapt as the needs, demands and aspirations of citizens, clinicians and health managers change. Determining from the initial planning stage what functionality should exist and what data will be shared and/or centralized is important to the design of the overall technical architecture. These decisions will drive the specification for major components of the architecture, including connectivity and messaging solutions, record locator applications, secure network infrastructure, data repositories and portals, as well as data warehouses.

Our research shows that realizing the full value from connected health technologies means embracing an approach that builds upon success, learns from failures and helps create a culture in which robust technological foundations continually evolve at a pace that is right for an organization’s changing and developing circumstances. Connected health is not a one-time fix.

For healthcare leaders, robust technology infrastructure demands that they are clear from the outset about the total cost of ownership over the course of its evolution, and not just as an initial investment. As integrated health delivery develops, some current technological components will require upgrade or replacement. Today’s new systems are tomorrow’s legacy systems—recycling technology will be a constant. Several case studies reported examples of outgrowing their infrastructure or key technical components of their connected health program. The extensibility of architectures and the limitation of risk through modular strategies are essential components of long-term success.

In Lombardia, for example, the CRS–SISS project included the deployment of an electronic identification system (CRS) using smartcards that aim to allow access to the network for both citizens and healthcare providers. The smartcard initially was an important enabler of the success of SISS, but now seems to be a limiting factor. Personal records can only be accessed by patients at locations where a reader is available, such as pharmacies, not in people’s own homes. Lombardia Informatica is now working with its partners to explore other options such as password authentication or use of mobile phones for authentication, in place of the smartcard.

Singapore’s approach has been to introduce the NEHR in phases, enabling the health system to take into account experience and learning from each phase and to exploit fast moving advances in technologies. Full implementation may take many years, and future phases have yet to be defined in detail, but they will look to incorporate the latest technologies.

The fast-moving nature of technology advancement in turn demands highly qualified health information capability—professionals who demonstrate strong project management skills and who are of the mind to look for new healthcare IT advances to keep pace—and sometimes lead—changes in organizational and clinical behavior. The Hong Kong Health Authority provides a stellar example of this. Its CIO attributes much of its success in IT development to its strong, committed and smart internal informatics group. Its fast and agile development work means that it can have a new system in place within six months. The HK government is relying on its expertise to design, develop, operate and maintain the new EHR and HIE infrastructure.
At the core of robust health information and communication infrastructure is a need to establish a sound framework for information governance—the processes, functions and standards that enable high-quality information to be created, stored, communicated, valued and used effectively and securely in support of an organization’s strategic goals. Health information governance is crucial to maximizing the clinical and administrative value of connected health and to reducing implementation and delivery risks. Information governance enables healthcare organizations to manage, maintain and control patient information effectively in support of patient care. It is also critical to physician buy-in.

As part of the information governance framework, compatible standards and procedures form the basis for health information exchange and interoperability. The exchange platform must be a secure network for health practitioners, such as the UK National Health Service’s N3 network. Common standards that ensure syntactic and semantic interoperability within closed systems (such as HL7 standards for HCIT interoperability, DICOM standards for digital image sharing, SNOMED CT standards for medical terminology and the WHO-developed ICD-10 standards for medical classification lists for the coding of diseases, signs and symptoms, abnormal findings, complaints, social circumstances, and external causes of injury or diseases) are vital.

While various international standard-setting organizations have made great progress in developing usable standards, often these are not specific enough to achieve interoperability at various levels. To set the foundation for scaling up health information exchange at a whole-systems or national level, further detailed specifications are required. Organizations such as Integrating the Healthcare Enterprise (IHE) and the Continua Alliance, though limited in resources, can help to create and operate processes through which interoperability of healthcare IT systems can be improved.

International evidence shows that, where such common standards and procedures are in place, technology systems can be implemented at a rate that allows change management processes to keep pace. In Singapore, for example, the Electronic Medical Record Exchange (EMRX) was introduced in 2004 to enable hospital inpatient summaries to be shared across healthcare clusters. This forward-looking yet limited initiative then acted as a platform for deeper integration—a National Electronic Healthcare Record (NEHR) designed to share summary patient health information across primary, secondary and community care settings. By ensuring a robust technological foundation, health leaders have been able to build on success and roll out connected health across the health system.

Constructing robust foundations around common standards and procedures also means that the building blocks of connected health can be put in place even when resources are squeezed. In Hong Kong, for example, policymakers focused a limited budget on putting standards, coding, terminology, formulary and identifiers in place at a very early stage of the connected health journey. An initial patient discharge summary module was built around the existing technology. Yet, with robust technological standards and procedures in place for use of that technology in healthcare, clinicians themselves were able to guide the development of the HKHA’s Clinical Management System (CMS) in a modular way—with information-viewing technology drawing from the transactional records of each individual hospital system.

Building on common standards and processes also allows “leapfrogging” technologies to be used, so that diverse and unequally digitized systems can be incorporated into ways of sharing health information that do not demand whole system reconfiguration. Madrid’s HORUS system is a good example. It uses viewing technology capable of integrating a mix of structured primary care data and unstructured hospital discharge data in PDF format. The result is a system that enables limited HIE today, but that has the potential to drive further and deeper digitization and integration across the region’s health system.

**Dynamic 4 – Co-evolution**

Co-evolution is about striking the right balance between strong leadership and vision from the top and the space that must be opened up for innovation and creativity at the front line. Both are needed. Get “top-down” wrong and complex systems may be implemented without the clinical buy-in and enthusiasm needed to make them sustainable in the long term. The result can be huge but fruitless expense to healthcare organizations and the taxpayer. Get “bottom-up” wrong and system-wide interoperability can be strained and alignment with organizational vision and strategy difficult to ensure. But if healthcare leaders can get the balance right by allowing co-evolution of connected health systems, our evidence shows that localized experiments, micro-scale clinical collaboration and regional piloting—conducted within a top-level framework of strategic goals, standards and support—can lead to the scaling-up of clinical ownership and innovative practice that can transform patient care and deepen overall system integration.

To create the dynamics of co-evolution, healthcare leaders must first establish the conditions for doctors, other healthcare professionals, managers, information specialists and even citizens to build their own solutions to the complex healthcare problems they face within their localities. Where this climate exists, and the results are taken seriously, we have seen groundbreaking innovation emerge. In Scotland, for example, a leading consultant and research director took the lead in developing a Web-based clinical information system for diabetes care in the Tayside region. Successful piloting of this led to a rolling out of the system at a national level, and the country now has an award-winning nationally integrated
single patient record for diabetes (called the Scottish Care Information-Diabetes Collaboration—SCI-DC) which spans primary, secondary and tertiary care. It is the success of projects like SCI-DC that has led to the Scottish eHealth Directorate taking a proactive approach to co-evolution, commissioning projects to be carried out by local organizations to develop and pilot local connected health solutions that—if proven successful—will be rolled out nationally.

In Denmark, a tradition of collaboration between professional associations and the policy community has enabled similar clinical innovations to become national policy. The country’s healthcare network, MedCom, has itself grown from a localized project initiated by a small group of regional GPs to the country’s independent yet government-funded e-health governance body.

Local needs drive site-level innovations, but learning from those local solutions and disseminating best practice across the organization or system is necessary to ensure interoperable connectivity. Managing co-evolution is about enabling the flow of information, developing lines of communication, and maintaining flexible relationships across different parts of the healthcare system. Innovative practices must be shared with others; clinicians and CIOs must have forums for discussion and debate; and the needs of diverse people and places must be given a voice. Where guidance or input is required to align innovation with organizational vision and strategy, that must come as an inherent part of the strategic change management process.

**Dynamic 5 – Clinical change management**

Clinical change management is the service delivery counterpart to strategic change management. The highest performing health systems show us that optimizing value through connected health means going beyond generating and sharing data and moving on to significant transformations, not only in organizational management but also in healthcare delivery.

While strategic change management deals principally with the alignment of organizational culture, systems and behaviors, clinical change management focuses on optimizing the efficacy of clinical service provision. We have observed organizations where strategic change management is the prelude to future changes in clinical practice. We have observed others where new clinical protocols are unsupported by changes in organizational management, systems and processes. The power of these two dynamics is in their functioning side-by-side.

Clinical change management entails the regular examination of data to develop an evidence base that can help reshape clinical decision-making and healthcare protocols, and streamline health management. For clinicians, analytics can provide evidence-based comparisons of performance to help determine the most clinically effective treatments for individual patients at the point of care. By implementing proven clinical protocols, physicians can reduce the variability of care, ensure use of best practices and manage costs of care.

Our case studies show that while statistical and quantitative analysis of care and treatment data is a powerful diagnostic tool that can be derived from connected health information exchange, analytics is only the diagnostic catalyst for change. It is not the panacea. Strong local clinical governance and collaborative relationships based on trust are essential to implement the improvements that analytics can put on view.

Clinical governance entails formal and regular physician peer review, performance management and agreed procedures and processes for design and implementation of clinical protocol. It provides the framework for clinical standards, responsibility and improvement. Together, analytics and clinical governance bring clinicians and managers together as part of a coherent change management process.

Intermountain is perhaps the best example of the application of health information analytics over a long term within a framework of clinical leadership and governance. It is renowned worldwide for leading practice in the development of analytically supported clinical protocol. Intermountain has operated a system-wide EHR since 1975, and it has used this as a basis to analyze data systematically on more than 1,400 clinical conditions and develop standardized protocols for physicians to improve care quality in what it discovered to be the 104 conditions that account for 95 percent of the healthcare needs of its patients. Intermountain’s analytical capabilities now benefit from more than 30 years of data so that new clinical protocols and clinician support mechanisms can be developed upon a wealth of evidence, and health managers can develop segmented and personalized organizational business planning. Central to these developments is clinical leadership and ongoing engagement. At Intermountain, where advanced work on development of new clinical protocols has been taking place over many years, physicians lead the numerous change task forces that have designed and implemented new guidelines for clinical practice, and continue to do so.

It has to be recognized that, for some clinicians, healthcare analytics may be daunting because it brings the potential of increased performance management and administrative accountability. But analytics also provides the basis for improved quality of healthcare delivery and improved outcomes for patients. To ensure the potential gains overcome any fears, healthcare leaders must
make certain that the processes of analysis and review are understood by clinicians as a means to enhance clinical capability and building better healthcare practices. Leaders must ensure that they have patiently engaged physicians and other health professionals in structured considerations of clinical performance and that they have fostered a climate that welcomes peer comparison, review and decision support.

The combination of clinical engagement and analytics also enables the development of new frameworks for healthcare policy and leadership at regional and national systems levels.

At a regional or local level, analytics can drive sophisticated frameworks for public health planning and strategic organizational reconfiguration. By analyzing clinical and administrative data (from medical records, claims processing, appointment scheduling, lab results and so on), organizations can obtain detailed insights into workflow and resource allocation across different parts of the patient care process. These insights can be used to optimize resource allocation and increase the efficiency of clinical processes.

At the system-wide level, analytics can be used to improve public health outcomes by evaluating population data sets to identify patients most at risk from chronic diseases or other high-cost health conditions. Using predictive analytic techniques, patient conditions can be managed and monitored proactively to ensure pre-emptive interventions that avoid hospitalizations and related costs. Those patients identified as being most at risk receive additional care and can be educated to manage their own treatment or change their behavior in ways that may improve their condition.

In this way, analytics can offer a picture of health processes and outcomes across diverse scenarios, identifying inequalities as well as good and bad practices, thus giving health leaders a means to identify needs and priorities for investment. These dynamics in turn can generate better quality information to drive citizen choice and empowerment.

The Indiana Health Information Exchange (IHIE) is a clear leader in this respect. It participates in many collaborative efforts at national and local levels on a variety of issues including HIE standards, analytics and care improvement programs. IHIE encourages stakeholder involvement in identifying new ways to use health information to support advancement in the use of health information throughout the region and across the country. Stakeholders need to be able to trust the system, confident that its value will be high and its risks low. IHIE works very closely with stakeholder boards to ensure all uses of data are approved by all participating organizations. Additionally, IHIE uses a technical architecture that stores all data separately by organization and only combines information when a specific query is run. This allows any organization to maintain control of its data and remove it at any time, should it need to.

Other health systems are successfully deploying analytics at a local and national level. Scotland, for example, has developed the Scottish Health Informatics Programme (SHIP), an ambitious, nationwide research platform which connects up existing local, regional and national databases, allowing data to be linked, made anonymous and analyzed. NHS Scotland collaborates with academic institutions to research population health outcomes. By improving the ability to analyze this data, SHIP is ensuring that Scotland is at the forefront of healthcare research globally, without having to rely on long-term, randomized clinical trials.

The benefits of clinical change management do not come cheap. The data warehousing required for system-wide analytics, the protocols needed for collecting clean data at source and the deliberations involved in design of new clinical protocol can entail large investments in money and time. Yet the ROI and—perhaps more important for physicians—the return on time can be very positive, as the experience of Intermountain shows.

"Partly it’s about finding new ways to accelerate the so-called translational lifecycle of medical research. Although randomized controlled trials are important, they can take several years and be very costly, and yet they can only ever hope to capture a subset of the relevant population. As access to and linkage between large population-based datasets improves, it will become increasingly possible to make similar deductions from observational data, and for theories to be continuously tested against the evidence as more observations are accumulated within the datasets."

—Professor Claudia Pagliari, Lecturer in Health Informatics, University of Edinburgh

Dynamic 6 – Integration drives integration

Connected health leaders describe the best working systems as those where integration of either health information or healthcare delivery drives emergence of new patterns of healthcare delivery and information exchange, respectively—a mutually reinforcing effect that is accelerated as more information and clinical practices are shared across teams of people, organizations and systems. Greater integration of healthcare IT drives greater integration of healthcare, which in turn drives further integration of healthcare IT.

What we have observed in some of our case studies is a virtuous cycle of integration, where building the functionalities of connected health increases the opportunities to deepen clinical and business process integration, to innovate and to change the behaviors, practices and expectations of stakeholders throughout the system. That in turn places new demands for new healthcare IT functionalities and even technologies. It is in this dynamic that we see
connected health generating the most tangible benefits in healthcare quality, access and cost control and the potential of connected health helping to transform the patient experience becoming a reality.

The key to deepening integration and successful innovation is strong and proactive project management that seeks to orchestrate the other five dynamics, and that is conducted in parallel with continual service appraisal and development.

Inspiring leadership and a clear vision empowers and shepherds the process. Robust technology and vigorous strategic change management must go hand in hand to facilitate organizational change. But this cannot only be mandated from the center—co-evolution is vital, freeing up clinicians and frontline innovators to develop new ways of sharing and using data. Meanwhile the deepening use of analytics within the framework of well-governed clinical change management must straddle this balance—identifying and helping create better ways to solve clinical problems at the front line, offering system leaders the means to make better strategic and evidence-based decisions. Synergies between these five dynamics must be actively orchestrated and strengthened, and performance and accountability monitored along the way. It will not happen on its own and, if not done purposefully, benefit realization will suffer as a consequence.

In addition to orchestrating the dynamics that characterize successful connected health development, healthcare leaders need to be vigilant about the need for parallel service delivery development. There is a constant need to be prepared to re-conceptualize what the organization is, what services it provides and how those services might need to be developed or extended to integrate delivery. There is little scope for integrating primary and secondary care, for example, if the organization or systems of each are disconnected, either technologically or clinically. And connections are important within both technology and clinical services as well. In the United States, for example, we have seen hospital systems reaching out to provide assistance and support for technology investment among independent primary care doctors to construct more integrated care and referral networks. Kaiser Permanente’s objective of “Home is the Hub” would be difficult to achieve without access to, or control of, out-of-hospital service delivery.

Achieving the virtuous cycle of deepening integration is still a distant aspiration for some healthcare leaders. Yet there are examples of where systems are getting close. In Madrid for example, the construction of HORUS health information viewing technology is driving the further digitization of paper hospital records and the further personalization of the system itself, as the region’s clinicians use, evaluate and benefit from integration to date. HORUS is the central element of a suite of connected health-related initiatives in Madrid and, as the program develops, can be expected to integrate separate connectivity and functionality even further.

Sharing information across organizations and systems fosters closer connections between clinical practices, which in turn set a frame for increased healthcare IT integration and sharing. This is the virtuous cycle, which must be encouraged and managed, enabling co-evolution and identifying needs for further development.

As each country develops connected health solutions along its own timeline, increasing integration will drive path-breaking change in the cost, quality and availability of care. For citizens, the increased availability of remote care—through telehealth, telecare, mobile (m)-health and remote communication with physicians—offers new ways for patients to self-diagnose, self-manage and take more control of their healthcare provision and outcomes. In the US, for example, the Veterans Administration is seen as a national leader in telehealth with more than 200,000 patients receiving care annually. The mission of these programs is to provide the right care, in the right place, at the right time to the appropriate patient. The associated aim is providing care for patients in the most convenient setting whenever safe, appropriate, effective and cost-effective. The VA experience shows telehealth can bring about transformative change in the management of high incidence chronic diseases in the population.

As integration drives further integration of both healthcare IT and healthcare itself, electronic patient record systems can be turned outwards, so that patients and doctors are working collaboratively to manage patient wellness and even across other elements of their lives. And as demographic change increases the pressure on health system managers, integrated working offers a massive opportunity to control costs through remote technologies, streamlined business processes and better long-term outcomes through preventative, whole-person approaches to care.

Connected health enables more integrated care, which places further demands on connected health. This drive to integration is where the big payback can be found for the organization, for clinicians, for payers and for patients. For in the end, connecting information and service delivery is actually about improving the health of all those served.
State of the connected health dynamic-country comparisons

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<th>Integration drives integration</th>
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- ![Circle](image) = recognized need/initial steps
- ![Circle](image) = progress being made
- ![Circle](image) = strong performance
- ![Circle](image) = sustained excellence

In general, against all six dynamics, Spain and Singapore clearly are leading this pack, with most other countries performing not as well, particularly in terms of “Vision and leadership” and “Strategic change management.” Australia and England are more strongly positioned with regard to “Clinical change management,” and some healthcare systems within the United States and Germany have advanced further than others on “Integration drives integration.”

Detailed assessments of each country are included in the appendix.
5. Assessing the Current State
5. Assessing the Current State

The broadest and deepest progress to connected health relies on both the actions of leaders and agencies that set national healthcare policies and the efforts and initiatives of the organizations that deliver health services at whatever level they operate. Progress is driven in different but equally important ways through policy, regulation and national investment and through operational strategies. Balancing the six dynamics of successful connected health across the ecosystem is crucial.

In Chapter 3 we identified four sets of barriers that we have observed globally in our research; these relate to system and policy, organization and management, clinicians and users, and patients and the public. It is important to have a clear appreciation of how those challenges do and will affect the organization in its progress toward connected health.

But it is just as important to assess the capabilities of the organization itself, not only in terms of its ability to overcome those barriers, but also to gauge the extent of its own knowledge, capacity for and commitment to change, and its resources, both in money and in time. As we showed in our discussion of the dynamics of success (Chapter 4), strong leadership with a compelling vision of health improvement, the active engagement of all clinicians—particularly physicians—and highly skilled change management capabilities are all essential.

The results of an honest assessment of a healthcare organization’s position and capabilities can be disappointing and seem daunting, especially when one looks at the tremendous time, effort and resources that others—like Kaiser Permanente and Intermountain—have put into the connected health journey. But this is not a reason to retreat from the challenge and, given the pressures and costs of healthcare delivery, doing nothing is not an option. Many organizations—in Singapore and in the regions of Spain, for example—have made steady and significant progress by developing realistic and modest initial plans, revisiting them frequently and pushing them forward as progress is made and new healthcare IT capabilities take hold. Knowing oneself is central to the journey.

Knowing oneself: Organizational diagnostic
We strongly advocate that organizations or systems that are embarking on the connected health journey begin by being very clear about their own current healthcare IT functionalities and by conducting intensive SWOT (strengths, weaknesses, opportunities and threats) analyses of external uncontrollable factors and of their own internal, manageable capabilities. Those that start down the path without having done such an assessment are likely to be surprised by barriers and challenges they had not anticipated.

Once on the path, constant review and revision are essential, as successful systems as different from each other as Kaiser Permanente and the Ministry of Health Holdings in Singapore demonstrate. Overcoming current challenges can present new issues and prospects. Building new capabilities, both technological and human, opens up new opportunities, especially when co-evolution is fostered. This is central to the dynamic of integration drives integration (dynamic 6).

Our international survey of physicians tested the use and prevalence of several of the connected health functionalities to help us assess national maturity of connected health development. The questionnaire used in that survey is presented in the appendix. A derivative of the survey questionnaire can be employed on an enterprise or organizational level to develop a precise picture of how healthcare IT is being used, both at the beginning of the journey and through its subsequent stages.
More fundamentally, we believe that the six dynamics of connected health success that we identified from our global research provide a solid basis for an ongoing SWOT analysis. To help healthcare leaders undertake that continuing assessment, we have structured and present below a diagnostic template based on the first five of the six dynamics: Vision and leadership, Strategic change management, Robust IT infrastructure, Co-evolution and Clinical change management. The diagnostic presents questions about internal organizational capabilities that have to be considered on a continuing basis and external, contextual factors that can affect organizational performance and need to be monitored. Taken together, assessments against these five dynamics provide the basis for designing the integrated project management at the heart of dynamic 6—Integration drives integration.

The diagnostic was designed to be most helpful at the organization/system level. But of course, the external, contextual factors usually can only be influenced or changed by national policy, legislation and investment decisions. We suggest that the lists of the contextual factors presented in the diagnostic template can also guide leaders in national or oversight agencies in gauging the effectiveness of policy and regulatory initiatives in promoting and enabling connected health at the organization/systems level. We have observed throughout the eight countries how national policies and initiatives can both help and hinder progress on the journey to connected health.

Within each healthcare delivery organization, we suggest that leaders may wish to expand and elaborate on the diagnostic basic template to capture the nature of the local environment and to reflect their organization’s own work, culture and business model. What remains important is to be constantly alert to new developments, challenges and capabilities and to use that knowledge to plan next steps. The gains of improved quality, access and cost control can only be maximized with deep knowledge of what the organization is—and is becoming—and a clear plan about how to apply that knowledge to building connected health.
The connected health diagnostic below can help guide organizations through this process.

**Vision and leadership focused on improved health outcomes**

<table>
<thead>
<tr>
<th>External, contextual factors to consider</th>
<th>Organization/system questions to be explored</th>
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<tbody>
<tr>
<td>• The organization and financial structure and the behavioral incentives of the country’s healthcare system.</td>
<td>• Is there a clear health outcome aspiration for the organization/system?</td>
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<tr>
<td>• The extent to which healthcare IT investment is politically sensitive or driven and subject to public scrutiny.</td>
<td>• Is there a coherent strategy linking healthcare IT investments to desired health outcomes?</td>
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<tr>
<td>• The number and diversity of potential partner organizations in terms of organizational structures and ways of working.</td>
<td>• Is there clarity about the clinical and operational benefits that are being sought through connected health development?</td>
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<tr>
<td>• Models of good practice on terms of healthcare IT development, change management and clinical engagement.</td>
<td>• Are there credible business cases linking investments in money and time to the interests and incentives of various stakeholders—e.g., different clinical professions, management and finance, and patients?</td>
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<td>• National/regional cultural attitudes about information sharing and security.</td>
<td>• Does top leadership have sufficient capability and time to devote to driving connected health development?</td>
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<td>• Are the mechanisms for communications sufficiently strong and clear?</td>
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<td>• Is there evidence-based awareness about potential healthcare IT costs and benefits? Is there realistic knowledge of the time required to optimize value?</td>
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<td>• Is the top leadership able to influence clinical behavior and work patterns?</td>
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### Strategic change management

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<tr>
<th>External, contextual factors to consider</th>
<th>Organization/system questions to be explored</th>
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<tr>
<td>• Other external pressures for change in service delivery patterns or finance.</td>
<td>• Are clinicians and other staff actively engaged in guiding and participating in long-term organizational change?</td>
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<tr>
<td>• Competition for clinical skills and for patients/subscribers.</td>
<td>• How are the voices of citizens and patients incorporated into new initiatives?</td>
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<tr>
<td>• Maturity of information technology use in general by the public and by professionals.</td>
<td>• Is there a realistic plan for the organizational and technical changes and manageable milestones needed to implement connected health?</td>
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<tr>
<td>• Level of fragmentation and/or integration in the country's healthcare delivery.</td>
<td>• Is the plan fully integrated with the human resource strategy, including training and communications?</td>
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<tr>
<td>• The ability of patients to choose where and how they receive health services.</td>
<td>• Is there dedicated, professional change management capability? Is there budget allocated to organizational change management?</td>
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<tr>
<td>• The level of influence achieved by stakeholder organizations (e.g., clinical professional associations, consumer advocacy organizations, disease-focused advocacy organizations, etc.).</td>
<td>• What is the experience of and facility for collaboration among the clinical departments, healthcare professionals and management?</td>
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<tr>
<td>• The role and influence of labor unions.</td>
<td>• Has provision been made for the potential disruptive impacts of change and technology developments on health service delivery, administration and revenue?</td>
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<td>• Is there sufficient capacity to train clinical users in healthcare IT use? Is there sufficient support to clinicians to assist in managing the additional time requirements of healthcare IT use, especially in the early stages?</td>
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<td>• Is organizational change subject to monitoring and performance management? Is there a clearly defined and understood core set of performance measures that is consistently tracked and reported? What are the measures of progress? How is success promulgated across the system?</td>
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<td>• Can the system sustain and cope with long-term change?</td>
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### Robust healthcare IT infrastructure

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<tr>
<th>External, contextual factors to consider</th>
<th>Organization/system questions to be explored</th>
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<tr>
<td>• Regulatory and legal frameworks restricting information exchange and/or protecting privacy and confidentiality.</td>
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<tr>
<td>• Information requirements of payers/funders and regulatory agencies.</td>
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<td>• Credibility, reliability and sustainability of available healthcare IT solutions and vendors.</td>
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<td>• The range of healthcare IT readily available in country including needed customization for language or culture.</td>
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<td>• State of competitors’ technologies.</td>
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<td>• Public/media concerns over privacy and security.</td>
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<td>• Existence or not of unique patient identifiers.</td>
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<td>• What is the state of current healthcare IT architecture? Does the HIE model align with system goals? Are there technical, legal or cultural limitations preventing information exchange?</td>
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<tr>
<td>• What are the current quality, completeness and consistency of health data being collected in various clinical departments?</td>
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<td>• Are there formal procedures, functions and standards for health information collection, storage, communication and use?</td>
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<td>• What are the procedures for data confidentiality, security and patient privacy? Are there agreed models for obtaining patient consent?</td>
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<td>• Is there clarity about the total long-term costs and benefits of healthcare IT ownership—i.e., looking beyond initial investments and identifying need for subsequent upgrading to new technologies and operations?</td>
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<td>• Are there standards for information interoperability in the organization/system?</td>
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<td>• Is there a plan to incorporate or migrate legacy systems into the connected health technology suite?</td>
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<td>• Is there sufficient technical expertise in the organization to manage healthcare IT implementation? Is there strong project management capability? Do healthcare IT professionals understand and buy into the organization’s health outcome goals?</td>
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<tr>
<td>• What are the healthcare IT skills of clinical and administrative professionals in the organization? Is there sufficient training provided?</td>
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## Co-evolution

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<th>External, contextual factors to consider</th>
<th>Organization/system questions to be explored</th>
</tr>
</thead>
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<tr>
<td>• Range and geographic distribution of alternative delivery channels available from other (or competing) health service agencies.</td>
<td>• Is there a culture of co-evolution in the system generally? Are there incentives for innovation and service improvement? Is there a fear of failure?</td>
</tr>
<tr>
<td>• The extent to which the economy and the employment market in particular encourage or discourage frontline experimentation and innovation.</td>
<td>• What is the experience of clinical innovation in the organization?</td>
</tr>
<tr>
<td>• The existence of national programs or policies to replicate and scale successful local pilot projects to state/provincial/regional or national levels.</td>
<td>• What systems and practices are in place to collaborate and jointly innovate with other organizations in the continuum of care?</td>
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<td></td>
<td>• What is the experience of collaboration between central leadership and frontline professionals?</td>
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<td></td>
<td>• Are there organizational guidance and frameworks to encourage clinical and technical innovation at the frontline?</td>
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<td></td>
<td>• Are there procedures and resources available for supporting local practice developments to ensure alignment with organizational mission and goals?</td>
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<td></td>
<td>• How effectively are successful pilot projects operationalized across the entire organization?</td>
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<td></td>
<td>• Are there procedures and resources available for collaborative learning and for dissemination of good practices in the organization?</td>
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<td>• Are there constructive relationships with the clinical research community?</td>
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<tr>
<td>External, contextual factors to consider</td>
<td>Organization/system questions to be explored</td>
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<tr>
<td>• Government and public health regulations regarding acceptable data sharing within and across national and state/provincial/regional boundaries.</td>
<td>• Is there a strong system of clinical governance in the organization?</td>
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<td>• Required quality reporting to government agencies.</td>
<td>• Is there a culture of reflective learning?</td>
</tr>
<tr>
<td>• Roles and influences of medical and other clinical professional bodies.</td>
<td>• What is the disposition of various clinical professionals regarding uses of new technologies, potential loss of time/productivity, legal liability and potential effects on income?</td>
</tr>
<tr>
<td>• Extent to which health system performance data is available to professionals and to the public.</td>
<td>• Are there formal clinical practice protocols and regular procedures for their review?</td>
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<td>• Is health information coded to enable sophisticated analytics?</td>
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<td></td>
<td>• Are there sufficient clinical analytical capabilities in the organization? Are there procedures and systems for data warehousing and analysis?</td>
</tr>
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<td></td>
<td>• Are clinicians engaged in identifying needs and priorities for investments in service change?</td>
</tr>
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<td></td>
<td>• Is clinical behavior performance managed?</td>
</tr>
<tr>
<td></td>
<td>• Is there organizational support (e.g., training, time) for changes in clinical behavior?</td>
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6. The Future of Connected Health
6. The Future of Connected Health

This study has shown how different countries, regions and health systems are employing connected health to develop new ways to achieve the critical goals of improving the quality of healthcare delivery, expanding access to vital services for increasingly diverse and demanding populations and getting a grip on the spiraling cost of healthcare. We have seen different priorities and approaches across a range of international case studies. But common across all of them has been a desire to improve system connectivity and deepen integrated healthcare delivery over the long term.

Connected health is a key enabler of integrated healthcare delivery. We have shown how leading countries, regions, systems and organizations are deploying healthcare IT in different ways to share information, improve business processes and generate better-informed and increasingly seamless interventions across the continuum of healthcare. From their different starting points, health leaders in many different countries are creating new models and setting new standards for healthcare delivery in the twenty-first century.

However, every step in the journey to connected health occurs in a unique environment, with its own leadership, structures, norms, policies and requirements. These contextual factors can act as constraints in realizing the full benefits of connected health. It is critical that organizations understand both the external, uncontrollable factors and their own internal, manageable capabilities and incorporate this insight into their planning. In doing so, successful programs are able to recognize and, to a large extent, mitigate structural, cultural, technical and environmental limitations by concentrating investments and change management efforts where they are most likely to succeed. But while high performing health systems seize short-term opportunities and celebrate early wins, they also maintain a focus on the long-term value proposition: improving quality, extending accessibility, controlling costs and efficiency, and—ultimately—achieving better outcomes for patients and communities.

The six dynamics that we have observed in the successful development of connected health demonstrate how healthcare leaders translate the vision of improved health outcomes into the on-the-ground organizational and behavioral changes that are needed. Vision and leadership sets the foundation. Strategic change management builds momentum for change within the clinical and policy community. Robust technology infrastructure creates a reflexive, adaptive healthcare IT framework. Co-evolution enables clinical leaders to be a catalyst for innovation. Clinical change management creates the potential for powerful system analysis to underpin evidence-based care. And managing these dynamics in concert creates a culture and a virtuous cycle in which integration can really begin to drive innovation.

It is this innovation that will shape the future of connected health—offering not only the potential to improve quality, access and cost-control today, but to radically transform the way healthcare is designed, delivered and experienced tomorrow.

High performing healthcare systems around the world are already showing us important elements of what the future holds. They are using healthcare IT adoption and health information exchange as a launch pad for the next wave of connected health development that could reshape clinician-patient relationships, facilitate holistic, fully integrated care for patients and shift healthcare spending from expensive, episodic interventions to preventative approaches and outcomes-based performance frameworks. In the next section, we highlight four potential areas of continuing growth and evolution that will shape the future of health system transformation.
Potential future developments in connected health

Deepening technology integration

"What you would hope is that [in the future] you’ve got the technology, the support that helps you navigate through the system so that your experience of healthcare is a single integrated joined-up process."

– Kevin Jarrold, Chief Information Officer, Imperial College Healthcare NHS Trust

We have argued that connected health can help create a virtuous cycle and, as healthcare leaders in high performing systems already know, putting the technological building blocks for HIE in place can provide the base upon which systems can evolve to keep pace with the needs of patients and clinicians. At the leading edge, this is about integrated systems that blend EMR with methods of communication, remote care and process management to build seamless systems and workflows. These “unified communications” systems also have the potential to create virtual links between front-end care delivery and system analytics.

These systems will develop as the pace of technology adoption allows, but we can see huge possibilities. New online clinician and patient interfaces are being developed that will make healthcare data and analytical tools easier to access, navigate and put to good use. Voice recognition technologies are being developed that can instantly digitize healthcare consultations and integrate them into EMR systems. Natural language processing will facilitate the extraction of free text data from EMRs, converting it into structured data that allows for more sophisticated analytics. And in the back room, cloud technologies are being explored as a way of accessing huge remote server capacity, providing the flexibility to quickly deploy new technologies and information at the front line. These are all developments that build on the platform generated by effective information exchange and that raise the potential of generating huge process efficiencies, more informed clinical decision-making and a broader range of healthcare services.

Enabling flexibility and remote care

"The real transformational opportunity in healthcare is in consumer directed healthcare... The end game is really about outcomes."

– John Mattison, Chief Medical Information Officer (CMIO), Kaiser Permanente, US

Effective HIE builds the platform for a more mobile, flexible and adaptive type of healthcare delivery—in which the mobile and remote technologies we use in everyday life become a central part of how we interact with clinicians and manage health conditions. M-health represents a broad range of applications, from handheld devices to facilitate remote diagnosis, through to touch-screen technologies and “smart” devices (such as “intelligent shirts” that use electrodes and sensors to monitor patients’ vital signs, activity sensors and webcams) that allow remote monitoring and communication. The impact of self-monitoring can be significant, with many studies showing that self-management programs can improve outcomes and reduce costs for a number of chronic conditions. One study by Kaiser Permanente, for example, found that patients doing self-monitoring of their vitals were 50 percent more likely to have their blood pressure under control than those who were not self-monitoring.

As policymakers across the world look for ways to redirect healthcare interventions away from expensive hospital settings, telemedicine, remote care and m-health will become increasingly important, both as “stand-alone” solutions for individuals, and integrated approaches that blend these technologies with EMR and holistic monitoring systems.

"I think that the ways in which the patient interacts with their record is going to continue to expand... more transparency in their records, more communication via their computer. Where does most healthcare take place? It takes place in people’s homes. It’s only some of the time they come to a clinic and even less of the time they come to a hospital. So if we want to really affect people’s health, I think we are going to probably end up moving more into people’s homes, whether that means devices like a blood pressure monitor that transmit results that they get integrated into the record or... a game or an application for a smart phone that helps remind people to take medicine or makes them play a little game that helps them to exercise... These are some of the ways in which, overall, we are going to integrate more technology into healthcare."

– Ben Broder, M.D., Ph.D. ,Kaiser Permanente SCAL, Systems Solutions and Deployment, Inpatient EMR Physician Lead

"[Telemedicine] makes medicine multidisciplinary, without moving the patient or the doctor."

– Healthcare leader, Midi-Pyrenees Regional Health Service, France

M-health is an evolving field and, as new technologies hit the mainstream, new health solutions are being created. For example, touch screen technology is enabling GPs and specialists to use tablet PCs as a means of communicating information to patients at the bedside or remotely. Devices using digital ink allow patients to input information and draw pictures of their conditions. And as smartphones become increasingly more powerful, the capability is there to share high-quality digital images and conduct
remote consultations by video. The increasing use of high-speed broadband networks and social networking technologies both brings clinicians together in diagnostic networks and collaborative working groups and allows patients to engage with healthcare and other public services online.

Building integrated care around patients

"Patients need to be taking charge of their health a lot more ... and e-health is what is going to enable it. Ten years from now you are not going to recognize the way it is being delivered and the role of the consumer in their own care."

–Tom Closson, President and CEO, Ontario Hospital Association, Canada

The financial crisis and rising demand is forcing healthcare providers to rethink the way citizens engage with their health services. Many of the experts with whom we spoke pointed to this imperative as a next major step in connected health development. The question they pose is simple: “How can health systems better engage patients in their own health and wellness?” But what the question also implies is an additional concern about the patients’ potential role in cost containment.

Several developments already point the way. New, independently developed, mobile healthcare “apps” are giving people the tools to eat well and live well, and to begin managing their own healthcare needs. Industry data suggests that this will be an area of huge expansion over the coming years, embracing the potential of more powerful smartphones, tablet PCs and cloud capability. And, as Accenture research has argued, these individual, “standalone” solutions are likely to develop into more integrated approaches that link mobile capabilities into EMR, appointment and e-prescribing systems. These approaches engage the citizen in the creation and use of personal health records (PHRs). These records are platforms upon which patients can access their own data, communicate with clinicians, interact with other patients (perhaps as part of “expert patient” programs) and organize appointments, diagnostic tests or consultations.

And there is an appetite among patients and the public to be more engaged. Accenture’s 2010 Citizen Experience Study—which measured citizen perspectives across 16 countries worldwide—found that an average of 61 percent of people agreed that the general public should be much more actively involved in shaping health services. This public interest will further drive the development of PHRs. According to the California Health Foundation, for example, only 7 percent of adults use a PHR today, but 40 percent express an interest in doing so. Although serious challenges remain, there is enormous potential for PHRs to transform the role and engagement of patients in their own wellbeing—for instance through shared decision-making, conditioning monitoring and chronic disease management.

"I would like to see a world where as a patient I can have my own PHR, and it’s a repository from every health provider I’ve seen, and I can seamlessly interact with my healthcare provider, and my providers can interact with each other. That will happen sooner than later."

–Trudi Matthews, Director of Policy and Public Relations, HealthBridge, United States

Transforming personalized medicine

For experts with whom we spoke in the United States and Singapore, the next transformative step on the journey lies in exploring the potential of genomics. By identifying and integrating a patient’s unique “biomarkers” into EMR systems, genomics offers the possibility of personalizing treatment and wellness plans. The potential is enormous. Where patients have a genetic predisposition to certain medical conditions, early or even preventative interventions can be identified. Clinicians can deploy pharmacogenomic techniques to assess the effectiveness of different treatments. For this level of analysis and treatment to become widespread, there is much to be done in building a global evidence base and addressing legitimate concerns over data security and privacy. But as patient-clinician connectivity and engagement increases, there is every chance this potential will become the reality for connected health systems.

"I think there is another level of analysis which might enable what I would call personalized medicine.... So given my genomic analysis, you should be able to have some statistical view with respect to the likelihood that I may develop certain diseases. Or even to see how I might react adversely to certain types of drugs. All this genomic information could be captured in the patient’s electronic medical record. This is not case today."

–Robert Chew, Alexandra Hospital Board Member and OpenNet Board Member, Singapore

As we have argued, optimizing value from connected health technologies is about integrating different functionalities and deepening the connections across healthcare systems and providers. Here the challenge is to integrate developments in genomics with EMR, HIE and unified communications systems. This
would present clinicians with a powerful range of analytical and diagnostic tools, and would enable managers to coordinate care, target resources and improve public health outcomes.

Some healthcare systems are already exploring this potential. In Northern California, Kaiser Permanente's Research Program on Genes, Environment and Health (RPGEH) is assembling one of the world's largest biobanks of genetic, environmental and health data. The biobank—which is working on DNA data from approximately 400,000 volunteers—will enable research to determine which genes and environmental factors, and lifestyles and habits, are linked to specific diseases such as heart disease, diabetes, cancer, asthma, mental health disorders and others. The findings will increase the health system's ability not only to diagnose illnesses and deliver the best possible treatments, but also to prevent people from becoming ill in the first place.

Moving forward on the journey

There is no single route to traverse the progressive stages of health healthcare IT adoption, health information exchange and care transformation, as our studies in the eight countries and beyond have demonstrated. And where one begins and what are the next issues to be addressed will be determined by local diligence and resourceful planning. Faced with severely constrained resources, some countries and systems—like Hong Kong—have made significant progress in developing connected health, especially in comparison to others that have spent much more for less success. The key is constant vigilance over what can be done, of what costs and benefits can realistically be expected, and of the organization's capacity, evolving expertise and determination.

Embarking on the journey to connected health requires careful assessment, planning and preparation. Wherever a healthcare system may be in its current healthcare IT development, the nature and scale of the challenges faced in the journey forward will depend upon the particular national, regional and systemic context in which the organization operates.

We strongly advocate that organizations or systems that are embarking on the connected health journey begin with clear assessment of their own current healthcare IT functionalities and with a detailed analysis both of their own internal, manageable capabilities and of the external uncontrollable economic and political factors that will influence their journey. We believe that the six dynamics of connected health success that we identified from our global research provide a solid basis for such analysis.

Our research also demonstrates that “biting off more than one can chew” can result in failure. The manageable change and planned incremental action that we observed in the more successful national and system initiatives should encourage those who recognize that the journey forward is made one step at a time. Overly ambitious plans—especially if they are undertaken without first establishing a sense of ownership across the organization and especially with physicians—can be a mistake.

Unlike some other journeys, the march to connected health toward more integrated healthcare, will not cease. Clinical developments, technology advances and the growing needs and demands of patients will constantly present new pressures, challenges and opportunities for healthcare delivery systems and organizations. Connected health is not a one-time investment—it is a permanent and evolving part of operations that requires sustained financial backing, technical expertise, organizational change and political will.

Our study clearly demonstrates that connected health offers massive opportunity for forward-thinking healthcare leaders to achieve the aims of increased quality, sustained access and managed cost. Our research points to a future in which integrated healthcare and improved health outcomes can be better achieved through the power of healthcare IT and the systematic broadening of health information exchange. Connected health helps drives integration and innovation, and the future prospects of each is more exciting and more value-producing—if also more challenging—than today.

By developing and harnessing the value of connected health, healthcare leaders around the world are better placed to create the future, to lead a journey toward high performance and improved health outcomes—for themselves, their organizations, their patients and their countries. It is an arduous journey, but one well worth making.
i. The EHR Impact Study, conducted by Empirica Communication and Technology Research and TanJent Consultancy, 2010

ii. See https://himshie.pbworks.com/w/page/4777793/HIEModels


iv. Accenture Citizen Experience Study for Health, 2010

v. Accenture Citizen Experience Study for Health, 2010

vi. Accenture Citizen Experience Study for Health, 2010

vii. For more information on healthcare information governance, see Information Governance: The Foundation for Effective e-Health, Accenture Institute for Health and Public Service Value


ix. “M-Health: All About It—What Tangible Opportunities Exist Today?” in Insight on Hospital and Healthcare Management 1(2) at www.hmglobal.com

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Country Summaries
Country Summaries

In this appendix, we present our assessment of how the eight countries included in the study—Australia, Canada, England, France, Germany, Singapore, Spain and the United States—are progressing in connected health, based on findings from our survey of 3,700 physicians, in-depth interviews with health system leaders in each of the countries and, where applicable, relevant case studies.

Through our research, we identified 17 key functionalities of connected health that drive value across the three stages of the connected health journey: Healthcare IT adoption, health information exchange and insight driven healthcare. Based on the interviews and findings from the survey, we describe the adoption and utilization of the different functionalities and assess each country’s progress along the three stages of the journey.

In addition, each country summary considers the ongoing challenges for connected health progress, assesses how each country matches up against the six dynamics of successful connected health and outlines the future priorities for making further progress.
The health system in Australia

- Total population: approximately 23 million (with many residents in remote areas).
- Financing and governance is bifurcated, with responsibilities split among the federal, state and territory governments.
- Nearly 70 percent of total healthcare spend is publicly funded with the federal government covering approximately two-thirds of the public health budget. Almost half of all Australians have some sort of supplementary private coverage.
- With life expectancy of 81.6 years, Australia ranked fifth in the latest OECD ranking (2011).
- There are three doctors and 10.2 nurses per 1,000 population (compared to an OECD average of 3.1 and 8.4 respectively) and 7.7 hospital beds (compared with the OECD average of 4.9).
The Australian context

To date, connected health progress in Australia has varied across different care settings, geographic regions and organizations. However, the health system is undergoing a major national reform process and recently introduced policies signal a step change. Connected health is seen as crucial to drive wider policy goals of improved access to healthcare services, quality of care and system efficiency. The national government’s e-health strategy, which is supported by all levels of government, is providing the means to reduce fragmentation. The e-health strategy includes:

- Development of a nationwide personally controlled electronic health record (PCEHR) system for initial deployment in July 2012.
- Investment in point-to-point technologies such as electronic referral, electronic discharge and event summaries, and electronic transmission of prescriptions.
- Significant investment in interoperable infrastructure—including health identifiers (supported by national privacy legislation), interoperability standards and a national compliance body to review, test and certify solutions.
- Introduction of a national vendor accreditation scheme.
- Various programs for delivery of clinical information systems to primary and secondary care settings.
- Establishment of a national health portal.

This work has been consolidated under the National e-Health Transition Authority, NEHTA, an independent, time-limited authority established by Council of Australian Governments (COAG).

Australia has set up a national investment fund to drive development of high-quality, scalable e-health priority solutions across the health system. In primary care, the incentives that the federal government provides under the practice incentive payment program (ePIP), have driven uptake. Under this program, GPs can choose among 13 incentive areas, some of which relate to e-health progression.

The nearly AUD$500 million investment in the national PCEHR is a critical cornerstone of the e-health strategy. By July 2012, NEHTA and the Commonwealth government expect a national PCEHR infrastructure to be fully developed, allowing initial deployment in July 2012.

“We are really talking about a generational change in terms of healthcare delivery and the transformative power of e-health in terms of new models of care…. We are at the beginning of the journey.”

--David Johnston, Director, eHealth Advisory Services

Australia’s progress on the connected health journey

In this section, we describe Australia’s progress across the three stages of the connected health journey: Healthcare IT adoption, health information exchange and insight driven healthcare.

Healthcare IT adoption

In comparison to the other countries in our study, Australia is relatively far advanced in healthcare IT adoption, particularly in primary care.

Across Australia, most general practitioners use some form of computerized system in their care management. Our physician survey shows that 87 percent of GPs surveyed enter patient notes electronically either during or after consultations. Nearly seven in 10 use healthcare IT to reduce administrative burdens in their practice, and roughly the same number use automatic alerts and e-reminders at the point of care. In all these areas, primary care clinicians in Australia are ahead of their peers in most of the other countries surveyed. However, the healthcare IT systems primary care clinicians in Australia use are disparate and vary in quality. As a result, clinicians rarely share the records they have.

The rate of uptake and use of healthcare IT among specialists and hospital clinicians is lower than that of general practitioners. Fifty percent (out of a possible 76 percent whose organization operates an EMR system) said they enter patient notes electronically either during or after consultations (with about half of clinicians entering patient notes themselves) and about 26 percent say they do this on a routine basis. One in 10 uses some form of computerized clinical decision support system or electronic alerts and reminders while seeing patients. Forty-four percent of clinicians in secondary care use healthcare IT to reduce the administrative burden (compared with 70 percent in primary care).

Patterns of healthcare IT adoption, however, vary significantly across regions and organizations. South Australia, for example, is using a statewide clinical information system (CIS) across 75 percent of its public hospitals, while New South Wales has recently deployed its CIS across many parts of the state (with varying results). Some states, however, have invested millions with little or no return and few demonstrable benefits to date according to the healthcare industry executives interviewed.
Health information exchange
The extent to which Australian clinicians share health information across the system is less advanced than in other countries in the study. Our survey shows that 15 percent of primary care clinicians and 35 percent of secondary care clinicians communicate electronically with clinicians in other organizations. About a quarter of primary care clinicians are electronically notified of their patients' interactions with other health organizations, have electronic access to clinical data about a patient who has been seen by a different health organization and electronically send order requests to laboratories (for some diagnostic tests, for example). In secondary care, the numbers are 6 percent, 28 percent and 17 percent respectively. Six percent of primary care clinicians send prescriptions to pharmacies electronically. In secondary care settings, this number is 3 percent, below the survey average.

Electronic communications with patients (online consultations, for example) are also rare, although recent government additions to the Medicare benefits schedule, such as new items for telehealth consultations and coordinated care, are expected to help make these services more attractive. The private sector is generally less advanced than its public sector counterparts in health information exchange, largely because it has less incentive to invest in IT systems that span wider than its own immediate sites.

Health industry executives suggest that a major reason for the relatively low levels of HIE across primary and secondary care is the somewhat fragmented nature of the health system in which different states, territories and organizations have followed their own paths. While there are examples of good practice in health information exchange, such as e-referrals in the Australian Capital Territory, most HIE happens within organizations and not yet between different sectors and care settings. Up until the establishment of NEHTA, there was no overarching body responsible for coordinating efforts. So traditionally there has been little impetus for collaboration and connectivity across different jurisdictions. Most of the health industry executives interviewed commended the role of NEHTA in delivering the e-health strategy and said that initiatives like PCEHR would provide a foundation for HIE now and in the future as they continually evolve in line with consumer needs.
Progress in primary care: percentage of clinicians using a range of healthcare IT and HIE functionalities

Accenture survey question: How often do you perform the following functions (results show percentage of clinicians that use “routinely”)?

Healthcare IT adoption and HIE: primary care – Australia

In primary care, Australia is ahead of the survey average in a few aspects of connected health, including electronic patient notes, alerts and reminders, and electronic results.
Progress in secondary care: percentage of clinicians using a range of healthcare IT and HIE functionalities

Accenture survey question: How often do you perform the following functions (results show percentage of clinicians that use “routinely”)?

Healthcare IT adoption and HIE: secondary care – Australia

In secondary and specialist care, Australian clinicians tend to lag behind other countries in most aspects of healthcare IT adoption and HIE.
In an effort to improve service efficiency levels and patient outcomes, the Australian Capital Territory (ACT) health department has instituted a bidirectional electronic referrals solution between the 90 general practices in the region and the Canberra Hospital, the major teaching and trauma retrieval hospital providing specialist services to about half a million people across the ACT and the southeastern part of New South Wales.

The e-referrals system is based on end-to-end information exchange between primary and secondary care providers. To refer a patient, a standardized template is integrated into the GP Patient Management System (PMS) to create a referral. The referral is automatically populated with relevant patient information from the PMS, reducing the time GPs spend retyping data. GPs can also attach and send results to the referring specialist. Once completed, a copy of the referral is saved in the PMS and electronically sent to the hospital system. Once dealt with at the hospital, the system then sends back information such as confirmation of appointment date and time and triage categorization by the specialist to the GP’s PMS.

The e-referral system, which is one of the first integrated solutions in Australia, has already begun to generate benefits, streamlining administrative processes and reducing referral errors. Building on the initial success of the program, work is now underway to extend the e-referrals solution to other PMS vendor systems and roll out the project to the southeastern part of New South Wales. This will involve another 28 GP practices and reach a population of more than 500,000 Australians.
Insight driven healthcare

Given the number of past e-health initiatives within different levels of government and the private sector, insight driven healthcare is, as yet, largely limited to application of data analysis within individual organizations. Eighty-four percent of primary care clinicians state that they share their patients’ clinical data across their own organization and use it to help improve their clinical care protocols. In secondary care settings, this figure drops to 66 percent. As is the case in most countries around the world, doctors do not regularly share electronic patient data with other organizations with the purpose of improving joint clinical protocols and patient care: 31 percent of primary care clinicians and 35 percent of secondary care clinicians say that they use data for this purpose. The percentages are only slightly higher when it comes to sharing patients’ clinical data for population health reporting and disease management. The health industry executives we interviewed, however, are optimistic about the potential value of these functionalities once the foundations of consistent usage of national identifiers and the PCEHRs are in place.

To enable sophisticated health data analytics to improve patient care and population health management, individual patient data needs to be systematically collected and stored in a form that is easily accessible and enables interrogation. This in turn, requires data to be entered in a structured, and ideally coded, way. To shed light on the extent Australia—along with the other seven countries surveyed—is able to apply analytics to drive improvements, we asked clinicians to indicate how they currently enter data in their CIS. We found that just under one in four clinicians now enter patient data in a coded way. By international comparison, this level of coded data is relatively low and places Australia behind England, Singapore and Spain. However, more than two in five clinicians in Australia report that they enter data in a structured way, which can provide a relatively solid information base for analytics.

Health industry executives we interviewed recognize this discrepancy, but point out that much of the data currently collected is not optimized as fully as it could be. However, the Department of Health and Ageing’s National Health Reform (NHR) Enterprise Data Warehouse (EDW) Program, which will be operational beginning in June 2012, is expected to go a long way in helping optimize the use of available information. There are notable exceptions to the current picture: The Northern Territory, for example, is using data from a patient-owned model of health information to produce population level data about chronic disease within the community. There are other examples throughout the country, but they are limited to a particular region and/or with a specific clinical or administrative focus and not system-wide.

How electronic clinical patient data is used

Accenture survey question: To what extent do you use the clinical patient data you collect electronically in the following ways?

<table>
<thead>
<tr>
<th>Australia</th>
<th>Global Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Care</td>
<td>Secondary Care</td>
</tr>
</tbody>
</table>

| | Patients’ clinical data are shared across my organization and used to help improve our clinical care protocols and clinical outcomes | 84% | 66% | 78% | 77% |
| | Patients’ clinical data are shared with other organizations, including public health authorities, to improve protocols and patient care | 31% | 35% | 44% | 45% |
| | Patients’ clinical data are shared with other organizations, including public health authorities, for population health reporting, disease management | 36% | 35% | 46% | 47% |

Note: number of clinicians who use electronic clinical patient data for different purposes to “some extent” or “to a great extent.”
How patient data is currently entered in the system

Accenture survey question: Please indicate which statement most closely describes how you currently enter the following data in your electronic system.

- **US**
- **Spain**
- **Singapore**
- **Germany**
- **France**
- **England**
- **Canada**
- **Australia**
- **Average Survey Total**

Legend:
- **Coded**
- **Structured**
- **Unstructured**
In terms of technologies that directly engage patients, Australia is not yet as far advanced as a majority of the other countries surveyed. However, recent government additions to the Medicare Benefits Schedule, such as new items for telehealth consultations and coordinated care, are expected to help make these services more attractive.

“Individuals need to take more responsibility and accountability for their health.”

–Dr Ian Rogers, NSW Health

Currently, approximately 4 percent of Australian clinicians indicate that their patients can use telehealth devices to monitor and record their own health indicators and remotely inform clinicians of their conditions, and 3 percent of clinicians indicate that their patients can electronically access their medical information. Seventeen percent of doctors state that their patients can electronically access health information/education to help them manage their own conditions, and more than two in five clinicians enable their patients to see health-related information during the consultation.

“Patients need to be told about the benefits and given the imperative to use new technologies. There is no point in building these things if patients do not understand the benefits and why they should be signing up.”

–David Freemantle, Fred IT Group
## The technologies available to patients

Accenture survey question: Please identify which of the following patient-related technologies are available to your patients:

<table>
<thead>
<tr>
<th>Technology</th>
<th>Australia</th>
<th>Survey average</th>
<th>Canada</th>
<th>England</th>
<th>France</th>
<th>Germany</th>
<th>Singapore</th>
<th>Spain</th>
<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients can electronically access their medical information</td>
<td>2.4%</td>
<td>8.2%</td>
<td>2.8%</td>
<td>6.7%</td>
<td>5.2%</td>
<td>3.2%</td>
<td>42.6%</td>
<td>6.6%</td>
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</tr>
<tr>
<td>Patients can electronically book/change/cancel appointments</td>
<td>2.6%</td>
<td>20.7%</td>
<td>4.0%</td>
<td>33.3%</td>
<td>7.6%</td>
<td>22.8%</td>
<td>52.5%</td>
<td>44.9%</td>
<td>16.8%</td>
</tr>
<tr>
<td>Patients receive electronic reminders when it is time for preventative or follow up care</td>
<td>19.8%</td>
<td>18.9%</td>
<td>6.4%</td>
<td>17.1%</td>
<td>8.0%</td>
<td>16.9%</td>
<td>51.5%</td>
<td>32.3%</td>
<td>18.8%</td>
</tr>
<tr>
<td>Patients can see health-related information during the consultation</td>
<td>41.5%</td>
<td>29.2%</td>
<td>18.4%</td>
<td>35.9%</td>
<td>28.3%</td>
<td>24.8%</td>
<td>44.6%</td>
<td>22.6%</td>
<td>26.6%</td>
</tr>
<tr>
<td>Patients can electronically request prescription refills</td>
<td>4.6%</td>
<td>20.6%</td>
<td>7.2%</td>
<td>33.3%</td>
<td>12.0%</td>
<td>27.8%</td>
<td>29.4%</td>
<td>29.9%</td>
<td>25.8%</td>
</tr>
<tr>
<td>Patients can communicate with me electronically, for example, through secure email or video conferencing</td>
<td>20.6%</td>
<td>27.4%</td>
<td>19.2%</td>
<td>16.7%</td>
<td>29.5%</td>
<td>47.4%</td>
<td>45.1%</td>
<td>25.7%</td>
<td>25.4%</td>
</tr>
<tr>
<td>Patients can use tele-monitoring devices to monitor and record their own health indicators and remotely inform me of their conditions</td>
<td>3.6%</td>
<td>7.5%</td>
<td>4.4%</td>
<td>8.2%</td>
<td>6.4%</td>
<td>6.7%</td>
<td>26.5%</td>
<td>8.0%</td>
<td>7.5%</td>
</tr>
<tr>
<td>Patients can electronically access health information/education to help them manage their own conditions</td>
<td>17.0%</td>
<td>19.3%</td>
<td>14.2%</td>
<td>25.9%</td>
<td>14.5%</td>
<td>4.4%</td>
<td>39.2%</td>
<td>30.1%</td>
<td>21.0%</td>
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</table>
Ongoing challenges for connected health

While there has been significant progress over recent years, the development of connected health in Australia will continue to face certain challenges. The Australian health industry executives interviewed identified five barriers to progress on the journey toward connected health:

1. **System-wide fragmentation:** Despite recent efforts to coordinate care across the system, the inherently fragmented system of governance, funding and delivery is continuing to pose challenges to the progression of connected health. However, many of the health industry executives we interviewed agreed that the recent efforts to boost the federal level role (including the strengthening of the cross-national NEHTA body) are an important response to the system fragmentation challenges.

2. **Culture change:** Most of the Australian health executives interviewed agreed that the greatest challenges for achieving connected health are cultural in nature, not technological, and are not being sufficiently addressed. Some of the specific cultural challenges relate to: establishing political support and impetus for changes, achieving buy-in to the vision and strategic plans, bringing clinicians and health professionals on board to support changes in clinical workflow and engaging with patients to address public privacy and security concerns. While technical challenges are significant, they are not insurmountable. The prevailing view is that NEHTA and the investment in interoperable infrastructure (including the development of national standards) will be successful in addressing technical challenges.

3. **Establishing an appropriate financial incentive model:** Many of the health executives we interviewed believe that private hospitals and GPs do not have sufficient incentives to invest in a connected health infrastructure. While certain incentives are already in place, many argue that they need to optimize these incentives to achieve the e-health vision for Australia—through greater infrastructure funding subsidies, for example.

4. **Demonstrating and measuring benefits:** The issue of how to identify progress and measure the benefits of connected health investment is critical. Many of those interviewed agree that demonstrating benefits remains the most effective response to the cultural barriers and to achieving public and professional buy-in. Support will build as e-health investments begin to deliver returns on their investment with notable improvements in the quality of care.

5. **Political will and consistency of approach:** The health industry executives emphasize the importance of continued focus on implementation over the coming years and are concerned that a change of government during the next federal election could slow the progress of NEHTA initiatives. Similarly, they argued for the necessity of keeping connected health a funding priority in the context of the wider fiscal management challenges.

"[The challenge] is 80 percent change management, 20 percent IT."

–Professor Paddy A. Phillips, Chief Medical Officer, SA Health

In the quantitative survey, we also asked clinicians to list their top five barriers to healthcare IT adoption and HIE. Forty-five percent responded that lack of interoperability is a major barrier with IT systems not being able to "talk" to each other. A similar number of physicians say that their organization’s costs are a major barrier. Related to this barrier is a concern about loss of productivity as a result of spending too much time inputting data (mentioned by nearly two in five). Furthermore, 35 percent of physicians in Australia mentioned privacy and security concerns as a major barrier, and a similar number point to lack of IT literacy—with lack of training among clinicians and staff—as a major barrier.
Top five barriers experienced by Australian clinicians

Accenture survey question: Please select the five main barriers to the adoption and use of electronic medical record systems and health information exchange in your organization.

- Costs to my organization
- IT systems that can't talk to each other
- Concern about loss of productivity too time consuming to input data
- Concerns about privacy and security of patient data
- Low IT literacy—lack of training among clinicians and staff

[Bar chart showing the top five barriers with corresponding percentages]
How Australia matches up against the six dynamics of successful connected health

<table>
<thead>
<tr>
<th>Dynamic</th>
<th>How does Australia match up against these dynamics?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vision and leadership focused on improved health outcomes</td>
<td>The health system in Australia is characterized by a complex mix of provision, funding and governance across the federal, state and territory governments. As a result of this complexity, the development of healthcare IT has been somewhat patchy and fragmented across the system. However, with the launch of the national e-health strategy in 2008, connected health gained new momentum—not least because the Council of Australian Government (COAG) took a greater role in setting the overall vision. The goals for connected health are seen as critical means of supporting the high level political vision of greater care integration and improved cost management across Australia’s multi-tiered health system. This commitment is backed by dedicated funding from the federal government, and a number of state-led initiatives to advance connected care.</td>
</tr>
<tr>
<td>Strategic change management</td>
<td>The COAG has strengthened the role of the National e-Health Transition Authority (NeHTA) in an effort to achieve change across the inherently fragmented system of governance and delivery. Yet, while this has been instrumental in developing the infrastructure, there is concern that the broader cultural challenges related to encouraging uptake are not yet sufficiently addressed. There are now efforts to strengthen the program of change management to encourage physician adoption, vendor compliance and patient engagement—the latter being critical because of the “opt-in” approach, which requires patients to opt into the national e-health system and determine the level at which their personal data is shared. The Federal Department of Health and Ageing (DoHA) is increasingly assuming a leadership role in this area—a reflection of the importance of e-health to the government’s wider agenda in terms of national health and hospital reform.</td>
</tr>
<tr>
<td>Robust IT infrastructure</td>
<td>The healthcare IT adoption and use of EMRs varies significantly across different care settings, states and territories. And, although there are pockets of good practice (general practice, for example), health information exchange across sectors is still at a relatively low level and constrained by the limited use of EMRs in hospitals. There is good progress, however, around setting standards for interoperability based on the HL7 framework. NeHTA is driving this development and, in doing so, the agency is building relationships with system suppliers and end users. In addition, the federal government has committed to deliver a national e-health platform, known as the Personally Controlled Electronic Health Record (PCEHR) system, by July 1, 2012. As a consequence of the strengthened national coordination and the PCEHR initiative, there has been significant progress in addressing the technical or interoperability barriers to connected health.</td>
</tr>
<tr>
<td>Co-evolution</td>
<td>The Australian approach is distinctively “middle-out,” with a combination of “top-down” and “bottom-up” initiatives. “Top-down” initiatives include the PCEHR system, to be delivered as core e-health infrastructure by July 2012, and NEHTA-led interoperability specifications and standards for adoption by local vendors. In parallel, the federal government has funded a number of local projects, tagged “Lead eHealth Sites” to foster innovation, generate insights and promote early adoption. Lessons learned from these sites are already informing the national solution and approach. But further work is required to integrate these top-down and bottom-up initiatives and move beyond the early adopters to achieve a national rollout.</td>
</tr>
<tr>
<td>Clinical change management</td>
<td>The use of analytics is limited due to the lack of comprehensive and comparable patient data. Nevertheless, more could be done to use the data that is already available and there are examples “e-mature” organizations and regions that capture and analyze data to improve administrative processes, achieve greater efficiencies in clinical management and/or reduce clinical errors. Significant progress is expected in this area over the coming year: two new national agencies are forming to support health reform—the National Health Performance Authority and the Independent Hospital Pricing Authority. DoHA has also commissioned a national data warehouse platform to support these agencies. The potential to link this infrastructure to the national PCEHR system is clear and obvious, although it is not yet clear how this might operate.</td>
</tr>
<tr>
<td>Integration drives integration</td>
<td>For Australia, integration is still in its early phases, and this cycle has yet to establish momentum. Yet the national infrastructure will likely drive more widespread health information exchange across and between primary and secondary care providers. This, in turn, will support the broader goal of greater care integration. Advances in some areas provide local examples of this virtuous cycle. For example, the Northern Territory has widely deployed its Shared eHealth Record (SEHR) across a range of care settings in remote areas to improve the care of indigenous Australians. This is seen as a major success and is being expanded to neighboring states. Similar progress can be seen in other advanced lead e-health sites such as Brisbane North. However, this level of integration and innovation remains the exception rather than the norm in Australia.</td>
</tr>
</tbody>
</table>

* = recognized need/initial steps  = progress being made  = strong performance  = sustained excellence
Future priorities
While there is still some way to go before healthcare data is collected and shared widely across the system, the interviewees largely share the view that the recent government initiatives to further connected health will pave the way for much greater use of healthcare IT. This will improve quality and enhance access to care, while helping manage budgets more efficiently and effectively.

"Once it [connected health] happens the benefits will be enormous. We will not be able to believe we lived without it."
– Regional health system leader

There is optimism around the work of NEHTA and broader health reforms to enable greater connectedness in the health system. Over the past years the PCEHR program, broader efforts on developing the infrastructure and driving adoption have already begun to transform the way in which healthcare is managed and delivered in Australia.

The strengthened role of NEHTA, interviewees point out, has to a great extent been instrumental in driving this progress.

"Australia’s government’s investment in the National eHealth Transitional Authority has been a really wise investment."
– David Johnston, Director, eHealth Advisory Services

Interviewees believe that initiatives currently underway may, in themselves, be insufficient to achieve system-wide connectedness. They emphasize the importance of COAG in strengthening further governance structures and aligning funding structures to drive further health reform goals of greater integration and continuation of care across the different settings.

While there is a lack of consensus over what benefits might be realized in the short term in Australia, there is optimism that within a few years, interoperability standards will be endorsed, unique identifiers will be widespread and the PCEHR system will be in use across the health system. There is also hope that improved e-health use will be seen within the next five years, which will create some momentum within the clinical community, which in turn will help keep e-health investment on the political agenda in the future.

To continue to drive progress and optimize the value of investments, however, the interviewees stress the importance—and urgency—of a continued effort to drive healthcare IT change and adoption and health information exchange across the system. As far as the squeeze on public budgets in the wake of the global economic crisis is concerned, as well as, importantly, the forthcoming election, the health professionals interviewed express concern that political priorities may change and funding for the overall program may be insufficient to continue the momentum.

Interviewees suggested that the following topics should be given further focus and effort:

- Continue to build momentum by maintaining and building broad political support for the initiatives and allocating funding to drive progress over coming years.
- Continue the emphasis on demonstrating the early benefits of existing connected health initiatives and further developing the business case with projected return of investments in the short, medium and long term.
- Deliver a targeted change and adoption strategy, and plan to clearly and consistently articulate value and direction of the overall connected health program to key stakeholders, clinicians, consumers and wider health management.
- Gradually deliver a wider adoption program to encourage clinicians to adopt healthcare IT and exchange information across the system.
- More needs to be done to provide non-financial and ongoing support to clinicians, especially those in small or solo practices in primary care and those of the baby boom generation, who are less likely to be IT literate.

"I think that [health infomatics] is an area where we should foster that skill set. We don’t have enough people with those sets of skills … and that’s an area where government could take a role."
– Peter Williams, Department of Health, Victoria
The health system in Canada

• Total population: 34 million people.

• Spending on healthcare was 11.4 percent of GDP in 2009, almost 2 percent above the OECD average.

• Healthcare is largely funded by the federal government from general taxation. Responsibility for delivery is devolved to the 10 provinces and three territories, and transfer payments are made as long as the provinces adhere to the broad principles agreed to in the Canada Health Act.

• Canada’s Medicare system covers all essential healthcare in the country, but approximately two-thirds of the population has supplementary private insurance, often through employer plans.

• Independent and private or not-for-profit entities deliver most healthcare services. The system is highly decentralized, and more than 85 percent of care is provided at the community level.

• With life expectancy of 80.7 years, Canada ranked 12th in the latest OECD ranking (2011).

• There are 2.4 practicing physicians per 1,000 population (compared with the OECD average of 3.1) and 3.3 hospital beds per 1,000 population (compared with the OECD average of 4.9).
The Canadian context
In 2001, the federal government created Canada Health Infoway (CHI), making healthcare IT the central part of a strategy to deliver more cost-efficient, coordinated healthcare. CHI has a mandate to “accelerate the development and adoption of modern systems of health information and to define and promote standards governing health infrastructure to ensure interoperability.” While Canada’s provinces and territories support this agenda, each has its own e-health organizations setting their own agendas for e-health development.

In collaboration with the provinces and territories, CHI developed a shared vision of a pan-Canadian electronic health record (EHR). Published in 2006, the “Vision for 2015” set out a 10-year blueprint for national EHR development. The vision also focuses upon consumer health and telehealth.

CHI’s strategy is simple: build the foundation blocks for connected health across the country, with all jurisdictions buying into a common architecture and standards. Once the jurisdictions have their systems functioning, these foundational pieces will help enable inter-jurisdictional connectivity. By 2010, all provinces had agreed upon a common EHR architecture. Approximately 200 projects are now underway across Canada to develop and implement EHR components with the goal of achieving full coverage by 2016.

“CHI has done a noble service in terms of pushing and moving the EHR and its importance throughout the country, and trying to build an integrated health record. I think it has been a powerful exercise and an important one.... If you look at where we were before CHI came on the scene and where we are now, I don’t know if we would ever have gotten close to what we have been able to accomplish, especially in a country that is so large geographically, with a sparse population.”

–Barry Rivelis, Chief Information Officer, Provincial Health Services Authority, Vancouver Coastal Health, Providence Health Care

“Creating a nationally shared vision of an EHR and the support and funding provided by CHI have acted as strong drivers of progress toward connected health in Canada. Experts consider the strategy of building the foundational pieces for connected health incrementally—gradually linking health authorities or units until an entire territory or province is covered, before moving on to link territories and provinces into a full EHR—to be a sound one.

However, the experts interviewed for this study suggest that the goal of a pan-Canadian EHR by 2016 is very ambitious and may take a good deal longer to put in place. Once completed, though, it will provide a secure and comprehensive electronic record of a person’s critical health history that can be accessed and shared by all authorized healthcare providers in a community, province or territory, and across the country. The system will enable healthcare professionals to view, update and share essential patient information, including medications, X-rays and lab results.

“Canada’s progress on the connected health journey
There is a wide array of different projects underway within vastly different healthcare settings in Canada, from single hospital environments to hospital networks, regional health units and, in some cases, province-wide. Despite this, healthcare IT and health information exchange (HIE) are still relatively limited compared to other countries. The speed of progress is influenced to a great degree by jurisdictional priorities for e-health initiatives, and wide variations remain in the maturity of connected health across provinces and territories.

"For the most part I think we still live in a very disconnected environment in this country, both inter-provincially and also within the provinces. Fundamentally there are still some core pieces that would facilitate connectivity that are not in place.”

–Dr. Alan Brookstone, Physician, Founder Canadian EMR, American EMR Partners
Healthcare IT adoption

Overall, the extent to which Canadians are using healthcare IT across primary and secondary care is limited, though adoption is slightly more advanced in primary care than in secondary care. Accenture’s physician survey findings revealed that:

- Approximately 50 percent of physicians from across primary and secondary care report that they use electronic tools to reduce the administrative burden for delivering healthcare.
- Forty-two percent of primary care physicians report that they electronically enter patient notes either during or after consultations, but in secondary care, this figure drops to 29 percent.
- Twenty percent of primary care physicians use electronic alerts and reminders compared with only 13 percent of secondary care physicians.
- Eighteen percent of primary care physicians use more advanced clinical decision support systems, but only 11 percent of secondary care physicians use them, the lowest levels of usage across the eight countries in this study.

In general, physicians working alone are less likely to make use of healthcare IT compared with those who work in group practices. For example, 27 percent of doctors in single practices routinely enter patient notes compared with about 50 percent of doctors in practices with two to 10 other physicians.

Although there are regional disparities in the extent of healthcare IT adoption, it is still regarded as relatively limited across the country as a whole. There are some notable initiatives in some territories and provinces to improve adoption levels. For example, Alberta Netcare is a large and multi-faceted program involving many groups of health service providers across the province, which was set up to encourage adoption and use of an integrated province-wide EHR solution. At a national level, CHI has recently announced $350 million of new funding for the development of electronic medical records (EMRs) in primary care.

Health information exchange

At present, the level of health information exchange across organizations and care settings is generally poor and among the lowest across the eight countries Accenture surveyed. The survey findings revealed that:

- In primary care, 12 percent of physicians communicate electronically with clinicians in other organizations and the use of electronic notifications, electronic referrals and electronic order requests is only slightly higher.
- Fewer than three in 10 primary care physicians have electronic access to clinical data about a patient who has been seen by a different health organization.
- Thirty-five percent receive clinical results electronically to populate their patients’ EMR.

In secondary care, HIE is slightly more mature:

- Twenty-eight percent of secondary care physicians have electronic access to clinical data about a patient who has been seen by a different organization.
- Thirty-four percent have electronic access to clinical data about a patient who has been seen by another organization.
- Thirty-seven percent receive clinical results electronically to populate their patients’ EMR.
- Other HIE functionalities are less frequently used: Twenty-two percent electronically send order requests; sixteen percent use e-referrals; eleven percent receive e-notifications; and seven percent use e-prescribing.

On the whole, HIE in secondary care tends to be confined to a single hospital, a network of hospitals or regional health authority or unit.

Across this general picture of HIE, there are significant variances in progress within Canada’s provincial and territorial borders. Canada’s largest, most western provinces, Alberta and British Columbia, are leaders in health information exchange. Alberta’s connected health network, Netcare, which started in the provincial capital and is now in the process of being expanded province-wide, is working well for information exchange and for such capabilities as viewing diagnostic imaging, lab results, discharge summaries and drug orders. British Columbia (BC) and Ontario have put drug information systems in place that connect emergency departments in each province with data generated by all the pharmacies in the province. A number of provinces planned to have a province-wide lab and diagnostic image viewing system in place by the end of 2011. Both Alberta and BC are moving rapidly toward e-prescribing solutions. Progress is considered reasonable in Canada’s less populated areas and in smaller provinces, where the context is simpler and it is easier to achieve greater consistency and interoperability. However, Ontario and Quebec are seen as lagging behind as a consequence of their fragmented health delivery systems and large and dispersed populations.

There are some successes regarding the availability of repositories for lab results and drugs, which are in place almost universally. Canada’s drug repositories are under construction, designed to house complete medication profiles, including prescriptions and dispensed drugs, allowing for information-sharing capabilities. Diagnostic imaging systems are also in use throughout most of the country. A recent benefits analysis, commissioned by CHI, suggests there have been significant improvements to patient outcomes, as well as significant savings.
for the healthcare system, resulting from PACS. Once fully implemented across the country, it is estimated that PACS will generate $850 million to $1 billion a year in health system efficiencies through increased clinical productivity and reductions in patient transfers, duplicate exams and film costs.

Progress in primary care: percentage of physicians using a range of healthcare IT and HIE functionalities

Accenture survey question: How often do you perform the following functions (results show percentage of clinicians that use “routinely”)?

Healthcare IT adoption and HIE: primary care - Canada

In primary care, Canada lags behind the average of all eight countries within the survey in all components of connected health.

Note: These figures represent overall findings for Canada. However, each province varies in the degree of use of the different components, with some exhibiting higher usage than others.
Progress in secondary care: percentage of clinicians using a range of healthcare IT and HIE functionalities

Accenture survey question: How often do you perform the following functions (results show percentage of clinicians that use “routinely”)?

Healthcare IT adoption and HIE: secondary care - Canada

In secondary care, Canada lags behind the survey average in most of the components of connected health, with the exception of electronic access to clinical data about a patient who has been seen by a different health organization, where it is slightly ahead of the average.

Note: These figures represent overall findings for Canada. However, each varies in the degree of use of the different components, with some exhibiting higher usage than others.
Insight driven healthcare
Given the fragmented picture of healthcare IT adoption and information exchange across the Canadian healthcare system, it is perhaps unsurprising that insight driven healthcare is still in its early stages. However, experts suggest that Canada’s vision for an EHR means that the country could be well placed to exploit the value of data analytics in the future.

At present, the value extracted from the electronic systems that are already in place largely relate to the management and operations of individual physician practices and hospital settings. Sixty-two percent of primary care physicians state that their clinical data is used to help improve their own clinical care protocols. In secondary care settings, this figure is slightly higher at 68 percent. As is the case in most countries around the world, healthcare organizations share electronic patient data less regularly across other organizations to improve protocols and patient care. Only 30 percent of primary care physicians and 31 percent of secondary care physicians share data for this purpose. The picture is similar when it comes to sharing patients’ clinical data for population health reporting and disease management.

In general, this limited sharing of patient data means that significant data analytics is not yet happening across Canada. The relatively limited use of patients’ clinical data for analytical purposes is largely due to a lack of comprehensive and comparable patient data sets. To enable sophisticated analytics, healthcare organizations need to systematically collect and store individual patient data in an easily accessible format that enables interrogation. This, in turn, requires practices to enter data in a structured, ideally coded, way. To shed light on the extent Canada—along with the other seven countries surveyed—is able to apply analytics to drive improvements, we asked physicians to indicate how they currently enter data in their medical record systems. Across Canada, we found that one in five of the physicians enter patient data in a coded way. By international comparison, this level of coded data use is among the lowest levels across the eight countries surveyed.

How electronic clinical patient data is used
Accenture survey question: To what extent do you use the clinical patient data you collect electronically in the following ways?

<table>
<thead>
<tr>
<th>Patients’ clinical data are shared across my organization and used to help improve our clinical care protocols and clinical outcomes</th>
<th>Primary Care</th>
<th>Secondary Care</th>
<th>Primary Care</th>
<th>Secondary Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>62%</td>
<td>68%</td>
<td>78%</td>
<td>77%</td>
</tr>
<tr>
<td>Global Average</td>
<td>78%</td>
<td>44%</td>
<td>45%</td>
<td>47%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Patients’ clinical data are shared with other organizations, including public health authorities, to improve protocols and patient care</th>
<th>Primary Care</th>
<th>Secondary Care</th>
<th>Primary Care</th>
<th>Secondary Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>30%</td>
<td>31%</td>
<td>44%</td>
<td>45%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Patients’ clinical data are shared with other organizations, including public health authorities, for population health reporting, disease management</th>
<th>Primary Care</th>
<th>Secondary Care</th>
<th>Primary Care</th>
<th>Secondary Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>32%</td>
<td>28%</td>
<td>46%</td>
<td>47%</td>
</tr>
</tbody>
</table>

Note: number of physicians who use electronic clinical patient data for different purposes to “some extent” or “to a great extent.”
How patient data is currently entered in the system

Accenture survey question: Please indicate which statement most closely describes how you currently enter the following data in your electronic system.

- Coded
- Structured
- Unstructured
Despite the overall picture of limited use of data for analytical purposes, there are pockets of good practice in some jurisdictions, where organizations use data to manage specific disease conditions. For instance, Alberta has partnered with CHI on a chronic disease management system and expects to have all diabetics on an electronic care plan by 2012. The province will include other diseases in the system over time. Similarly, in British Columbia and Ontario programs around screening for colorectal cancer are resulting in significant improvement in patient outcomes.

To date, Canadian citizens have not been drivers of change in healthcare IT. However, CHI has made efforts to engage with healthcare consumers through a large-scale public education campaign.

“Patients need to be taking charge of their own healthcare a lot more.... Patients are very passive in this system, and we can improve that an awful lot electronically. E-health is what is going to enable it. So 10 years from now you are not going to recognize the way it is being delivered [or] the role of the consumer in their care.”

—Tom Closson, President and CEO, Ontario Hospital Association

In telehealth and other technologies that directly engage patients in their care, Canada is trailing behind other countries surveyed. For example, less than 3 percent of patients in Canada can electronically access their medical information, compared to more than 40 percent in Singapore and nearly 17 percent in the US. Approximately 4 percent of physicians report that their patients can electronically book, change or cancel appointments, and 6 percent receive electronic reminders when it is time for preventive or follow-up care. Fewer than one in five Canadian physicians report that their patients can communicate with them electronically, for example, through secure email or video conferencing. A similar number state that their patients are able to see health-related information during the consultation, and slightly fewer—15 percent—say that their patients can electronically access health information/education to help them manage their own conditions. Only 7 percent of physicians state that their patients can electronically request prescription refills, considerably lower than the average of more than 20 percent across all eight countries in the survey.
The technologies available to patients

Accenture survey question: Please identify which of the following patient-related technologies are available to your patients:

<table>
<thead>
<tr>
<th>Patient-related technology</th>
<th>Canada</th>
<th>Survey average</th>
<th>Australia</th>
<th>England</th>
<th>France</th>
<th>Germany</th>
<th>Singapore</th>
<th>Spain</th>
<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients can electronically access their medical information</td>
<td>2.8%</td>
<td>8.2%</td>
<td>2.4%</td>
<td>6.7%</td>
<td>5.2%</td>
<td>3.2%</td>
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</tr>
<tr>
<td>Patients receive electronic reminders when it is time for preventative or follow up care</td>
<td>6.4%</td>
<td>18.9%</td>
<td>19.8%</td>
<td>17.1%</td>
<td>8.0%</td>
<td>16.9%</td>
<td>51.5%</td>
<td>32.3%</td>
<td>18.8%</td>
</tr>
<tr>
<td>Patients can see health-related information during the consultation</td>
<td>18.4%</td>
<td>29.2%</td>
<td>41.5%</td>
<td>35.9%</td>
<td>28.3%</td>
<td>24.8%</td>
<td>44.6%</td>
<td>22.6%</td>
<td>26.6%</td>
</tr>
<tr>
<td>Patients can electronically request prescription refills</td>
<td>7.2%</td>
<td>20.6%</td>
<td>4.6%</td>
<td>33.3%</td>
<td>12.0%</td>
<td>27.8%</td>
<td>29.4%</td>
<td>29.9%</td>
<td>25.8%</td>
</tr>
<tr>
<td>Patients can communicate with me electronically, for example, through secure email or video conferencing</td>
<td>19.2%</td>
<td>27.4%</td>
<td>20.6%</td>
<td>16.7%</td>
<td>29.5%</td>
<td>47.4%</td>
<td>45.1%</td>
<td>25.7%</td>
<td>25.4%</td>
</tr>
<tr>
<td>Patients can use tele-monitoring devices to monitor and record their own health indicators and remotely inform me of their conditions</td>
<td>4.4%</td>
<td>7.5%</td>
<td>3.6%</td>
<td>8.2%</td>
<td>6.4%</td>
<td>6.7%</td>
<td>26.5%</td>
<td>8.0%</td>
<td>7.5%</td>
</tr>
<tr>
<td>Patients can electronically access health information/education to help them manage their own conditions</td>
<td>14.2%</td>
<td>19.3%</td>
<td>17.0%</td>
<td>25.9%</td>
<td>14.5%</td>
<td>4.4%</td>
<td>39.2%</td>
<td>30.1%</td>
<td>21.0%</td>
</tr>
</tbody>
</table>

The experts taking part in the interviews are highly optimistic about the potential benefits of telehealth for Canada with its many remote communities. The successful PACS system, available throughout most of Canada, has been a major enabler of telehealth, and experts recognize it as providing particular benefits to the aboriginal population. Alberta has leveraged Netcare to provide diagnostics and support services to remote communities. And in Ontario, telehealth enables 70 neurosurgeons and 200 technicians across the province to communicate and consult remotely, saving millions of dollars in time and transfer costs. Yet, despite these examples, our survey of physicians—perhaps surprisingly—suggests that progress overall is limited in this area: only 4 percent of physicians surveyed state that their patients can use telemonitoring devices to monitor and record their own health.
Tele-health in Canada’s remote communities

Connected health initiatives are beginning to drive substantial benefits for Canadians who live in remote regions, where accessing specialists is only possible if patients travel extremely long distances for their diagnosis, care and follow up. Canada’s provincial and territorial telehealth networks, which began as telephone triage, are now providing videoconferencing capabilities, allowing community healthcare workers to access diagnostic and care specialists, enabled in part by Canada’s successful country-wide PACS initiative.

The system is of particular benefit to Canada’s aboriginal population: telehealth capabilities are now available in approximately 50 percent of remote First Nations communities. Alberta has leveraged the Netcare system to provide remote diagnostics and other support to its remote communities. These programs realize efficiency gains, but their primary benefit is superior outcomes for patients.
Ongoing challenges for connected health

Experts suggest that Canada is at a crucial point in its connected health journey. While recent policies and initiatives offer great potential to drive progress, there are key challenges to overcome to deliver the vision of a Canada-wide EHR and optimize the value from healthcare IT and HIE. There are, according to experts, four key barriers that Canada needs to overcome to more fully develop connected health:

• **Data ownership, identification and authorization**—The split between primary care (largely privately provided) and secondary care (largely run on a not-for-profit basis) raises issues about data ownership across care settings, but also between provinces and territories. This not only challenges HIE but also limits the use of data for analytical purposes. Currently there are unique patient identifiers within each jurisdiction but not nationally. This, according to experts, presents a major barrier to a pan-Canadian EHR. Experts also highlight that there is no existing legislation for electronic signatures, which has already halted the progress of electronic prescribing in Canada. Experts seem surprised at the lack of national action to address these issues of data ownership, identification and authorization. They would like to see CHI be given a stronger mandate to address these issues, perhaps through changing legislation, taking on the lessons from British Columbia and Alberta.

• **Interoperability standards**—A condition of CHI-funded projects is that organizations must meet all standards. However, many hospitals and primary care physicians use legacy systems that they cannot afford to upgrade, and some territories and provinces fund and develop their own systems, which are often non-compliant. Experts suggest that organizations must realize the universal adoption of an internationally recognized standards platform for exchanging information between medical applications to extract any significant value from the connected health system through data mining and manipulation.

"Where we are lacking a critical mass of focused time and energy is on the interoperability side of things."

– William J. Pascal, Chief Technology Officer, Canadian Medical Association

• **Sustainability of investment**—CHI has provided generous funding to support the implementation of its EHR vision. However, some experts are skeptical over how long CHI can continue to fund healthcare IT at this level given the current economic crisis. They argue that more needs to be done to build connectivity with community systems and thus strengthen the business case for investments at regional and local levels.

• **Physician adoption**—Persuading primary care physicians to change remains a particular challenge, especially when it comes to physicians of the baby boomer generation and those working in solo practices, who are on the whole more reluctant to use healthcare IT. Several jurisdictions have actively tried to address these barriers, and the Physician Information Technology Office in British Columbia and the Physician Office System Program in Alberta have proven to be valuable in gaining a wave of early adopters.

In the quantitative survey, we asked physicians themselves to list the top five barriers to healthcare IT adoption and HIE. The message is clear: costs and concerns about loss of productivity are the major barriers, with 59 percent of physicians and 48 percent respectively pointing out these barriers. Forty-six percent also mentioned concerns about investing in IT systems that are not interoperable, and 38 percent believe that lack of financial incentives remains a significant barrier to adoption. A similarly high number—37 percent—cited concerns about privacy and security of patient data as a major barrier.
Encouraging healthcare IT adoption in British Columbia

British Columbia established the Physician Information Technology Office (PITO) in 2006 as a voluntary program to assist physicians in adopting and using EMRs. PITO provides reimbursement of 70 percent of the cost of adoption and use of an eligible EMR. A total of CAD$108 million was committed for 2006 to 2012, to be disbursed gradually over the duration of the program.

The PITO program is largely modeled on the Physician Office System Program (POSP), launched in Alberta in 2001. The main goals were to support the transition to EMRs, including for change management and the provision of effective tools for professional development, practice and knowledge management. In addition, PITO provides an implementation support program that includes:

- Pre-implementation planning.
- Tools to assist in selecting an appropriate EMR.
- Coordination during implementation to ensure that all the key aspects come together at the right times.
- Privacy and security tutorials.
- Post-implementation review.

The basket of the PITO premiums is substantial and can pay for most of the costs of the IT systems, with a remaining funding gap for physicians of only about an equivalent of US$12,750 over five years.

Top five barriers experienced by Canadian physicians

Accenture survey question: Please select the five main barriers to the adoption and use of electronic medical record systems and health information exchange in your organization.

![Bar chart showing the top five barriers experienced by Canadian physicians](chart.png)
## How Canada matches up against the connected health dynamics

<table>
<thead>
<tr>
<th>Dynamic</th>
<th>How does Canada match up against these dynamics?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vision and leadership focused on improved health outcomes</td>
<td>Traditionally, Canada’s provinces and territories have adopted healthcare IT to meet their local needs. In 2001, the government created a central coordinating body called the Canada Health Infoway (CHI), led by a board, which includes the 14 Deputy Ministers of Health. In 2006, CHI developed “Vision 2015,” a 10-year blueprint critical to achieving three main business goals: 1) continued enhancement of patient safety and greater communication across the continuum of care; 2) greater and more consistent access to health services; and 3) improved overall system sustainability by driving performance management and lowering cost of care. One of the priorities in this blueprint is to “finish what has been started in electronic health records, telehealth and public surveillance.” To support this, CHI has funded approximately 300 local projects to put the building blocks for an EHR in place. Some experts view CHI’s vision of a pan-Canadian EHR as being potentially unattainable but recognize the enormous value it has been in driving forward connected health to progress at the regional level.</td>
</tr>
<tr>
<td>Strategic change management</td>
<td>Given the diversity of connected health projects across Canada, it is difficult to make any overall observations about the use of change management, except for individual projects. For example, the Alberta Physician Office System Programme (POSP) is underpinned by strong change management support, and its Netcare system has been successful in facilitating the use of IT in routine practice for more than half the physicians in Alberta. Experts cite physician concerns about changes to workflow and additional workload as a key barrier to connected health. This indicates that change management needs attention in some areas, specifically with regard to the adoption of IT in primary care.</td>
</tr>
<tr>
<td>Robust IT infrastructure</td>
<td>CHI has defined the architecture for an EHR comprising three building blocks—clinical data storage, point of care systems and a secure pathway for data exchange. Once these building blocks are in place in the territories and provinces, it will facilitate pan-Canadian connectivity through interoperability standards set by CHI. However, experts point out that there are still issues of connecting disparate local hospital systems with these building blocks. CHI is now funding projects to address this. For example, the Diagnostic Imaging Common Services Project is developing standards of interoperability for diagnostic image repositories in Ontario.</td>
</tr>
<tr>
<td>Co-evolution</td>
<td>The clinical work process architecture contained in Canada’s EHR blueprint was developed using cases by medical experts and validated by practitioners and health information professionals. However, clinician adoption of IT systems is still relatively low in primary care and patchy across secondary care. In recognition of this, CHI has established 10 peer networks across Canada to support physicians, nurses and pharmacists within the practice setting. An online forum provides a community of practice for the sharing of resource materials, nurturing new knowledge and stimulating innovation related to the clinical adoption of EMRs and EHRs.</td>
</tr>
<tr>
<td>Clinical change management</td>
<td>Currently, there is minimal systematic analytics at the national level even though the Canadian Institute for Health Information has an extensive database of hospital discharge data. The vision is that the EHR will form the basis for access to reliable, accurate, longitudinal information when conducting research. Many experts believe that the cost savings it will bring are vital to sustain Canada’s publicly funded healthcare system. At the regional level there are some good examples of governed analytics. Toronto’s University Health Network, which includes three hospitals and a teaching hospital, is actively using evidence-based care to improve outcomes and reduce readmissions. In Calgary, connected health across the city supports clinical decision support across the spectrum of care.</td>
</tr>
<tr>
<td>Integration drives integration</td>
<td>Canada is a large country with hundreds of small, remote communities, which presents an opportunity for telehealth. Where telecare systems have been implemented, the benefits they provide are driving connected health in other areas. Patients have not been a major driver for connected health but CHI is actively engaging with them through a public education campaign and is also funding consumer health projects to implement patient access to EHR, online booking of appointment and repeat prescription orders across jurisdictions. The lack of vertical and horizontal integration of information in existing delivery systems for urban/high-density populations is also a continuing problem, but one that some jurisdictions are taking steps to address. For example, ConnectingGTA will integrate electronic patient information from across the greater Toronto area and make it available to health service providers across the GTA so that they can deliver better, faster and more coordinated patient care. While these examples are patchy, experts believe they drive integration across “circles of care” at the province or territory level.</td>
</tr>
</tbody>
</table>

### Symbols
- **recognize need/initial steps**
- **progress being made**
- **strong performance**
- **sustained excellence**
Future priorities
Perhaps because of its complex governance, funding and delivery structure—and its large geographic area—Canada is still lagging behind most other countries we studied in its use of healthcare IT and HIE. Nevertheless, experts point to significant pockets of good practices in different regions and subsystems, arguing that the coordinating role of CHI has been, and will continue to be, instrumental in driving healthcare IT adoption and HIE as a critical means to control cost and improve the quality of and access to healthcare in the future.

What do Canadian e-health experts believe must be prioritized to facilitate the best possible outcome for connected health? Though experts prioritize issues differently, there is a general consensus on the following:

• Connected health is not possible if primary care is not in the equation. Though CHI is responding, having recently announced $340 million in new funding directed at EMR adoption, many experts believe that, as yet, it has not made the value proposition clear to late adopters as they continue to ignore the incentives and support being offered in many jurisdictions. Payment models must change to ensure physicians are compensated for more cost-efficient methods of care delivery—for example, online consultations in place of face-to-face visits. Those payment models should also, according to some, start to reward physicians for improved outcomes, which are most easily achievable through the managed care pathways that connected health enables.

• Governance issues over privacy, data security and electronic signatures have to be resolved. Because these issues must be addressed within each Canadian province and territory with eventual pan-Canadian interoperability in mind, several experts think that CHI should take on a more proactive role in overcoming them. Without agreements on privacy legislation, inter-jurisdictional sharing will be difficult, if not impossible. Currently, unique identifiers are at jurisdictional levels. If national interoperability is to become a reality, these identifiers will have to be synchronized in some fashion, as it is unlikely Canada will ever have a national identifier.

• The healthcare system must, according to many experts, switch focus to put the patient at the center of his or her healthcare plan. This patient-centered approach should include comprehensive strategies for patient engagement and self-directed care.

• Canadian jurisdictions must focus on developing care pathways for chronic disease management, which accounts for a large proportion of healthcare budgets. By 2012 Alberta expects to have all diabetics in the province on an electronic care plan, and will be rolling this plan out to other chronic disease populations over the next several years. These are the types of programs that are not necessarily overwhelming to facilitate, yet drive huge benefits in outcomes and efficiency. Ideally, these care pathways would be adopted nationally.

• Information and best practice sharing among e-health experts in Canada is good, but it needs to be better. Much of the sharing is done on an ad hoc basis. This information sharing should include details that can inform and support initiatives—work plans, terms of reference and specifics related to infrastructure procurement.

• Organizations are using healthcare data to facilitate change, but they must put more emphasis on the power of health data and its ability to drive outcomes and save lives. Cancer Care Ontario’s renal project, for example, has changed the average stage at which colorectal cancer is discovered in that province. And the province’s Wait Times project has resulted in reduced wait times for certain surgical procedures and document imaging tests. Wait Times is also on the Ministry of Health’s website, providing transparent access to data. Successes such as this, and the potential for other population-wide outcome improvements, should be better publicized both to engage the public and to bolster support among physicians.

The Council of Deputy Ministers of Health address CHI policy and direction at their annual meeting, but experts suggest too often it is given insufficient attention. Although the council has the “teeth” to actually make meaningful change, each member is driven by his or her own provincial agenda, and limited time is spent on this facet of the complex health agenda. Health experts advocate a new pan-Canadian council with a more specific responsibility for the connected health agenda, prepared to address the complex challenges ahead.
The health system in England

- Total population: approximately 51 million.
- The UK’s National Health Service (NHS) is centrally funded through taxation and free for citizens at the point of need.
- Both primary and specialist care is commissioned and paid for through primary care trusts (PCTs). Hospitals and other providers are operated as trusts, directly accountable to the Department of Health (DH), which is responsible for setting policy and monitoring quality of the NHS as a whole.
- The NHS is undergoing a period of major structural reform, including decentralizing healthcare management functions and extending choice and competition across different care settings.
- Health outcomes in England are relatively good by international standards—life expectancy of 80.4 years (OECD average: 79.5) places England 16th in the latest OECD ranking.
- There are 2.7 doctors and 9.7 nurses per 1,000 population (compared to an OECD average of 3.1 and 8.4 respectively) and 3.3 hospital beds (compared with the OECD average of 4.9).
The English context
The perception of connected health among health system leaders in England is mixed, combining a sense of both achievement and frustration. Experts describe the picture as "patchy" and "fragmented," pointing to examples of great success, but with high variability across care settings and regions. In many areas, information "silos" are yet to be joined up, and fragmentation between care settings undermines the potential for integrated care delivery. Despite some leading-edge practices and significant progress, the main benefits of connected health are, in many places, yet to be realized.

The development of connected health in England has fallen under the responsibility of NHS Connecting for Health (CfH), a government delivery body set up to oversee the National Programme for IT (NPfIT), and to coordinate other e-health-related activities across the NHS. This central body has driven progress in e-health infrastructure, electronic medical records, electronic prescribing, picture archiving and communications systems (PACS) and clinician support mechanisms. Its centerpiece has been the Summary Care Record, a national patient record designed to share data held by primary care organizations with providers in other healthcare settings, such as emergency and out-of-hours care.

But despite a relatively high level of national investment and a strong central government role, the success of these initiatives has been mixed. In September 2011, the government announced an alteration to the NPfIT, moving toward a more “locally led” approach to healthcare IT implementation, with the Department of Health seeking local software solutions rather than a single nationally imposed system.

This reflects both the concerns of clinicians and health managers, many of whom have criticized the "top-down" nature of connected health development. It also demonstrates a desire to pare back large-scale investment and capital-intensive projects in the face of difficult economic conditions. Although the NHS is not subject to immediate spending reductions, a flat funding settlement coupled with rising demand from an aging population will pose huge sustainability challenges in the future. This is placing real and immediate pressure on healthcare IT spending. The majority of organizations are in an IT spend reduction spiral—it is seen as a cost center rather than an area for strategic capability development and is increasingly short-term in focus. Anecdotal evidence suggests that few trusts are anywhere near the "Wanless" vision of 4 percent healthcare IT investment levels—most appear to be in the region of 1 to 2 percent of overall spending, and this is focused largely on legacy support.

"Some organizations are seizing on these levels of austerity by looking at IT systems to make them more efficient. Unfortunately, some other organizations are actually just cutting funding in back office functions and IT, and not investing."

–Phil Corrin, Deputy Director of Health Informatics - NHS Acute Trust (St. Helens & Knowsley Teaching Hospitals NHS Trust)

England’s progress on the connected health journey
In this section, we describe England’s progress across the three stages of the connected health journey: healthcare IT adoption, health information exchange and insight driven healthcare.

Healthcare IT adoption
The NHS as a whole has seen significant improvements in its IT and communications infrastructure. A key development has been the N3 network—establishing broadband and secure email connectivity across the system. This in itself has enabled a greater degree of communication and information sharing between clinicians.

Use of healthcare IT functionality is widespread across England, though disparity between care settings is notable. In primary care, progress has compared well with most countries we surveyed: 91 percent of primary care clinicians routinely enter patient notes electronically, and more than 80 percent make use of electronic alerts or reminders during patient consultations. Almost 50 percent report using electronic tools to reduce the administrative burden on their organization. A nationally led Electronic Prescription Service is in place, though only 11 percent of primary care clinicians report routinely sending electronic prescriptions to pharmacies.

Several experts attribute successful healthcare IT adoption in primary care to the Quality and Outcomes Framework (QOF), which provides incentives for efficient and preventive healthcare management. It is widely acknowledged that its payment-by-results and pay-for-reporting incentive scheme would be difficult without health IT systems in GP practices.

"Effectively the GP incentive system... has required them to have good electronic data about a lot of what’s happening to their patients…. For most GPs, it’s ended up where you couldn’t easily secure your income without having very good electronic records, and the software is very well developed.”

–Jim Easton, National Director - Improvement and Efficiency

Healthcare IT adoption across hospital and specialist care settings is a more fragmented picture and is generally less well developed than in primary care. Twenty-five percent of hospital and specialist care clinicians report using healthcare IT to ease the administrative burden, well below the international average. Just 16 percent electronically enter patient notes either during or after consultations, and only approximately one in 10 use some form of clinical...
decision support system or receive electronic alerts and reminders while seeing patients. The main barrier to progress has been the failure of NPfIT to deliver the new integrated secondary care (hospital) EMR solutions. This failure has meant that most hospital trusts have an ailing patchwork quilt of systems, only loosely connected, that are proving to be a barrier to efficient and effective operations and patient service. To fill the gap, several hospital trusts and PCTs have adopted short-term or interim solutions, but most hospital trusts still do not have an EMR in place.

Health information exchange
Health information exchange (HIE) is progressing across some parts of the English health service, but the slow progress of the national program and fragmentation between primary and secondary care settings have been holding it back. However, there are some real successes. Since 2007, for instance, more than 1.5 million records have been transferred securely using GP2GP, an initiative that facilitates the exchange of medical records between GP practices when patients move between them. More than 5,000 practices currently use GP2GP.

Our survey shows that 32 percent of primary care clinicians and 47 percent of secondary care clinicians claim that they communicate electronically with clinicians from other organizations. Approximately 40 percent of primary care clinicians are electronically notified of patients’ interactions with other organizations, and about 50 percent electronically send or receive referrals from health professionals in other organizations.

For secondary care, HIE in this area is more limited. Only 19 percent electronically send or receive patient referrals electronically, and fewer than one in 10 are electronically notified of patient interaction with other organizations. Limited HIE in secondary care (and between primary and secondary care settings) is partly due to the complexity of hospital systems, but the quasi-market structure of the NHS also plays a part. In contrast to primary care, there are few incentives, financial or otherwise, for busy health professionals in hospitals to prioritize keeping electronic records up to date, even where capabilities are more advanced. Experts admit that, despite some leading-edge practices—for example, in Picture Archiving and Communications Systems (PACS), which has enabled significant increases in the speed of X-ray reporting—ongoing reliance on paper-based records and a lack of intra-hospital interoperability remain as significant barriers.

"PACS has worked really well – stunning, in a way, and far ahead of what's being done in other countries like the US... but it isn't really connected, which is the big flaw in it."

—Dr. Paul Taylor, Centre for Health Informatics, University College London

In primary care, English clinicians are leading the field in adopting and using many of the components of connected health.
Progress in secondary care: percentage of clinicians using a range of healthcare IT and HIE functionalities

Accenture survey question: How often do you perform the following functions (results show percentage of clinicians that use “routinely”)?

Healthcare IT adoption and HIE: secondary care – England

Compared to their peers in primary care, clinicians in secondary/specialist care are lagging behind in their use of connected health components, particularly in basic aspects of healthcare IT such as electronic entry of patient notes.

Insight driven healthcare

Few experts believe that the value of connected health is currently being optimized, but many see exciting possibilities. The NHS has done better than many fragmented health systems in collecting and making use of centralized data returns. At a national level, its centralized data warehouse, the Secondary Uses Service (SUS), aggregates anonymized data from primary and secondary care interactions to inform business planning, payment-by-results mechanisms, healthcare commissioning and the measurement of progress against national benchmarks and targets.

Regional data variations do exist however, and some health system leaders expressed concern over the quality and timeliness of the information collected, as well as frustration that systems are not in place to undertake more sophisticated analysis. This is especially problematic in secondary care, where IT systems tend to be less well developed than in primary care. Nevertheless, experts see huge potential for analytics as the connected health infrastructure develops. Indeed, several hospital trusts and local healthcare organizations are already deploying analytics and risk management technology to help reshape care pathways from acute to primary and community care settings.
In our survey of clinicians, we asked how patient data is currently used. A high percentage of clinicians surveyed reported that patients' clinical data is shared across their organization to improve care protocols and clinical outcomes—92 percent and 70 percent across primary and secondary care respectively. Three quarters of primary care physicians and 44 percent of specialist and hospital doctors reported sharing information with other healthcare organizations for similar purposes. More than 60 percent of primary care physicians reported that they share patients' clinical data with other organizations for population health reporting and disease management purposes. For secondary care, however, the figure is considerably lower.

How electronic clinical patient data is used

**Accenture survey question:** To what extent do you use the clinical patient data you collect electronically in the following ways?

<table>
<thead>
<tr>
<th>England</th>
<th>Global Average</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Primary Care</td>
</tr>
<tr>
<td>Patients' clinical data are shared across my organization and used to help improve our clinical care protocols and clinical outcomes</td>
<td>92%</td>
</tr>
<tr>
<td>Patients' clinical data are shared with other organizations, including public health authorities, to improve protocols and patient care</td>
<td>71%</td>
</tr>
<tr>
<td>Patients' clinical data are shared with other organizations, including public health authorities, for population health reporting, disease management</td>
<td>70%</td>
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</table>

Note: number of physicians who use electronic clinical patient data for different purposes to "some extent" or "to a great extent."

The table above shows that, although England scores mainly above average in terms of the analytical use of patient data, there is clear fragmentation between care settings. The use of patients' clinical data for analytical purposes is partly dependent on having comprehensive and comparable patient data sets. To enable sophisticated analytics, individual patient data need to be systematically collected and stored in a form that is easily accessible and enables interrogation. This in turn, requires data to be entered in a structured, ideally coded, way. To explore the extent to which physicians in England—along with those in the other seven countries we surveyed—are able to apply analytics to drive improvements, we surveyed how they currently enter data in their medical record systems. As the table below indicates, on average more than 40 percent of patient data is entered in a coded or structured way—offering a sound basis for the application of analytics in future.
How patient data is currently entered in the system

Accenture survey question: Please indicate which statement most closely describes how you currently enter the following data in your electronic system.

- Coded
- Structured
- Unstructured

US
Spain
Singapore
Germany
France
England
Canada
Australia
Average Survey Total

0 20% 40% 60% 80%
According to experts, several NHS authorities are already building on this base. For example, NHS Redbridge is implementing risk management technology to reconfigure services around better information on referral rates using primary and secondary care data. In south London, NHS Lambeth is using analytics to help redirect care from acute to primary and community care settings. Torbay Care Trust, in southwest England, has reconfigured health and social care pathways using single-point patient assessment, integrated care teams, and pooled health and social care budgets. Drawing on partnership work with the US healthcare organization Kaiser Permanente, the trust is now deepening its connected health approach using a "pathway analytics and reporting system" that will allow commissioners to redesign more efficient clinical pathways and better model the costs of care across their population.

Use of patient-related technologies
The Department of Health has led the way in establishing England’s online health architecture, which has helped promote patient choice, and begun reshaping the relationship between citizens and their health service providers. There have been notable successes with NHS Choices and NHS Direct, online portals and a call center that enable citizens to access health information and advice and to choose and book healthcare appointments. Increasing prevalence of social media and open data has the potential to drive further progress in this area.

The NHS has also recently launched HealthSpace, an online personal health record portal partly modeled on Kaiser Permanente’s My Health Manager. Experts, however, have suggested that HealthSpace has had limited value to date, due partly to cultural barriers. Some experts believe that HealthSpace “started with the technology,” but was not developed to solve real patient problems.

"The societal shift will happen, but it needs to progress a bit further before the general population are entirely comfortable logging on, getting health information, contributing health information and carrying out health transactions.”

– Prof. Kent Woods, Chief Executive, Medicines and Healthcare Products Regulatory Agency

Experts also point to remote care as an area of significant potential. Approximately 1.7 million people use telecare services in England, and the benefits of telehealth are being tested in three “Whole System Demonstrator” pilots, which are evaluating the effectiveness of remote care for chronic and old age conditions. However, these remain small-scale pilots, and there are no specific plans at present to bring these to scale.

In terms of technologies that directly engage patients, our physician survey shows that England is relatively advanced in some areas, compared to the other countries surveyed. For example, 33 percent of English physicians indicate that their patients can electronically schedule or change appointments (versus an average of 21 percent across all countries). More than a third of physicians report that their patients can see health-related information during consultations and electronically request prescription refills. A smaller proportion of physicians report that their patients can see health information/education to help them manage their own conditions (26 percent); receive electronic reminders when it is time for preventive or follow-up care (17 percent); and communicate electronically with their doctors (17 percent).
Use of patient information and communication technologies

Accenture survey question: Please identify which of the following patient-related technologies are available to your patients:

<table>
<thead>
<tr>
<th>Technology</th>
<th>England</th>
<th>Survey average</th>
<th>Australia</th>
<th>Canada</th>
<th>France</th>
<th>Germany</th>
<th>Singapore</th>
<th>Spain</th>
<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients can electronically access their medical information</td>
<td>6.7%</td>
<td>8.2%</td>
<td>2.4%</td>
<td>2.8%</td>
<td>5.2%</td>
<td>3.2%</td>
<td>42.6%</td>
<td>6.6%</td>
<td>16.6%</td>
</tr>
<tr>
<td>Patients can electronically book/change/cancel appointments</td>
<td>33.3%</td>
<td>20.7%</td>
<td>2.6%</td>
<td>4.0%</td>
<td>7.6%</td>
<td>22.8%</td>
<td>52.5%</td>
<td>44.9%</td>
<td>16.8%</td>
</tr>
<tr>
<td>Patients receive electronic reminders when it is time for preventative or follow up care</td>
<td>17.1%</td>
<td>18.9%</td>
<td>19.8%</td>
<td>6.4%</td>
<td>8.0%</td>
<td>16.9%</td>
<td>51.5%</td>
<td>32.3%</td>
<td>18.8%</td>
</tr>
<tr>
<td>Patients can see health-related information during the consultation</td>
<td>35.9%</td>
<td>29.2%</td>
<td>41.5%</td>
<td>18.4%</td>
<td>28.3%</td>
<td>24.8%</td>
<td>44.6%</td>
<td>22.6%</td>
<td>26.6%</td>
</tr>
<tr>
<td>Patients can electronically request prescription refills</td>
<td>33.3%</td>
<td>20.6%</td>
<td>4.6%</td>
<td>7.2%</td>
<td>12.0%</td>
<td>27.8%</td>
<td>29.4%</td>
<td>29.9%</td>
<td>25.8%</td>
</tr>
<tr>
<td>Patients can communicate with me electronically, for example, through secure email or video conferencing</td>
<td>16.7%</td>
<td>27.4%</td>
<td>20.6%</td>
<td>19.2%</td>
<td>29.5%</td>
<td>47.4%</td>
<td>45.1%</td>
<td>25.7%</td>
<td>25.4%</td>
</tr>
<tr>
<td>Patients can use tele-monitoring devices to monitor and record their own health indicators and remotely inform me of their conditions</td>
<td>8.2%</td>
<td>7.5%</td>
<td>3.6%</td>
<td>4.4%</td>
<td>6.4%</td>
<td>6.7%</td>
<td>26.5%</td>
<td>8.0%</td>
<td>7.5%</td>
</tr>
<tr>
<td>Patients can electronically access health information/education to help them manage their own conditions</td>
<td>25.9%</td>
<td>19.3%</td>
<td>17.0%</td>
<td>14.2%</td>
<td>14.5%</td>
<td>4.4%</td>
<td>39.2%</td>
<td>30.1%</td>
<td>21.0%</td>
</tr>
</tbody>
</table>
Ongoing challenges for connected health
Despite the progress in particular care settings and regions, it is clear that the development of connected health in England continues to face some significant cultural, technical and financial challenges. The experts we interviewed listed four key barriers:

- Culture change and leadership at the front line—Many experts describe culture change as a key barrier to connected health within the NHS, perhaps even more significant than technical challenges. A lack of clinical enthusiasm, time pressures and financial incentives are all factors, exacerbated by an environment in which clinicians and health managers are under increasing pressure to deliver better quality and more efficient services. Strategic direction and a clearer clinical and business case for connected health are seen as key enablers.

"You might have an IT director and a clinical lead who are passionate about connecting up all their different silos ... but the people who make the decisions don’t really see those benefits."
– John Lindberg, Healthcare Programme Manager, Intellect

- Public concerns over privacy and data security—Public concern over the security of patients’ personal medical data is a longstanding barrier to connected health in England. Experts recognize these concerns as genuine, even if many feel they are overly influenced by misinformation or scaremongering. In fact, some experts feel that segments of the public probably expect a higher existing degree of information sharing between their local primary and secondary care organizations, and are surprised at the lack of communication between elements of the system. The case for electronic health records has been made very poorly to the public, focusing more on the solution rather than the response to a relevant problem. As a result, the public has been unable to see the value in the work of NPfIT.

"You get the framework right at a national level, and then you allow local scope."
– Frances Blunden, Senior Policy Manager, NHS Confederation

- There are differences of opinion among experts about whether moving to a more local approach to connected health will deliver a truly connected system. Key to striking the right balance between them is the role of government. Some experts put the blame for slow progress on implementation—rather than strategic—failures. But most feel that government could play a stronger role in enabling, but not necessarily driving and implementing, the process.

"Because health is becoming more fragmented, so is the approach to this issue."
– Janet Davies, Director of Nursing & Service Delivery, Royal College of Nursing

- The funding challenge and uncertainty of reform—England has spent large sums of money on attempting to roll out a nationwide connected health infrastructure. Recent estimates put spending on the National Program for IT at £6.4 billion. Although there has been notable success in areas such as primary care practice management and medical imaging, most of the promised benefits to professionals and patients are yet to be seen. This underwhelming return on investment to date will be further tested by an unprecedented squeeze on health spending over the coming years, which must be realized by an NHS in flux as a result of proposed structural reforms. Individual healthcare providers within a more localized NHS will face a considerable squeeze on their own funding, providing a difficult backdrop for further healthcare IT investment.

In our quantitative survey, we asked clinicians themselves to list the top five barriers for healthcare IT adoption and HIE. The results support the findings from the expert interviews. Fifty-nine percent of clinicians pointed to a lack of system interoperability as a fundamental barrier. Concerns over privacy and data security also ranked high, with almost 50 percent reporting this as a key barrier. More than 40 percent mentioned the twin challenges of replacing—and paying for—upgrades to existing healthcare IT systems, and 37 percent pointed to incomplete or poor data entry as undermining the case for connected health. Experts note that overcoming these and other barriers will require a role for government, both to provide investment and incentives, and to enable the co-evolution between national and local bodies to manage change. The shifting context of NHS reforms and the localization of the NPfIT is a key source of uncertainty in this area.

2 http://www.publications.parliament.uk/pa/cm201012/cmselect/cmpubacc/1070/107003.htm
Ranking of top five barriers experienced by English clinicians

Accenture survey question: Please select the five main barriers to the adoption and use of electronic medical record systems and health information exchange in your organization.
# How England matches up against the six dynamics of successful connected health

<table>
<thead>
<tr>
<th>Dynamic</th>
<th>How does England match up against these dynamics?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vision and leadership focused on improved health outcomes</td>
<td>The English NHS is in transition, playing out major changes in governance that signal a shift away from centralized management and delivery, toward a more localized, variable system. The country’s Connected Health vision reflects this shift. NHS Connecting for Health and the National Programme for IT (NPfIT) are being repositioned, with some functions being repositioned to other central NHS bodies, putting the emphasis on NPfIT’s providers (trusts) to design and procure their own medical records systems. Elements of the government’s connected health vision have translated into success—such as the NHS broadband network (N3), PACS, GP Systems of Choice (GPSoC) and GP2GP patient records transfer between primary care practices. Yet the NPfIT was seen as a top-down and technology-centric rather than outcome-oriented program and struggled to gain clinician and end user buy-in. As a result, the Department of Health’s new information strategy emphasizes collaboration, trust and constructive relationships between local health leaders as the core of its approach. As responsibility for healthcare IT adoption passes from regional SHAs and PCTs to more localized healthcare commissioning boards and larger hospital trusts, local clinical imperatives and the need to generate unprecedented efficiency savings will dominate the thinking of clinicians and CIOs.</td>
</tr>
<tr>
<td>Strategic change management</td>
<td>Experts describe the lack of enthusiasm among front line professionals as a real barrier to connected health development—perhaps a result of the NPfIT being presented largely (and simplistically) as a technology, not an organizational change management—program. As the NHS moves to a more localized approach, change management strategy will inevitably vary across organization and geographical clusters. Experts speak about “tiers of change” and a potentially greater level of engagement between clinical and technological leadership, perhaps embodied in the role of a chief medical information officer within larger healthcare trusts. The success of PACS provides evidence that the benefits of electronic information exchange can be communicated effectively to clinicians. Where HIE is occurring at a local level across primary and secondary care settings (for example, in areas such as Yorkshire and Humber, Somerset or Hampshire), good relationships between managers, clinicians and technicians have been key. Future change management strategy will need to build on this good regional and local practice, getting the right balance between national frameworks, organizational leadership and local collaboration.</td>
</tr>
<tr>
<td>Robust IT infrastructure</td>
<td>NHS healthcare IT infrastructure is a mixed picture, with several “community of interest networks” (COINS) and shared systems operating effectively, alongside examples of underinvestment and poor quality infrastructure. Experts argue that the national N3 secure broadband network has provided a solid platform, but infrastructure and network quality varies considerably within local health systems and individual organizations. Use of EMR is common across primary care, with most GPs dealing with electronic data within their practices, and motivation for GP take-up in primary care (partly via the Quality and Outcomes Framework) a success story for policymakers. HIE between care settings is less common. The main barrier to progress has been the failure of NPfIT to deliver the new integrated Secondary Care (Hospital) EMR solutions, leading several hospital trusts to fill the gap with short-term or interim solutions. Effective and collaborative local leadership of this sort will be a key determinant of infrastructure development in future.</td>
</tr>
<tr>
<td>Co-evolution</td>
<td>Co-evolution is becoming the operational reality for connected health development in England, with new emphasis on allowing local and regional discretion within a framework of common standards for semantics and interoperability, as well as service quality and performance. There are several local success stories: In several primary care trusts, shared information systems and are trust integrated working. In Tower Hamlets and Cumbria for example, two types of clinician-led, shared IT systems are being developed to facilitate integrated diabetes care between local health partners. In primary care, the development of the Quality Outcomes Framework (QOF) has been seen as a success—providing incentives for GPs to improve the management of chronic illnesses and improve business processes by investing in health technologies. Experts argue that co-evolution in the future will partly be about economics: healthcare trusts will need to generate efficiencies and quality improvements through integrated care, enhanced patient access and remote medicine—all of which could drive greater collaboration and co-evolution within local healthcare clusters.</td>
</tr>
<tr>
<td>Clinical change management</td>
<td>England has one of the largest integrated care records in the world in the primary care space. Centralized data returns are currently aggregated and analyzed as part of the secondary uses service (SUS) and used to inform business planning, payment mechanisms, commissioning processes and national healthcare benchmarks. The NHS Information Centre and the NHS Health Informatics Centre provide national focal points, and experts note that recent NHS reforms have the potential to unlock more rapid local progress. Regional, disease-specific networks are already contributing to clinical protocol development, and areas such as Leicester, Redbridge and Lambeth are using tailored analytics and data management to re-shape care pathways, analyze risk and allocate resources more effectively. Experts cite exciting potential for development in this space, perhaps in response to the DH’s “Quality, Innovation, Prevention and Productivity (QIPP)” agenda, which sets out a framework for sustaining services within a context of fiscal austerity. At a national level, plans for a new Health Research Agency and an opening up of pseudonymous NHS data for external research and business development purposes offer the potential of a more open system that can generate collaborative insight.</td>
</tr>
<tr>
<td>Integration drives integration</td>
<td>The case for integrated healthcare getting a strong voice in England as a result of controversy over reform plans that appear to deepen competitive pressures within the healthcare system. With the NHS in flux, it remains to be seen whether reorganized commissioning arrangements will drive further integration at a local level, or exacerbate fragmentation between primary and secondary care. Where the five dynamics above have been combined, some progress has been made: in PACS for example and in the adoption of EMR and e-prescription services in primary care. However, many experts argue that it is the difficulty of managing these dynamics together—struggling to combine, for example, technological design and implementation with change management and space for local innovation—that has limited progress. Austerity, is, in some senses, the primary new driver of integration. Local health leaders know that financial sustainability will necessitate sharing services and proactively managing the “frequent flyers”—the small number of patients who consistently use the most healthcare resources. To make serious progress within an increasingly decentralized system, deepening connected health at the local level will be key.</td>
</tr>
</tbody>
</table>
"What you’re doing is not only introducing IT… what you’ve got to understand is you’re introducing system change. System change is a lot harder to do."
– Andrew Burnell, Chief Executive, City Healthcare Partnership CIC

Future priorities
The English health system is in flux, and the further development of connected health will partly depend upon how the health system responds to significant structural upheaval and the introduction of stringent efficiency measures.

In the wake of the cancellation of NPfIT, experts expect a more localized and diverse healthcare IT infrastructure to emerge. However, while some experts suggest that locally procured systems should be designed to integrate fully in the longer term, others believe that exchanging only key summary information nationally, with more extensive local and regional sharing, is a more realistic and pragmatic vision.

Given the failure of NPfIT, experts suggest that in the future, the leadership role of national government should involve the following:

- Taking responsibility for the overall vision for the future, providing general strategic direction and setting clear, workable interoperability standards. Government should then step back to allow local leaders to develop and champion their own local approaches within this framework.
- Acting as an enabler for connected health by encouraging and monitoring the activities of different actors in the system. For example, this could involve setting guidelines for data security and then regulating implementations to ensure appropriate standards are maintained. Another potential role is in setting financial incentives for individuals and organizations, to encourage greater connectivity across the system.
- Helping build the capacity and capabilities of regions to commission and implement an appropriate solution for their area. There are concerns about a lack of expertise in public sector procurement of IT in general, and this may be even more pronounced at a local level. Attracting high-quality staff to work on projects and developing this local capacity will be an important driver of progress.
- Providing continued investment in health IT, particularly because the amounts of money required are so large. Even if this is a desirable role for government, however, there is little expectation that significant sums will be made available.

- Continue to engage health professionals and organizations to encourage buy-in, adoptions and use of healthcare IT systems. Too often the focus remains on the technology itself and not on the use of the technology and value realization. More needs to be done to convince health professionals of the potential benefits, with a bigger emphasis on ROI measurement.

Unless the general direction becomes clearer, there are real concerns that individual projects, even if they are successful on their own terms, will end up working in isolation from the overall goals of connected health. The key to the future development of connected health in England is leadership at all levels of the health system—top, middle and bottom—to drive developments and ensure that the various pieces link together.

"Nationally there’s a bit of a vacuum since the national program ended... but there are lots of ideas and, I think, over the next few years there will be lots of innovation."
– Phil Corrin, Deputy Director of Health Informatics, St Helens and Knowsley NHS Acute Trust

www.accenture.com/connectedhealthstudy
There are a number of specific connected health capabilities that experts and health system leaders see as potential quick wins to drive further progress. Over the next five years, the following are seen as key priorities:

- In secondary care, improvements to hospital IT systems should be prioritized as a precursor to developing greater connectivity across care settings. There are some examples of progress in this area, but over the next five years, many more trusts will need to make strides toward better systems.

- Some local projects to increase sharing between primary and secondary care are underway. These are important, as the sector needs to demonstrate that health information exchange is scalable and that it brings benefits. Learning from these projects and championing them should be a priority.

- There needs to be progress on encouraging patient engagement using, for example, mobile technologies, telemedicine, social media and online portals to help people interact with their clinicians and manage their own health. This may begin with those managing chronic conditions, but should be available to more patients as time progresses. The key to success here is to ensure the privacy and security of data and to develop solutions with patient needs in mind, rather than simply putting the technology in place.

- Much more needs to be done with the data that is collected as connected health systems develop. There is massive unexploited potential as the NHS is not yet optimizing the use of analytics. Vast amounts of clinical/patient data can help improve chronic disease management, preventive interventions, disease tracking and forecasting, clinical protocol development, comparative effectiveness research and so on. Building these capabilities in when systems are being designed should help the potential benefits of connected health to be realized to a much greater extent in the future.

"What you would hope is that [in the future] you've got the technology, the support that helps you navigate through the system so that your experience of healthcare is a single integrated joined-up process."

– Kevin Jarrold, Chief Information Officer, Imperial College Healthcare NHS Trust

Progress in these areas will help to increase the buy-in of stakeholders across the system and increase awareness of the potential of connected health to improve quality, access and cost control. The challenge in the future will be to turn this potential into a clear case for change across the NHS.
The health system in France

- Total population: 62 million.
- Access to healthcare in France is universal and funded through a compulsory insurance system, which is paid for by employer and employee contributions and an income tax.
- Patient choice is an underlying principle in French healthcare, and patients can directly access primary or secondary care. However, reforms have put in place financial incentives for patients to register with a GP who then refers them to a specialist if appropriate.
- With life expectancy of 81.0 years, France ranks 9th in the latest OECD ranking (2011).
- There are 3.3 practicing physicians per 1,000 population (compared with the OECD average of 3.1) and 6.6 hospital beds per 1,000 population (compared with the OECD average of 4.9).
The French context

Connected health in France is regarded as a "work in progress," with recent national policy and investment attempting to leapfrog from a legacy of incremental development. While there is some health information exchange occurring, experts tell us this is mainly between interconnected teaching hospitals in urban areas, facilitated by locally developed systems, or for specific chronic diseases. Extending healthcare IT adoption and health information exchange (HIE) while maintaining high quality in the country’s disparate health facilities is a key challenge for the government.

In recent years, the French government has embarked on a number of reform initiatives placing healthcare IT at the center of plans to deliver more cost-efficient, coordinated healthcare.

- The €10 billion Hospital 2012 Plan was launched in 2007. It aimed to address the lack of coordination across healthcare providers in France by modernizing the hospital network, promoting organizational excellence and embedding modern IT systems. Supporting the plan is a strong legal framework intended to advance electronic healthcare and the access and use of patient data.
- France Numérique 2012 was announced in 2008. The policy, which was designed to restore growth and modernize the country, included a pledge to give all French inhabitants broadband access by 2012.
- In 2009, the French government passed the law on Hôpitaux, Patients, Santé et Territoires (HPST), which added a layer of regional management. The law established six hospital communities and associated regional health agencies (named ARS) to coordinate the provision of primary healthcare and encourage collaboration between providers. Healthcare IT is considered to be an essential enabler of these new integrated hospital communities.

Despite these reforms, experts agree that the lack of an overall vision or implementation strategy for connected health has held back progress in France. The creation of ASIP Santé, a central coordinating body tasked with overseeing and steering e-health implementation, is a major step forward. Replacing three existing agencies and supported by new funding, ASIP provides a sharper focus to the national healthcare IT program. Many experts are optimistic that ASIP Santé will provide the necessary leadership at the national level, although it is too soon to judge the organization’s impact.

"The creation of ASIP Santé results from the fusion of three fragmented bodies. The recent idea to group them together and to create ASIP Santé allows the development of connected health in France to be concentrated in a unique leadership role.... It is based on a real political will, and it is positive."

France’s progress on the connected health journey

In this section, we describe France’s progress across the three stages of the connected health journey: healthcare IT adoption, HIE and insight driven healthcare.

"For a year now, France has started to seriously tackle connected health. It is recent, but we now have the necessary institutions to deal seriously with the topic."

Healthcare IT adoption

Healthcare IT adoption in France offers a mixed picture. Generally, the large urban regions with well-developed medical structures and advanced research facilities (such as Île-de-France, Rhône-Alpes, Marseille Area, Lille Area, Rennes Area, Toulouse Area and Alsace) are making faster progress than rural and sparsely populated regions (such as Centre Region, Champagne-Ardennes and Auvergne). According to experts, progress is also dependent on the political will of regional organizations. Also, GPs and small rural hospitals tend to lag behind the large urban hospitals.

Our physician survey bears out this mixed picture:

- While 86 percent of primary care physicians electronically enter patient notes either during or after consultation, only 47 percent of hospitals and specialist care doctors do.
- Less than 40 percent of primary care physicians receive electronic alerts or reminders while seeing patients, while in secondary care, only 16 percent report having this capability.
- The survey also showed that 57 percent of both primary and secondary care physicians report using electronic tools to reduce the administrative burden of delivering healthcare.

The national rollout of the Dossier Medical Personnel (DMP), a voluntary, lifelong, shared electronic health record, will frame the next steps for healthcare IT adoption in France. The program is being re-launched after initial difficulties, and it is intended to be the cornerstone of the country’s connected health architecture, linking up with the existing electronic insurance card system that patients and practitioners already use.

"Concerning data sharing, France cannot consider that this is functioning as long as the DMP is not implemented. DMP is the key to health data sharing."
Health information exchange
Progress in health information exchange in France is limited. The lack of interoperability between systems in different parts of the country has posed considerable difficulties for data sharing. While the DMP is considered pivotal in fostering a culture of HIE across the French healthcare system, experts recognize the need for greater progress in achieving interoperability and integration. ASIP is expected to play a central role in achieving this.

Again, our survey data support the view that HIE is currently limited:

- Less than one-third of both primary and secondary care physicians communicate electronically with clinicians in other organizations.
- Approximately 10 percent of doctors are electronically notified of patients’ interaction with other health organizations.
- Approximately 20 percent of doctors across both primary and secondary/specialist care settings electronically send or receive referrals to or from other healthcare organizations.
- The level of e-prescribing is also relatively low, with 5 percent of primary care physicians and 17 percent in secondary care electronically sending prescriptions to pharmacies.
- Just 12 percent of primary care physicians and 21 percent of secondary care physicians electronically send order requests to laboratories.

"The patient’s medical file shared and computerized in a hospital—that would be a revolution...."
France is ahead of the survey average in electronic patient notes, but is below the average in e-notifications, e-referrals, e-prescribing and electronic access to data about patients seen by different health organizations.
Progress in secondary care: percentage of physicians using a range of healthcare IT and HIE functionalities

Accenture survey question: How often do you perform the following functions (results show percentage of physicians that use “routinely”)?

**Healthcare IT adoption and HIE: secondary care – France**

<table>
<thead>
<tr>
<th>Function Description</th>
<th>France Secondary</th>
<th>Survey Average Secondary</th>
</tr>
</thead>
<tbody>
<tr>
<td>I communicate electronically with patients (e.g. via secure email) to support remote consultation and diagnostics</td>
<td>100%</td>
<td>80%</td>
</tr>
<tr>
<td>I electronically enter patient notes either during or after consultations</td>
<td>100%</td>
<td>80%</td>
</tr>
<tr>
<td>I receive electronic alerts/reminders while I am seeing my patients (e.g. prompts regarding contraindications or preventative care)</td>
<td>100%</td>
<td>80%</td>
</tr>
<tr>
<td>I communicate electronically with clinicians in other organizations (e.g. via secure email)</td>
<td>100%</td>
<td>80%</td>
</tr>
<tr>
<td>I receive clinical results electronically that populate my patients’ electronic medical record</td>
<td>100%</td>
<td>80%</td>
</tr>
<tr>
<td>I electronically send prescriptions to pharmacies (e-Prescribing)</td>
<td>100%</td>
<td>80%</td>
</tr>
<tr>
<td>I electronically send or receive referrals to/from health professionals in other organizations (e.g. for specialist appointments)</td>
<td>100%</td>
<td>80%</td>
</tr>
<tr>
<td>I have electronic access to clinical data about a patient who has been seen by a different health organization (e.g. hospital, laboratory)</td>
<td>100%</td>
<td>80%</td>
</tr>
<tr>
<td>I am electronically notified of my patients’ interactions with other health organizations (e.g. admissions to hospital)</td>
<td>100%</td>
<td>80%</td>
</tr>
<tr>
<td>I use computerized clinical decision support systems to help make diagnostic and treatment decisions while I am seeing my patients (e.g. real-time access to evidence-based)</td>
<td>100%</td>
<td>80%</td>
</tr>
</tbody>
</table>

In secondary care, France is in line with the global survey average in most aspects of healthcare IT adoption and HIE, though it is slightly above the average in using electronic tools to reduce the economic burden and below average in e-orders.

Experts point out that these percentages mask the progress France is making in HIE for chronic conditions such as diabetes, which is driven by a program known as Sophia and includes financial incentives for GPs to recruit patients into the program. Progress in cancer care is driven by the need to work across specialties and is underpinned by the French Cancer Plan, which is implementing a specific cancer patient summary in the dedicated cancer treatment networks. The pharmacy record (DP) is an example of successful data sharing between pharmacists, which reduces the risk of drug interactions and complications. Teleradiology is mainly happening through small, local initiatives. Many regions have plans to develop it further. This development is partially driven by the Ministry of Health prediction that by 2020 there will be 20 percent fewer radiologists in France. There is also a teleradiology charter in France, which addresses practice, ethics, payment, legal and technical quality assurance and training. In general, experts believe there has been isolated progress on technical solutions but that little information is actually exchanged in secondary care, largely a result of cultural and organizational barriers.
How electronic clinical patient data is used

Accenture survey question: To what extent do you use the clinical patient data you collect electronically in the following ways?

<table>
<thead>
<tr>
<th>Patients' clinical data are shared across my organization and used to help improve our clinical care protocols and clinical outcomes</th>
<th>France</th>
<th>Global Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Care</td>
<td>Secondary Care</td>
<td>Primary Care</td>
</tr>
<tr>
<td>70%</td>
<td>75%</td>
<td>78%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Patients' clinical data are shared with other organizations, including public health authorities, to improve protocols and patient care</th>
<th>France</th>
<th>Global Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Care</td>
<td>Secondary Care</td>
<td>Primary Care</td>
</tr>
<tr>
<td>26%</td>
<td>35%</td>
<td>44%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Patients' clinical data are shared with other organizations, including public health authorities, for population health reporting, disease management</th>
<th>France</th>
<th>Global Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Care</td>
<td>Secondary Care</td>
<td>Primary Care</td>
</tr>
<tr>
<td>25%</td>
<td>39%</td>
<td>46%</td>
</tr>
</tbody>
</table>

Note: combines number of physicians who use electronic clinical patient data for different purposes to “some extent” or “to a great extent.”

Insight driven healthcare

As one might expect, doctors and other stakeholders across France are sporadically realizing the value of connected health. Data analysis is patchy and remains a low priority in many areas. Limited progress in HIE has undermined the development of data usage and analytics, with a few exceptions such as for cancer data and diabetes. Once again, the DMP is expected to be the key that unlocks the potential of connected health more systematically across these areas.

Our survey data demonstrates the potential for change. A high percentage of clinicians—approximately 70 percent in both primary and secondary care—report sharing clinical patient data within their organization to improve clinical care protocols and clinical outcomes. But this percentage drops dramatically when HIE across different organizations is factored in. Only 26 percent of primary care physicians and 35 percent of secondary care clinicians report sharing clinical data across organizations to improve care protocols and clinical outcomes.

At a national level, public health policymakers are building on the Ameli health insurance portal and the infrastructure of the CNAM insurance fund to collect population level health data. But again, clinicians are relatively pessimistic about current trends: only 25 percent of primary care and 39 percent of secondary care physicians say that they share their data with other organizations for population health reporting and disease management purposes.

To explore the extent to which physicians in France—along with those in the other seven countries we surveyed—are able to apply analytics to drive improvements in care quality and business processes, we surveyed how they currently enter data in their medical record systems. Their answers are instructive because use of sophisticated analytics requires individual patient data to be systematically collected and stored in an easily accessible form that enables interrogation. This in turn requires data to be entered in a structured, ideally coded, way. Less than 30 percent of French physicians enter coded patient data. This ranks below average across the eight countries within the study, though a higher percentage reports entering data in a structured format, suggesting the potential for secondary use and analytics over the longer term.
How patient data is currently entered in the system

Accenture survey question: Please indicate which statement most closely describes how you currently enter the following data in your electronic system.

<table>
<thead>
<tr>
<th>Country</th>
<th>Coded</th>
<th>Structured</th>
<th>Unstructured</th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
<td>40%</td>
<td>20%</td>
<td>40%</td>
</tr>
<tr>
<td>Spain</td>
<td>60%</td>
<td>20%</td>
<td>20%</td>
</tr>
<tr>
<td>Singapore</td>
<td>40%</td>
<td>50%</td>
<td>10%</td>
</tr>
<tr>
<td>Germany</td>
<td>30%</td>
<td>40%</td>
<td>30%</td>
</tr>
<tr>
<td>France</td>
<td>40%</td>
<td>40%</td>
<td>20%</td>
</tr>
<tr>
<td>England</td>
<td>40%</td>
<td>30%</td>
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</tr>
<tr>
<td>Canada</td>
<td>40%</td>
<td>30%</td>
<td>30%</td>
</tr>
<tr>
<td>Australia</td>
<td>40%</td>
<td>30%</td>
<td>30%</td>
</tr>
<tr>
<td>Average Survey Total</td>
<td>40%</td>
<td>30%</td>
<td>30%</td>
</tr>
</tbody>
</table>
Use of patient-related technologies

The physician survey confirmed the expert impression that the availability of patient-related technologies in France is relatively advanced in some areas and less so in others. At the physician-patient interface for example, 30 percent of physicians note that patients are able to communicate with them electronically, such as via email or secure video messaging. A similar number reports that patients are able to see health-related information during consultations. Other indicators point to slower development. Physicians report that only 5 percent of patients can electronically access their medical information, and fewer than one in 10 can electronically schedule appointments.

"Teleservices uses have progressed well. I am thinking about the Ameli portal. It is a part of connected health even if it is administrative data related to care payment."

Telemedicine is one area where connected health is seen as having great potential and providing clear benefits—demonstrably improving access and controlling costs for rural and mountain area healthcare providers. Numerous local projects have been implemented, leading to good coverage on a national scale. The government has supported progress and recently issued a "user guide" to the 2010 telemedicine decree intended to ensure patient safety and fairer reimbursement for doctors.
The challenges for connected health

While France was seen as an early adopter of healthcare IT with the introduction of smartcards in the 1980s, progress has since slowed. Experts cite a number of challenges that they believe have held back progress.

- Cultural change—The French healthcare system is based on the principles of choice for patients and freedom of practice for healthcare providers. This has defined much of its culture and practice, so there has been considerable resistance to changing them. Fears among physicians of an increased workload because of time-consuming data processes are prevalent. Experts also point to concerns over greater scrutiny of professional practice or increased litigation and an overarching concern about the potential loss of power and independence as a result of more integrated healthcare delivery.

> "There are sources of inflexibility on behalf of the medical profession when it comes to data sharing. In France there is this idea of different medical practices for every doctor, and each one is convinced that his is the best."

- Public concerns over privacy and data security—Public awareness and support for the DMP is generally high. But patients also recognize the risks posed to data privacy and security. The public has voiced its concerns through patient associations such as the French Data Protection Authority (CNIL) and the DMP Public Interest Group, and this has sometimes meant slow progress at a national level. Experts noted that some physicians were initially very reluctant for patients to access their records—a concern they felt should have been debated more rigorously during the DMP planning phase. There is broad awareness of the technical solutions available to address data security issues, but a strong sense that government must take the lead in setting rigorous national standards.

- Demonstrating benefits and learning from experience—Experts argue that France has seen relatively little government funding for healthcare IT development, and budget constraints mean that few providers have invested individually in systems. This has made the need to communicate the benefits of local successes even more acute. Return on investment from connected health has been difficult to measure and benefits have not been widely demonstrated, so experts cited relatively few success stories. The Ministry of Health has recently developed an evaluation framework for connected health projects, which is seen as a useful development.

> "The return on investment is an extremely complicated subject. The mix of factors is extremely complicated to work out, [and] no methodology can be considered valid today."

Experts highlight a failure to share lessons learned and best practices from local initiatives. For example, the cancer networks have been very successful, yet its lessons have not been transferred more widely. They cite the need for better mechanisms for sharing learning between the full range of stakeholders involved in implementing healthcare IT.

- Government leadership—While there is a strong tradition of liberalism in French politics, the experts consulted in this study advocated a stronger leadership role for central government in healthcare IT development. This includes the need for a centrally set interoperability standard to ensure that different system suppliers implementing tailored networks for private providers do not create systems that cannot “talk” to one another. Many argue that a significant proportion of healthcare IT funding should come from central government to demonstrate both commitment and confidence in the potential of connected health.

In our quantitative survey, we asked physicians themselves to list the top five barriers to healthcare IT adoption and HIE. The results support the view of the experts. Fifty-one percent of physicians cited concerns over loss of productivity due to time-consuming data entry; forty-five percent reported concerns over the privacy and security of patient data, with a similar number worried about the lack of interoperability between IT systems. Another 40 percent cited the cost of implementing connected health solutions, while 38 percent mentioned the problems of incomplete or poor quality data entry.

Many experts are positive about the potential of government agencies such as ASIP Sante, the new regional health agencies (ARS) and ANAP to provide the strong leadership that could help negotiate these challenges. But this will depend upon the extent to which robust regulation and guidance around how French officials create the security of data exchange, interoperability standards and access to the DMP.
Top five barriers experienced by French physicians

Accenture survey question: Please select the five main barriers to the adoption and use of electronic medical record systems and health information exchange in your organization.
## How France matches up against the connected health dynamics

<table>
<thead>
<tr>
<th>Dynamic</th>
<th>How does France match up against these dynamics?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vision and leadership focused on improved health outcomes</strong></td>
<td>The Hospital 2012 plan was launched in 2007. This aimed to address the lack of coordination across secondary healthcare providers. There is a tradition of liberalism in French politics, and in the past experts have felt that government should play a stronger leadership role in implementing connected health. The government created the Shared Information Systems Agency (ASIP) in 2009 to sharpen the focus on the national healthcare IT program. ASIP re-launched the much-criticized five-year-old EHR (DMP) project. Experts still suggest that the government needs to lead more strongly and put in place greater regulation with regard to data security and interoperability standards.</td>
</tr>
<tr>
<td><strong>Strategic change management</strong></td>
<td>In 2009, the French government established 26 regional health agencies (ARS) intended to enable integrated care. Systems are procured and implemented within the ARS as local projects, and these are responsible for undertaking all change management. They are supported by ASIP's framework for deployment, which includes mobilization of stakeholders and support for users. ANAP, an organization supporting hospitals to improve performance, is working with local IT projects to ensure they consider performance issues as part of the design and implementation process. ANAP also provides structured coaching to hospital managers. Despite these efforts, experts say there is still considerable physician concern over workflow issues related to the use of the DMP.</td>
</tr>
<tr>
<td><strong>Robust IT infrastructure</strong></td>
<td>The original architecture for the DMP was of a single health record held on a central computer server. However, public concerns over data security led to a new model in which the DMP contains only demographic data and indexes pointing to local EMR systems where data is held. France has an established communications infrastructure in place to support the smart-card system it uses to reimburse patients’ insurance claims, and this provides a basic building block for the DMP. The implementation of a national identification number for every citizen is also a key enabler to the progress of connected health.</td>
</tr>
<tr>
<td><strong>Co-evolution</strong></td>
<td>Consultation with both private and public institutional stakeholders within the healthcare sector is built into the constitution of ASIP. Consultation is seen as necessary to developing a common vision of shared health information systems. However, experts suggest that physicians need to play a more proactive role through co-evolution to move connected health forward. They also suggest that there is need for greater sharing of learning between the full range of stakeholders. There is national coverage of telemedicine in France. This has been implemented in a bottom-up manner, led by local physicians and organizations, but not government of ASIP.</td>
</tr>
<tr>
<td><strong>Clinical change management</strong></td>
<td>Implementation of the DMP is still in progress and does not currently support analytics at the national level. However, the established use of smartcards across France means that the National Health Insurance Fund (CNAM) has been able to create an inventory of care consumption and undertake population studies. There are also some examples where analytics is taking place for specific diseases and conditions, such as diabetes and cancer, but this is driven by the strong teamwork ethos of the discipline. Analytics of data stored in the pharmaceutical record has also led to recognized benefits.</td>
</tr>
<tr>
<td><strong>Integration drives integration</strong></td>
<td>The benefits of integration drive further innovation, but in France there is currently insufficient progress towards connected health to kick-start this cycle. There have been few benefits demonstrated to date, and as experts highlight, there is not systematic framework for measuring benefits. Public awareness and support for the DMP are generally high. The original DMP architecture was changed after patients raised concerns over data confidentiality, and this slowed progress in the initial stages. However, patients' access to the DMP and their strong desire to see how this data is used clinically is expected to drive integration in the future.</td>
</tr>
</tbody>
</table>

= recognized need/initial steps  
= progress being made  
= strong performance  
= sustained excellence
Future priorities

Experts agree that developing connected health is no longer a choice, but a necessary step to improve quality, enhance access and increase efficiency of healthcare in France. The overall approach, though, is still very unclear. The next few years offer a chance to establish the basis for more cohesive development. Ultimately, though, experts believe there has to be pragmatism about what can really be achieved, as past experience shows how difficult it can be to progress in connected health.

Certainly, France as a whole has yet to tap into the benefits of systematic healthcare IT adoption and information exchange, though recent reforms have helped in streamlining a diverse system and putting incentives in place for more integrated healthcare delivery.

Real progress will hinge on the success of ASIP Santé and the rollout of the DMP, which offers the potential of catalyzing health IT development, transforming the patient-clinician relationship and leapfrogging France to the cutting edge of global connected health. Nevertheless, the DMP and fully connected health are still seen as a long-term goal by health experts, rather than a short- or medium-term objective. Few expect that the DMP will enable a high level of data sharing within the next five years. Objectives are more modest: to concentrate on some chronic diseases and on the further development of some specific networks (such as cancer research, cardiology and diabetes). The record will not be comprehensive to begin with, and should concentrate on the sharing of certain types of data (for example, information about discharges from hospital and data on patient allergies and medications), or on particular objectives (such as ensuring the easy transition between primary care doctors and hospitals).

With financial and professional resources extremely limited, there is also a strong incentive to encourage patients to stay at home and be more self-sufficient in managing their health and care. In this regard, the benefits of telemedicine in terms of access, quality and cost of care are also tangible and more immediately obvious. Moreover, telemedicine is often based on more straightforward bilateral exchanges, which are simpler to implement than data sharing through a system like the DMP. Progress on telemedicine therefore continues apace, offering many more possibilities to use technology in innovative ways (from remote consultation to home telemonitoring and smartphone applications). The prospects for innovation make experts very optimistic about the potential of telemedicine.
The health system in Germany

- Total population: 83 million, the largest nation in Europe.
- Main funding through statutory insurance securing universal access to all major health services—all Germans can freely choose and switch from among more than 150 competing statutory insurance funds.
- Primary care is mainly provided by general practitioners or specialists operating in small private practices reimbursed through fee-for-services. Secondary care is provided through a mix of public hospitals (approximately half of all beds), not-for-profit facilities (approximately one-third of beds) and private for-profit facilities.
- Governance and policymaking is shared between the Bundesländer at state level and the federal government.
- With life expectancy of 80.3 years, Germany ranked 17th in the latest OECD ranking (2011).
- There are 3.6 doctors and 11 nurses per 1,000 population (compared with the OECD average of 3.1 and 8.4 respectively) and 8.2 hospital beds (compared with the OECD average of 4.9).
The German context

Germany has a longstanding commitment to e-health as a means of improving quality of care, controlling costs and forging stronger patient engagement. The plans over the past decade have been extensive, although implementation has fallen behind schedule. The corner stone of Germany's connected health strategy is the electronic health card—“Elektronische Gesundheitskarte” containing basic mandatory information and functionalities, such as patient insurance data, recording of co-payments and basic care history. In addition to the mandatory features, patients will be able to give their informed consent for a number of extended functionalities, including e-prescriptions; full records on pharmaceutical use; and the electronic physicians letter (elektronischer Arzbrief) that allows e-messaging related to test results, diagnoses, suggested therapies and treatments.

Gematrik, the central e-health agency, sets the strategic direction nationally and works with stakeholders at all levels to implement an interoperable national healthcare IT infrastructure. The original connected health strategy from 2005 was, according to the German healthcare IT experts interviewed, very ambitious and placed insufficient attention on the importance of promoting the vision and securing buy-in among the wide range of stakeholders across the country's complex healthcare system with bifurcated levels of governance, complex financing and multi-tiered provision. As a result of this, progress toward connected health across Germany is still limited although experts are optimistic that the revised strategy will secure new momentum in healthcare IT adoption, health information exchange (HIE) and—importantly—telemedicine solutions.

Germany's progress on the connected health journey

In this section, we describe Germany's progress across the three stages of the connected health journey: healthcare IT adoption, health information exchange and insight driven healthcare.

Healthcare IT adoption

In spite of the delay in the overarching e-health strategy, the use of healthcare IT is relatively widespread across primary and secondary healthcare in Germany. In primary care, most—if not all—general practitioners use basic computing systems though their functionality is often limited to practice administration, rather than patient or clinical management. Many of these systems are old and do not apply the new standards necessary for connected health development.

Use of IT within secondary care settings is also widespread, although the legacy systems are usually focused on easing administrative processes rather than used as clinical management tools. The picture, however, is set to change. Experts point to the introduction of diagnosis-related reimbursement in hospitals as a driver of investment in new systems (and the extension of existing systems) to build hospital-wide systems capable of capturing and managing the information required for more effective reimbursement.

"Within our individual units we have a high acceptance of technology ... but we do have a problem regarding the connection between hospitals and local physicians. The decentralized structure of Germany doesn’t support this well."

In our survey of physicians, we found that three in four in both primary care and secondary care electronically enter patient notes either during or after consultations, while 55 percent of primary care providers and 60 percent of secondary providers state that they make use of electronic tools to reduce the administrative burden of delivering healthcare. Twenty-four percent of primary care physicians use electronic alerts and reminders when seeing patients, compared with only 18 percent of secondary care physicians. Fewer than one in five physicians across primary and secondary care use more advanced clinical decision support systems.

Health information exchange

"The central problem in Germany is the [lack of] integration of the ambulatory and the secondary care. Physicians of different organizations don’t have a shared insight on the diagnoses of colleagues."

Overall, the extent to which health information is shared across the system is relatively limited in both primary and secondary care settings. The experts interviewed were optimistic that the smartcard in time will set the foundation for greater HIE, especially if patients buy into the scheme and opt for the voluntary components that offer greater potential to foster stronger health information exchange. Overall, however, experts feel that there are significant technological, cultural and structural barriers to address before health information exchange will be a reality for Germany's health providers.

"At the moment ... there is a general lack of motivation for innovation and coordination."

At the present time, only 12 percent of primary care physicians responding to our survey state that they communicate electronically with clinicians in other organizations, the lowest level of use of this functionality across all of the eight countries surveyed. In secondary care, this number rises to 36 percent, which is more on par with the average across the countries surveyed. Only a little more than one in 10 physicians across all care settings are electronically notified of patients’ interactions with other health organizations or send and receive referrals electronically. Use of e-prescribing
is particularly low too, with only 5 percent of primary care physicians and 8 percent of secondary care physicians using this functionality. Order requests are more frequently used in Germany with nearly half of all physicians stating that they regularly send order requests electronically to laboratories. A similar number regularly receives clinical results electronically to populate patients’ electronic medical records (EMRs).

Despite these relatively low levels of HIE across the board, there are some local examples of information sharing but more often than not these projects are limited to individual networks and small regions. According to the experts interviewed, there are particular problems with bringing good practice to scale in the German health system—largely because of the structural differences that exist across the different states and regions.

The charts below provide a visual depiction of the extent to which German physicians in our survey use a range of healthcare IT and HIE functionalities in comparison to the international average of physicians’ use across the eight countries of our study.

**Progress in primary care: percentage of physicians using a range of healthcare IT and HIE functionalities**

**Accenture survey question:** How often do you perform the following functions (results show percentage of clinicians that use “routinely”)?

**Healthcare IT adoption and HIE: primary care – Germany**

In primary care, German physicians are lagging behind other countries in adopting and using many components of healthcare IT and HIE, though they are ahead of the field in electronic entry of patient notes and computerized physician order entry (CPOE).
Progress in secondary care: percentage of physicians using a range of healthcare IT and HIE functionalities

Accenture survey question: How often do you perform the following functions (results show percentage of physicians that use "routinely")?

**Healthcare IT adoption and HIE: secondary care – Germany**

Secondary care and specialist physicians in Germany are leaders in electronic entry of patient notes, CPOE and clinical results.
Project “Gesundes Kinzigtal” is a regional integrated healthcare system in the Kinzig valley in Baden-Württemberg, Southwest Germany. The project, which was founded in late 2005, seeks to improve the coordination of the interfaces between inpatient and outpatient care and strengthen cooperation between primary and secondary (specialized) care. The overall goal is to improve public health in the region, through IT-enabled coordination of healthcare and enhanced self-management capabilities of patients.

The health information exchange happens across the system, with e-decision-making tools to enable diagnostics, a central record of patients and their care history and e-billing based on health developments and outcomes of their patients, rather than simply based on throughputs. A structured information management system supports this outcome-focused billing system (Patientenstamm), which all GPs in the region are required to use.

The Gesundes Kinzigtal project is subject to comprehensive evaluation and review, and results are promising. According to recent profit and loss accounts for the managing integrated care company, the program is proving to be a sound investment: from 2006 to 2008, the formal care costs in the region have gone down, increasing the contribution margin for the managing insurance companies. The profit will be distributed between the management company and the concerned insurers.

Since 2004, Germany has had many more integrated care initiatives thanks to the startup funding provided through the Statutory Health insurance Modernization Act. However, most of these initiatives have not been population-wide as is the case in the Gesundes Kinzigtal initiative.
**How electronic clinical patient data is used**

Accenture survey question: To what extent do you use the clinical patient data you collect electronically in the following ways?

<table>
<thead>
<tr>
<th>Patients’ clinical data are shared across my organization and used to help improve our clinical care protocols and clinical outcomes</th>
<th>Germany</th>
<th>Global Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Care</td>
<td>Secondary Care</td>
<td>Primary Care</td>
</tr>
<tr>
<td>81%</td>
<td>87%</td>
<td>78%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Patients’ clinical data are shared with other organizations, including public health authorities, to improve protocols and patient care</th>
<th>Germany</th>
<th>Global Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Care</td>
<td>Secondary Care</td>
<td>Primary Care</td>
</tr>
<tr>
<td>28%</td>
<td>27%</td>
<td>44%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Patients’ clinical data are shared with other organizations, including public health authorities, for population health reporting, disease management</th>
<th>Germany</th>
<th>Global Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Care</td>
<td>Secondary Care</td>
<td>Primary Care</td>
</tr>
<tr>
<td>28%</td>
<td>30%</td>
<td>46%</td>
</tr>
</tbody>
</table>

Note: Number of physicians who use electronic clinical patient data for different purposes to “some extent” or “to a great extent.”

**Insight driven healthcare**

Progress on insight driven healthcare—leveraging health information to improve the quality and cost of care—is rather limited. Nevertheless, with the launch of the Digitales Deutschland strategy, experts predict a new wave of innovation in healthcare through healthcare IT. One of the core aims of the strategy is to have broadband access in 75 percent of homes and businesses by 2015. Through this infrastructure, Gematik will seek to boost the use of telemedicine in an effort to move more chronic care delivery to people’s own homes using remote technologies. There is already a range of successful initiatives in place such as project AGNES in which nurses support GPs in rural regions through the use of telemedicine. However, these initiatives have tended to be isolated, and more needs to be done, according to the experts interviewed, to bring local innovations to scale.

At present, the value extracted from the electronic systems that are already in place largely relate to the management and operations of practices and hospital setting. Eighty-one percent of primary care physicians state that they share their clinical data across their own organization to help improve clinical care protocols. In secondary care settings, this figure is 87 percent. As is the case in most countries around the world, electronic patient data is shared less regularly across other organizations to improve protocols and patient care: only 28 percent of primary care physicians and 27 percent of secondary care physicians say they share data for this purpose. The picture is similar when it comes to sharing patients’ clinical data for population health reporting and disease management: just 28 percent of primary care physicians and 30 percent of secondary care physicians state that they share data for this purpose.

As is the case in most other countries around the world, the use of data analytics for organizational and public health reporting is still in its infancy in Germany, but it is likely to be an important focus of connected health development in the future. The relatively limited use of patients’ clinical data for analytical purposes is largely due to a lack of comprehensive and comparable patient data sets. To enable sophisticated analytics, individual patient data needs to be systematically collected and stored in a form that is easily accessible and enables interrogation. This in turn requires data to be entered in a structured, ideally coded, way. To shed light on the extent to which Germany—along with the other seven countries surveyed—is able to apply analytics to drive improvements, we asked physicians to indicate how they currently enter data in their medical record systems. In Germany, we found that just one in four of the physicians surveyed enter patient data in a coded way. By international comparison, this level of coded data use is on par with the average level across the eight countries surveyed but significantly below the UK and Singapore.
How patient data is currently entered in the system

Accenture survey question: Please indicate which statement most closely describes how you currently enter the following data in your electronic system.

US

Spain

Singapore

Germany

France

England

Canada

Australia

Average Survey Total

Coded
Structured
Unstructured
There are some pockets of good progress in the use of data. The national disease management program for breast cancer, diabetes, coronary heart diseases, asthma and COPD is an area where medical data has successfully been collected and used to improve quality of care. This program has been established for statutory health plans only (not private insurers). These health plans get “aid money” per inscribed insured patient, paid for out of the federal health fund by the supervising federal agency (Bundesversicherungsamt). Since 2003, general practitioners have collected medical data for all these chronic diseases. The data is sent to several federal data centers and forwarded to all health insurance organizations. Based on this data, patients are monitored and, in the event of triggers, interventions can be started. Doctors get regular feedback on their patients compared with their peers. There have also been dramatic improvements in how insurance companies collect and analyze evidence to identify risk areas and improve the efficiency of care provision and quality of prescription services. However, experts point out that treatment data is aggregated and analyzed at the macro level, and is therefore not patient-identifiable. They argue that there is vast potential to develop more patient-centered systems that would enable decision support and automatic checks against drug interaction risks.

"Wherever medical results are measured and analyzed, care always improves."

In terms of availability of patient-related technologies, Germany is relatively well progressed when it comes to enabling patients to communicate with their physicians electronically, for example, through secure email or video conferencing (mentioned by nearly half of all physicians surveyed) and enabling patients to electronically book, change or cancel appointments (mentioned by nearly a quarter). A similar number of physicians report that their patients can electronically request prescription refills. In all these areas, Germany is ahead of the international survey average. However, only 3 percent of physicians in Germany report that their patients can electronically access their medical information and only 4 percent report that their patients are able to access health information/education electronically to help them manage their own conditions. This is significantly below the international survey average and far behind the leading practice in Singapore where more than two in five physicians report the use of these patient related functionalities.

"It is not yet possible for patients to use the information himself or herself, but there is huge potential for this."

While the use of patient related technology is still patchy across the country as a whole, the use of health technologies has dramatically improved patient engagement in some areas. In the “Gesundes Kinzigtal” initiative, for example, patient satisfaction surveys show clearly that patients feel more empowered by having better information about their whole care journey. At the same time, patients report significant time savings through making use of the Internet to make appointments. At a national level, a number of portals have recently been developed that allow patients to rate their doctors. The portals, which are usually run by private or statutory insurers, aim to enable patients to make more informed choices in accessing care. Experts interviewed, however, argue that there is a long journey ahead before patients across Germany will report major improvement in the quality of care and efficiency of communication through the use of technologies.

The government’s recently revised e-health strategy has further pushed for greater use of telemedicine to move more chronic care delivery to people’s own homes using remote technologies. Despite this, the survey reveals as yet relatively limited progress in this area with only 7 percent of physicians stating that their patients can use telemonitoring devices to monitor and record their own health indicators and remotely inform them of their conditions. With the Digitales Deutschland strategy—which aims to have broadband access in 75 percent of homes and businesses by 2015—the hope is that it will enable the rollout of telemedicine facilities on a greater scale. Specifically, there are plans for remote monitoring of a range of chronic conditions and enabling more patients to be treated in their home environment. As part of the strategy, there has been a range of successful pilots, although they have so far tended to be sporadic. An example of this is the project AGNES in which nurses support GPs in rural regions through the use of telemedicine. Similarly “Partnership for the Heart” has transformed care for patients with cardiac problems through the use of telemedicine (see box for more details). However, experts argue that more work is needed to bring such innovations to scale and embed these in a national program.

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Use of patient information and communication technologies

Accenture survey question: Please identify which of the following patient-related technologies are available to your patients:

<table>
<thead>
<tr>
<th>Technology</th>
<th>Germany</th>
<th>Survey average</th>
<th>Australia</th>
<th>Canada</th>
<th>England</th>
<th>France</th>
<th>Singapore</th>
<th>Spain</th>
<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients can electronically access their medical information</td>
<td>3.2%</td>
<td>8.2%</td>
<td>2.4%</td>
<td>2.8%</td>
<td>6.7%</td>
<td>5.2%</td>
<td>42.6%</td>
<td>6.6%</td>
<td>16.6%</td>
</tr>
<tr>
<td>Patients can electronically book/change/cancel appointments</td>
<td>22.8%</td>
<td>20.7%</td>
<td>2.6%</td>
<td>4.0%</td>
<td>33.3%</td>
<td>7.6%</td>
<td>52.5%</td>
<td>44.9%</td>
<td>16.8%</td>
</tr>
<tr>
<td>Patients receive electronic reminders when it is time for preventative or follow up care</td>
<td>16.9%</td>
<td>18.9%</td>
<td>19.8%</td>
<td>6.4%</td>
<td>17.1%</td>
<td>8.0%</td>
<td>51.5%</td>
<td>32.3%</td>
<td>18.8%</td>
</tr>
<tr>
<td>Patients can see health-related information during the consultation</td>
<td>24.8%</td>
<td>29.2%</td>
<td>41.5%</td>
<td>18.4%</td>
<td>35.9%</td>
<td>28.3%</td>
<td>44.6%</td>
<td>22.6%</td>
<td>26.6%</td>
</tr>
<tr>
<td>Patients can electronically request prescription refills</td>
<td>27.8%</td>
<td>20.6%</td>
<td>4.6%</td>
<td>7.2%</td>
<td>33.3%</td>
<td>12.0%</td>
<td>29.4%</td>
<td>29.9%</td>
<td>25.8%</td>
</tr>
<tr>
<td>Patients can communicate with me electronically, for example, through secure email or video conferencing</td>
<td>47.4%</td>
<td>27.4%</td>
<td>20.6%</td>
<td>19.2%</td>
<td>16.7%</td>
<td>29.5%</td>
<td>45.1%</td>
<td>25.7%</td>
<td>25.4%</td>
</tr>
<tr>
<td>Patients can use tele-monitoring devices to monitor and record their own health indicators and remotely inform me of their conditions</td>
<td>6.7%</td>
<td>7.5%</td>
<td>3.6%</td>
<td>4.4%</td>
<td>8.2%</td>
<td>6.4%</td>
<td>26.5%</td>
<td>8.0%</td>
<td>7.5%</td>
</tr>
<tr>
<td>Patients can electronically access health information/education to help them manage their own conditions</td>
<td>4.4%</td>
<td>19.3%</td>
<td>17.0%</td>
<td>14.2%</td>
<td>25.9%</td>
<td>14.5%</td>
<td>39.2%</td>
<td>30.1%</td>
<td>21.0%</td>
</tr>
</tbody>
</table>
The Partnership for the Heart project is a collaboration between health providers and a range of private companies—including InterComponentWare, Bosch, Aipermon and T-Mobile—providing medical technological solutions. It is led by one of the largest European university hospitals, Charité Berlin.

The partnership is bringing telemonitoring to a large number of patients across the Berlin area with cardiac problems. Patients receive monitoring equipment to take with them or use at home. Patients then take regular readings, which are electronically submitted to a central database for daily review by clinical staff. In case of irregularities, a clinical reviewer will contact patients and/or their local GP.

A clinical study involving 710 patients showed that this form of rapid reaction has saved lives: mortality in a certain patient group involved in the scheme fell by more than half, compared with a match group with the same conditions but without telemedical monitoring. The study also concluded that the remote monitoring tools offer a way of achieving more efficient care, both in terms of reducing cost-to-be-served (saving patients time) and cost-of-being-served (saving clinical resources and focusing on early intervention). As a result of the successes of the Partnership in Berlin, there are efforts underway to transfer the lessons to other areas in Germany and beyond.
Ongoing challenges for connected health

Germany has faced a number of challenges in the development of connected health over the years, although many of the experts we interviewed are optimistic that the system will “turn a corner” and accelerate the connected health journey over the coming years—provided that stakeholders address major challenges effectively. These include:

- **Structural challenges:** addressing problems of size, complexity and tradition—The highly diverse and complex system of governance, funding and delivery—along with the sheer size of the system—means that implementing a nationwide e-health infrastructure in Germany is particularly challenging, compared to many other countries.

- **Engaging stakeholders:** providing strategic direction and clarifying responsibilities—The top-down approach set out in the initial strategy, many experts argue, has simply not been effective in bringing all the stakeholders—including insurance companies, doctors and patients—on board. They call for more emphasis on engaging stakeholders in the processes and establishing a better understanding of all partners’ different interests, needs and concerns. This, they believe, is crucial to foster the level of cooperation necessary for connected health to become a reality—especially in Germany, which has a very corporate culture.

- **Developing an effective funding structure:** According to experts, many insurers and different providers often defend their share of available funds rather than pursue common goals, and they tend to prefer the status quo to collaboration. At the same time, these groups manage and balance budgets within one specific financial year, which is at odds with the need for long-term investment, which e-health progression requires. While many of the experts acknowledge the effectiveness of current incentive payments in addressing the imbalances, they are largely related to healthcare IT adoption and infrastructure development, rather than stimulating actual health information exchange.

- **Identifying benefits and demonstrating success:** For many experts it is obvious that more and more connected health applications will develop locally in the future—for example, by hospital groups or through collaborations between organizations dedicated to particular conditions (such as hospitals, ambulatory doctors and rehabilitation centers). One concern among experts, however, is that these smaller projects and isolated examples of health information exchange have not been evaluated sufficiently. As a result, practitioners and health experts are simply not aware of leading practices or expected benefits and potential return on investment. With that in mind, there should be more effort to learn from successful models, apply the lessons elsewhere and bring local innovations to scale. This will, experts argue, be crucial in driving adoption.

- **Tackling privacy and security concerns:** Challenges around privacy and security remain a critical barrier. However, some experts point out that health professionals exaggerate privacy and security issues as “excuses to halt the progress.” Instead, they suggest that the key concern relates more to fear that greater transparency will challenge traditional ways of working. The experts argued that more is needed to communicate and educate both the public and health providers to provide reassurance that personal data is kept secure and only accessed by those who have a legitimate reason to do so. Some suggested that a clear communication strategy and a detailed plan for the governance of personal data is needed, which should be subject to monitoring and evaluation on an ongoing basis.

- **Overcoming design and technical issues:** While many of the challenges mentioned by the experts are cultural in nature, some also mention the design issues and technical aspects that need to be addressed urgently to progress on the connected health journey. These challenges relate to the development and implementation of a shared industry standard, insufficient or outdated hardware and, importantly, mature and easy-to-use software—particularly important as many clinical staffs do not have a high level of technical expertise or time to learn new systems or navigate through complex menus. As it stands, IT vendors are reluctant to invest in product development as they remain unconvinced that the uptake rate in the near future will be large enough to warrant their investment. To address this, experts suggested that incentives would help encourage vendors to invest in innovation and design.

In the quantitative survey, we asked physicians themselves to list the top five barriers to healthcare IT adoption and HIE. Interestingly, concerns about privacy and security were cited as the main barrier, mentioned by more than half of physicians surveyed. However, as highlighted above, some experts interviewed argue that this concern is actually covering for fear of disruption of current methods of working and potential interference as a result of greater transparency. Nearly two in five mention concerns about investing in IT systems that are not interoperable, and a similar number suggests that there is a broad lack of trust between organizations when sharing data with others. Unsurprisingly, costs and concerns about loss of productivity remain significant barriers to adoption.
Ranking of top five barriers experienced by German physicians

Accenture survey question: Please select the five main barriers to the adoption and use of electronic medical record systems and health information exchange in your organization.
How Germany matches up against the six Dynamics of Successful connected health

<table>
<thead>
<tr>
<th>Dynamic</th>
<th>How does Germany match up against these dynamics?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vision and leadership focused on improved health outcomes</td>
<td>Connected health has been on the German policy agenda for many years, and the overarching strategy has remained relatively consistent over the past decade. The specific goals and milestones, however, have been less clearly defined. As a result, progress is slower than expected despite significant investment, and several elements of the strategy have been scaled down or given lower priority. In an effort for connected health to gain new momentum, the government recently introduced a series of reforms and revised the existing e-health strategy. Consequently, the role of federal government has been strengthened, and the revised strategy—Deutschland Digital 2015—has sought to clarify strategic goals and set more specific and realistic timescales for implementation.</td>
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<tr>
<td>Strategic change management</td>
<td>The German health system is a complex mix of stakeholders at different levels in the system. Decision-making powers are shared between the Bundesländer at the state level and the federal government. Implementation happens through a process of self-administration by health insurance associations, provider associations and patient representatives. The experiences of the past decade have proven this to be both a strength and a weakness for progression on healthcare IT in Germany. On one hand, there is great user involvement in the design and delivery of solutions. On the other hand, the different—and at times conflicting—interest of the various stakeholders has been a major challenge. With the launch of the new strategy, the government has put more emphasis on change management with clarified roles and responsibilities of specific tasks assigned to named associations. In addition, more effort is targeted at engaging stakeholders, in particular end users and patients.</td>
</tr>
<tr>
<td>Robust IT infrastructure</td>
<td>Despite the widespread use of healthcare IT in primary and secondary care, there is relatively little progress on health information exchange across different service providers and regions. However, the introduction of the electronic health cards for all 80 million Germans holds the promise to connect health systems within the next few years. The recently strengthened role of the national healthcare IT agency, Gematik, is seen as critical in driving through changes and implementing a coherent set of standards and security features. As yet, however, most legacy healthcare IT systems in both primary and secondary care will require replacement or upgrades to comply with new standards and enable interoperability.</td>
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<tr>
<td>Co-evolution</td>
<td>With the newly launched Deutschland Digital 2015 strategy, the scene for connected health in Germany has been somewhat &quot;reset.&quot; There is now more emphasis on the importance of innovation across the different layers of the system and local players developing local solutions, which addresses the specific need and context in which they operate. Importantly these local innovations will need to align with the overall national strategy, and Gematik—the federal healthcare IT agency—will ensure that local systems are compatible with the overarching infrastructure. This approach will likely enable faster progression in the connected health journey in Germany.</td>
</tr>
<tr>
<td>Clinical change management</td>
<td>Analytics is still in the early stages of development, not least because there is little collection of standardized data across primary and secondary care. There are, however, pockets of good practice: Since 2003, a nationwide disease management program has been in place. GPs collect medical data for a number of key chronic diseases and send them to a number of federal databases. Today, there are approximately 5.5 million patients under monitoring. The data is already being used widely: GPs receive information about outliers or new interventions for their patients. Similarly, national agencies and insurance companies access the data to develop more effective and efficient chronic care in the future.</td>
</tr>
<tr>
<td>Integration drives integration</td>
<td>For Germany, integration is still in its early phases. Nevertheless, there are great examples of how integration of healthcare IT in a certain area and region has driven further integration of care provision. This in turn has provided the &quot;business case&quot; for further health information exchange and the use of health information to optimize value. Project &quot;Gesundes Kinzigtal&quot; is an example of this &quot;virtuous cycle&quot; where a region-wide information exchange, a central record of patients and their care history and an IT-supported outcome-based billing model has helped promote integrated care in the region. The successes in Kinzingtal have served as inspiration for other regions, which now seek to replicate their model.</td>
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</table>

= recognized need/initial steps  = progress being made  = strong performance  = sustained excellence
Future priorities

Over the past decade, healthcare IT has increasingly been seen as a critical means of improving the way in which healthcare is managed and delivered in Germany. Despite ambitious goals and significant investments, though, progress to date has been mixed, in particular when it comes to health information exchange. While many experts are disillusioned by the slow pace of change, they also believe that the overall goal and the funding models for connected health need to become clearer before connected health in Germany can develop further. Some believe that the benefits of e-health have yet to be proven, making it difficult to justify further huge investment and significant changes to the entire healthcare system.

Most experts agree that there has still not been proper consultation and agreement about the vision for connected health and see this as an important next step. The debate about the right scope and scale of connected health has to be conducted as an open discussion among all stakeholders. Most important, experts agree that the vision for connected health has to depict a win-win situation for all stakeholders to assure greater commitment and investment going forward.

That said, many believe that there can be some progress without agreement on the overall vision. For example, there is an expectation that the first telemedicine applications will be working nationwide, including the IT infrastructure for running them and that all communication, which is currently paper-based, will be carried out electronically. Some experts suggest that small local projects might also be an important starting point, to help demonstrate how connected health works and what benefits it can bring.

While experts diverge on what progress can realistically be expected over the next five years, most agree that healthcare IT adoption levels and, in particular, the use of telemedicine, will increase significantly. This will set the foundation for HIE and enable greater optimization of connected health to improve the quality of care and help to manage budget pressures.
The health system in Singapore

- Total population: approximately 5 million.
- Healthcare spend: 3.9 percent of GDP 2009—$2,086 per capita.
- Funded through a mixture of government subsidies (about a third) and private insurance.
- Primary care is predominately provided by the private sector (80 percent); secondary care delivery is largely provided by the public sector (80 percent).
- Care delivery is organized into six regional clusters, each anchored by a restructured hospital.
- Primary care is provided by some 2,000 private medical practitioner clinics and 18 outpatient polyclinics that are funded publicly. Acute care is provided through a number of general, community and specialist hospitals and institutions.
- Life expectancy of 81.8 years puts Singapore on a par with Spain (which is fourth in the latest OECD ranking—2011).
The Singapore context
In Singapore, healthcare IT is an important means of driving effectiveness and efficiency. While there is still a journey ahead, the current strategy is set to place Singapore on par with world leaders in connected health. With progress of the “Intelligent Nation 2015” (iN2015), the linked national health informatics strategy, the aim is to transform how the sophisticated use of healthcare IT helps deliver and manage health services.

The National Electronic Healthcare Record (NEHR) is the cornerstone of Singapore’s connected health strategy, and with the first phase completed in 2011, the Singaporean government is on track to deliver on the vision of “one Singaporean, one health record.” The NEHR, which was developed in collaboration with more than 200 clinicians and suppliers, is a longitudinal summary of healthcare profiles and a consolidated view of a patient’s current problems, medications and investigations. Unlike the existing electronic medical record exchange (EMRX) introduced in 2004, the NEHR architecture extracts structured information (rather than unstructured documents) from local EMRs into a single record, accessible by authorized healthcare providers.

This form of structured data recording and exchange will increasingly be instrumental in driving sophisticated clinical decision support and analytics for disease management, care interventions and research for public health. Underpinning the NEHR initiative is the development of a sturdy architecture and standards for interoperability and health information exchange, unique patient identifiers and robust information governance arrangements. The plan is to incorporate learning in phases and exploit rapidly developing technologies.

“[We have absolute government support, with an ‘it will be done’ attitude. They brought in the right people, created a risk tolerant environment and presented no big obstacles.”

– Sari McKinnon, Director of Solutions and Architecture, MOH Holdings

The Infocomm Development Authority (IDA) is responsible for implementing the iN2015 plan and directs national IT standards and policies, including information governance and privacy legislation. The Ministry of Health (MOH) and MOH Holdings—the holding company in charge of Singapore’s public healthcare assets—are responsible for developing the national healthcare IT framework, including interoperability standards and implementation of the NEHR program.

Progress on the connected health journey
As is the case in most of the countries we studied, Singapore has made advances in each of the different stages simultaneously and on an iterative and regional basis. This section provides an overview of the progress in Singapore in relation to healthcare IT adoption, health information exchange (HIE) and insight driven healthcare.

Healthcare IT adoption
As is the case in many other countries, the healthcare sector in Singapore has been relatively slow in embracing new technologies, compared to other sectors or industries. With the strategy for the NEHR progressing to plan, however, there is now rapid progress of connected health in Singapore, in particular within and between publicly funded hospitals, which account for 80 percent of secondary care provision. For those public sector providers, the Singaporean government funds the healthcare IT systems, whereas private providers are largely required to invest themselves. As a consequence, many of the experts interviewed for this study are concerned about private providers lacking incentives to invest in connected health and falling behind the rate of progress in the public system. This, experts pointed out, represents a major challenge to the government’s long-term vision.

“I do share the belief that the connected health model can lead to improved health outcomes, so I look forward to the NEHR living up to the ‘N’ letter in the acronym. That is, it must go beyond the public sector into the private sector, into the primary care market.”

– Dr. Colin Quek, Singapore Health Partners

While Singapore is progressing quickly in its journey toward connected health, there are still many physicians across both primary and secondary care who are not yet using healthcare IT functionality to a degree which makes a difference to their care management practices. In the survey, we asked physicians to indicate the extent to which they use key healthcare IT functionalities:

- Just over half—53 percent—of doctors in secondary care report that they electronically enter patient notes either during or after consultation. In primary care, this number drops to 29 percent.
- Fewer than two in five doctors in Singapore surveyed—38 percent—report that they use electronic tools such as e-scheduling or e-billing to reduce the administrative burden for delivering healthcare.
- A third receive electronic alerts and reminders while seeing patients—29 percent in primary care and 34 percent in secondary care.
- Thirty-one percent of primary care doctors and 23 percent of secondary care doctors report they use more advanced clinical decision support systems to help make diagnostic and treatment decisions while seeing patients. In secondary care, only 23 percent of those surveyed make use of this functionality.
Experts are optimistic that healthcare IT adoption levels will grow rapidly in the coming years, especially as current non-users begin to see the benefits realized by early adopters. Project CLEO (Clinic Electronic Medical Record and Operation Systems) was cited as likely to be a significant factor in driving uptake, according to experts interviewed. It is part of the GP IT Enablement Program launched in 2009, which aims to boost healthcare IT adoption among primary care physicians. The project will support GPs in all stages of adoption of a clinical management system and electronic medical record (EMR) system, from the design phase to implementation. The initial phase of Project CLEO started in 2011 and will run until 2013, with 50 GP clinics covered in the first phase.

Health information exchange

The overarching strategy is building the backbone of connected health for Singapore and getting the connectivity up. I think it is very clear, and that’s why it’s moving forward so fast.”
−Associate Professor Cheng Ooi Low, Changi General Hospital

While HIE is increasing across the healthcare system (in particular, among the publicly funded healthcare clusters), wider exchange is hampered by the lack of interoperability between local legacy systems. According to our survey, approximately a third of physicians communicate electronically with clinicians in other organization (30 percent in primary care and 35 percent in secondary care). Approximately one quarter across both primary and secondary care report that they are electronically notified of patients’ interactions with other health organizations and electronically send and receive referrals. A similar number of primary care providers have electronic access to clinical data about a patient who has been seen by a different health organization. In secondary care this number increases to 38 percent. Three in 10 primary care providers receive clinical results that populate their patients’ EMR, and a quarter of physicians send order requests to laboratories electronically.

The use of these HIE functionalities is more mature in secondary care—nearly two-fifths of secondary care physicians send order requests and receive clinical results electronically. The use of e-prescription in Singapore is relatively advanced, in comparison with other countries surveyed: a third of primary care physicians and two-fifths of secondary care physicians make use of this functionality. Looking across the different types of HIE, there are notable differences between private and public sector providers: the use of HIE is significantly more frequent among public sector providers compared with private-for-profit and private not-for-profit providers.

There are significant developments at the system level, which are set to escalate progress in HIE over the coming years. An enterprise architecture is in place to support the deployment of the NEHR, based on international standards—adapted where necessary to meet local requirements—to enable secure data exchange and data sharing among local and enterprise clinical systems.
NUHS has been one of the early adopters in the healthcare IT implementation, and as a result, patient care management has undergone a dramatic transformation. An enterprise messaging system delivered via mobile phones communicates a range of information to clinicians including laboratory results, bed allocation, remote monitoring, alerts such as mass casualty incidents and handover. Patients, their families and their caregivers can also receive messages. The messaging system has improved response times and informs care management. A wireless light box enables clinicians to bring digital images and EMRs to a patient’s bedside and supports a more collaborative approach to the consultation. A computerized patient support system provides a single view of patient data drawn from multiple systems.

The system includes X-rays, laboratory results, surgical operating notes, discharge summaries and clinical results.

The electronic medication administration system in place at NUHS is reported to be the single most powerful intervention for improving medication safety to date, with more than 80 percent in reduction of the medication error rate since the system was put in place.
In primary care, Singapore lags behind other countries in the survey in many aspects of healthcare IT adoption and HIE, but is ahead of the average in clinical decision support, secure email with other clinicians, e-prescribing and electronic communication with patients.
Progress in secondary care: percentage of physicians using a range of healthcare IT and HIE functionalities

Accenture survey question: How often do you perform the following functions (results show percentage of physicians that use "routinely")?

Healthcare IT adoption and HIE: secondary care – Singapore

Healthcare IT adoption and HIE are relatively well advanced in secondary and specialist care in Singapore, but are ahead of the average in clinical decision support, secure email with other clinicians, e-prescribing and electronic communication with patients.
Insight driven healthcare

The journey toward connected health is rapidly transforming how Singapore manages and delivers healthcare. However, the experts we interviewed argue that there is still some way to go before the various stakeholders across the health system can fully optimize how they use their health information to improve the quality and cost of care.

Nevertheless, our survey reveals that physicians in Singapore are generally much more likely than physicians in the other seven countries surveyed to share clinical data for analytical purposes—largely because the Ministry of Health requests performance data for public health reporting from both primary and secondary care providers. Seventy-one percent in primary care and 61 percent in secondary care in Singapore share clinical data with other organizations, including public health authorities, to improve protocols and patient care (compared to an international survey average of 44 percent in primary care and 45 percent in secondary care). When it comes to sharing clinical data with other organizations for population health reporting and disease management, nearly three quarters of primary care physicians and more than three in five secondary care physicians state that they share data for this purpose. In comparison, the international survey average is 46 percent for primary care and 47 percent for secondary care providers.

"With our expanding health IT network, we now have the ability to collect data from all the public sector hospitals and receive more information from the private sector so we have greater visibility of the entire health arena for planning, management, quality improvement and so on."

−Dr. Sarah Muttitt, Chief Information Officer, Information Systems Division, MOH Holdings

Singapore’s Chronic Disease Management Program (CDMP) has been driving much of the relatively high levels of data sharing. Since 2006, hospitals and GPs send data to a national repository, which supports the Health Promotion Board and enables benchmarking. The program, which is heralded as a great success, reflects the government’s increased focus on integrated care management—especially for patients with chronic diseases.

"The focus is now on integrated care, supporting the movement of patients through the system, and integrated work flow. As part of this, the department is looking at integrating immunization records and school health records."

−Sari McKinnon, Director of Solutions and Architecture, MOH Holdings

How electronic clinical patient data is used

Accenture survey question: To what extent do you use the clinical patient data you collect electronically in the following ways?

| Patients’ clinical data are shared across my organization and used to help improve our clinical care protocols and clinical outcomes | Singapore | Global Average |
|---|---|---|---|
| Primary Care | Secondary Care | Primary Care | Secondary Care |
| 64% | 72% | 78% | 77% |

Patients’ clinical data are shared with other organizations, including public health authorities, to improve protocols and patient care

| Singapore | Global Average |
|---|---|---|---|
| Primary Care | Secondary Care | Primary Care | Secondary Care |
| 71% | 61% | 44% | 45% |

Patients’ clinical data are shared with other organizations, including public health authorities, for population health reporting, disease management

| Singapore | Global Average |
|---|---|---|---|
| Primary Care | Secondary Care | Primary Care | Secondary Care |
| 74% | 62% | 46% | 47% |

Note: number of physicians who use electronic clinical patient data for different purposes to “some extent” or “to a great extent.”
Much of the reason behind the success of the CDMP is that compared to most of the other countries surveyed, Singapore is ahead of the game when it comes to the availability of comprehensive and comparable patient data sets that are systematically collected and stored in a form that is easily accessible. The relative progress in this area is because much of the data entered in the system is coded: in our survey, nearly 40 percent of physicians in Singapore enter patient data using a coded method. By international comparison, this level of coded data use is significantly higher than six of the seven other countries surveyed; only England is slightly further ahead. With the NEHR program driving the development of further coded data records, experts argued that there should be greater potential in the future to use sophisticated analytics for a wide variety of purposes, including operational, financial, care management, clinical quality, public health and performance management.

How patient data is currently entered in the system

Accenture survey question: Please indicate which statement most closely describes how you currently enter the following data in your electronic system.
Patient-related technologies

"As a consumer, I would like to access all my healthcare histories. I would like to be able to not have to rely on small little cards from every healthcare provider I go to, I would like to be able to access it all together online, [and] I would like to be able to recall what tests have been done, what the results were.”

–Singapore health system leader

In our survey, we asked physicians to indicate the extent to which a range of patient-related technologies are available. The results provide a clear picture: across the board, physicians in Singapore—especially those in the public healthcare settings—are much more likely to report that their patients can make use of a range of technologies to help manage their own care than in other countries. For example, more than half of the physicians in Singapore (primarily in the public sector) report that their patients can electronically book, change or cancel appointments. In addition, two in five report that their patients can electronically access their medical information, see health-related information during the consultation, communicate with physicians electronically or access health information/education to help them manage their own conditions. Nearly a third report that their patients can electronically request prescription refills.

According to our survey, the availability of telemonitoring is also relatively common by international standards, with more than one quarter of physicians stating that their patients can use telemonitoring devices to monitor and record their own health indicators and remotely inform practitioners of their conditions. The National Heart Center and Singapore General Hospital have in many ways led the way in this area through the implementation of a home telecare solution, which integrates the Internet, SMS, Web portal and mobile phones to monitor patients’ vital signs at home. The system sends SMS alerts to both doctors and the patients whenever vital signs are beyond set thresholds. Despite the relatively high levels of maturity in this area, some experts suggest that many physicians in Singapore remain skeptical about the use of telemonitoring, owing mainly to fear of increased levels of fraud and misdiagnosis. Because Singapore is a small country, some physicians argue that the benefits are more limited as most patients can easily access their healthcare services.
The technologies available to patients

Accenture survey question: Please identify which of the following patient-related technologies are available to your patients:

<table>
<thead>
<tr>
<th>Technology</th>
<th>Singapore</th>
<th>Survey average</th>
<th>Australia</th>
<th>Canada</th>
<th>England</th>
<th>France</th>
<th>Germany</th>
<th>Spain</th>
<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients can electronically access their medical information</td>
<td>42.6%</td>
<td>8.2%</td>
<td>2.4%</td>
<td>2.8%</td>
<td>6.7%</td>
<td>5.2%</td>
<td>3.2%</td>
<td>6.6%</td>
<td>16.6%</td>
</tr>
<tr>
<td>Patients can electronically book/change/cancel appointments</td>
<td>52.5%</td>
<td>20.7%</td>
<td>2.6%</td>
<td>4.0%</td>
<td>33.3%</td>
<td>7.6%</td>
<td>22.8%</td>
<td>44.9%</td>
<td>16.8%</td>
</tr>
<tr>
<td>Patients receive electronic reminders when it is time for preventative or follow up care</td>
<td>51.5%</td>
<td>18.9%</td>
<td>19.8%</td>
<td>6.4%</td>
<td>17.1%</td>
<td>8.0%</td>
<td>16.9%</td>
<td>32.3%</td>
<td>18.8%</td>
</tr>
<tr>
<td>Patients can see health-related information during the consultation</td>
<td>44.6%</td>
<td>29.2%</td>
<td>41.5%</td>
<td>18.4%</td>
<td>35.9%</td>
<td>28.3%</td>
<td>24.8%</td>
<td>22.6%</td>
<td>26.6%</td>
</tr>
<tr>
<td>Patients can electronically request prescription refills</td>
<td>29.4%</td>
<td>20.6%</td>
<td>4.6%</td>
<td>7.2%</td>
<td>33.3%</td>
<td>12.0%</td>
<td>27.8%</td>
<td>29.9%</td>
<td>25.8%</td>
</tr>
<tr>
<td>Patients can communicate with me electronically, for example, through secure email or video conferencing</td>
<td>45.1%</td>
<td>27.4%</td>
<td>20.6%</td>
<td>19.2%</td>
<td>16.7%</td>
<td>29.5%</td>
<td>47.4%</td>
<td>25.7%</td>
<td>25.4%</td>
</tr>
<tr>
<td>Patients can use tele-monitoring devices to monitor and record their own health indicators and remotely inform me of their conditions</td>
<td>26.5%</td>
<td>7.5%</td>
<td>3.6%</td>
<td>4.4%</td>
<td>8.2%</td>
<td>6.4%</td>
<td>6.7%</td>
<td>8.0%</td>
<td>7.5%</td>
</tr>
<tr>
<td>Patients can electronically access health information/education to help them manage their own conditions</td>
<td>39.2%</td>
<td>19.3%</td>
<td>17.0%</td>
<td>14.2%</td>
<td>25.9%</td>
<td>14.5%</td>
<td>4.4%</td>
<td>30.1%</td>
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Ongoing challenges for connected health

Experts interviewed commended the fast-paced progress on connected health in Singapore over recent years. There are, however, key challenges to address to deliver the vision of “one Singaporean, one health record.” According to the experts interviewed, the major challenges relate largely to issues around physician adoption, including:

- **Engaging the private sector:** Perhaps the greatest challenge for connected health progression in Singapore, experts suggested, relates to the use of healthcare IT systems being significantly lower in the private sector compared to public sector. The issue is particularly acute in primary care, where 80 percent of physicians operate in private practices. While the GP IT enablement program goes some way in addressing the issue, experts argue that there should be financial incentives for GPs to encourage implementation.

- **Developing the business case:** Financial support alone is not sufficient in addressing the challenges related to GP adoption. Many of the experts interviewed suggested that there is a large group of GPs that does not recognize the benefits of connected health. To convince this group of healthcare IT skeptics, officials should boost national awareness campaigns to showcase how healthcare IT has delivered key benefits for early adopters and thereby persuade more GPs to adopt healthcare IT.

- **Reluctance to share information:** Some experts suggested that many primary care physicians remain reluctant to share information electronically, concerned about the greater transparency it will bring. The concern relates both to fear of additional scrutiny from government and a perceived increased risk of losing patients as the NEHR will, as one interviewee suggested, enable more patients to “doctor hop.”

- **Addressing the older generation of physicians:** Many older clinicians are not healthcare IT literate and have only ever used paper-based records. This group of physicians is particularly reluctant to adopt healthcare IT and to change its working methods as a result. However, while this is a real challenge today and over the coming few years, experts suggested that this older generation of clinicians is soon retiring and will be replaced by a new generation of clinicians which is highly IT literate and much more likely to embrace healthcare IT in its day-to-day work.

"The fundamental question that needs to be answered is, 'What's in it for me?' from the perspective of the different stakeholders. ‘Am I going to get some financial benefits, is it really going to improve my business?’"

– Dr Colin Quek, Vice President Operations, The Farrer Park Company

In addition to the challenges related to physician adoption, some of the experts interviewed believed that timescales for HIE between the hospital clusters have been slower than they would have liked, largely because of technical interoperability issues. Yet, while technical challenges will likely continue throughout the different phases of implementation, experts expressed confidence that the technical challenges are being addressed promptly and appropriately.

In the quantitative survey, we asked physicians themselves to list the top five barriers for healthcare IT adoption and HIE. Interestingly, concerns about privacy and security were perceived to be the main barrier, mentioned by more than half of physicians surveyed. Yet, the experts interviewed did not consider this to be a key issue in Singapore. As such, it could be that physicians’ concerns about privacy and security might in fact cover for a more general skepticism related to fear of increased transparency. The second most frequently experienced barrier relates to lack of trust between organizations in sharing data, mentioned by 45 percent of physicians surveyed in Singapore, perhaps a factor regarding the competitive nature of Singapore’s health system. Approximately a third of physicians are also concerned about higher risk of medical liability, loss of productivity and a lack of technical expertise to manage the implementation.
Top five barriers experienced by physicians in Singapore

Accenture survey question: Please select the five main barriers to the adoption and use of electronic medical record systems and health information exchange in your organization.

- Lack of technical expertise to manage implementation
- Concern about privacy and security of patient data
- Higher risk of medical liability
- Concern about loss of productivity due to time consuming to input data
- Lack of trust between organizations in sharing data with each other
## How Singapore matches up against the connected health dynamics

<table>
<thead>
<tr>
<th>Dynamic</th>
<th>How does Singapore match up against these dynamics?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vision and leadership focused on improved health outcomes</td>
<td>With its vision of &quot;Championing a healthy nation with our people—to live well, live long and with peace of mind,&quot; the Singapore Ministry of Health promotes individual responsibility for the costs of services, while encouraging people to adopt a healthy lifestyle and take responsibility for their own health. Singapore has been exemplary in creating and communicating a clear vision of connected health (&quot;One Singaporean, one health record&quot;), driven by strong government backing. The government recognizes the challenges of a rapidly aging population and sees connected health as an essential element in tackling them. Led by clinicians, it has developed a robust business case, which identifies the benefits, therefore justifying investment. The vision and leadership for connected health has a greater impetus within the wider context of Singapore’s master plan to transform key economic sectors of government and society through the sophisticated use of &quot;info-communications.&quot;</td>
</tr>
<tr>
<td>Strategic change management</td>
<td>The MOH Holdings (MOHH) Clinical Transformation Service and Business Analysis Team worked with more than 200 clinicians to develop the clinical requirements and business case for the National Electronic Health Record (NEHR). This has resulted in a design that is seen as clinically relevant for clinicians’ routine practice. The rollout of the NEHR targets clinicians who see the benefits of incorporating IT systems into clinical practices. By demonstrating success at an early stage, it is easier to convince other clinicians of the benefits as “success breeds success.” The NEHR will initially be used by a subset of public sector providers including acute hospitals, polyclinics and community hospitals, but the government is committed to extending the use of the EHR to private sector GPs. Project CLEO (Clinic Electronic Medical Record and Operation System) is part of the government’s GP IT Enablement Programme which aims to encourage GPs to adopt EMRs. However, experts feel that the government still needs to demonstrate the benefits and put in place financial incentives to truly motivate GPs to adopt and use the system.</td>
</tr>
<tr>
<td>Robust IT infrastructure</td>
<td>An initial technical solution—the EMR Exchange (EMRX)—was introduced in 2004 and has acted as the starting point for the more comprehensive NEHR—a &quot;longitudinal summary of healthcare profiles and a consolidated view of a patient’s current problems, medications and investigations.&quot; Unlike the EMRX, the NEHR extracts structured information from local EMRs into a single record, accessible by authorized providers. An enterprise architecture is in place to support the implementation of the NEHR, based on international standards—adapted where necessary to meet local requirements—to enable secure data exchange and data sharing among local and national clinical systems. Singapore’s approach has been to introduce the NEHR in phases, enabling Singapore to take into account experience and learning from each phase and to exploit fast-moving advances in technologies. Full implementation may take many years, and future phases have yet to be defined in detail. MOHH is responsible for managing the system, and setting standards for interoperability, and has been commissioning external vendors to implement each phase.</td>
</tr>
<tr>
<td>Co-evolution</td>
<td>Singapore has embraced co-evolution to some extent, working closely with clinicians in the design and development of the NEHR and on Project CLEO. However, the NEHR is essentially a top-down implementation led by the MOHH. While many experts recognize the benefits of a top-down approach when it comes to enforcing standards of interoperability across systems, others feel it leaves little room for bottom-up experimentation and innovation. Singapore’s health system was recently reorganized from two into six healthcare clusters, each anchored by a regional hospital working with a variety of primary, intermediate and long-term care sector and support services to deliver patient-centric care. This has helped to make services more accessible for patients and assisted the bottom-up development of connected health in the regional clusters. The Agency for Integrated Care also acts as a national care coordinator, supporting the movement of patients across the various healthcare settings.</td>
</tr>
<tr>
<td>Clinical change management</td>
<td>The NEHR architecture is built around structured and coded data, and experts have high expectations for the benefits that will result through sophisticated analysis of secondary data. In particular, they anticipate opportunities for undertaking research to streamline processes, reduce costs, improve outcomes and promote public health. Future support for genomic analysis will lead to more personalized treatment and care. Implementation of the NEHR is still in phase 1, and analytics at the regional or national level has yet to be realized. However, there are good examples of localized benefits arising from clinical decision support systems used in public sector hospitals.</td>
</tr>
<tr>
<td>Integration drives integration</td>
<td>For Singapore, integration is still in its early phases, and this cycle is still establishing momentum. The implementation of the EMRX (which exchanges documents) has provided clear evidence of the benefits of sharing information between secondary care organizations, and has smoothed the path of integration for connected health in Singapore. The development of a Personal Health Management (PHM) Solution is expected to act as another key driver for integration, linking to the NEHR and supporting patients to better manage their health and wellbeing.</td>
</tr>
</tbody>
</table>

![Progress being made icon](https://www.accenture.com/_ui/cdn/fe772bd0-0f7d-434e-b2f0-831e36270c0e/progress-being-made.png)

= recognized need/initial steps

![Progress being made icon](https://www.accenture.com/_ui/cdn/fe772bd0-0f7d-434e-b2f0-831e36270c0e/progress-being-made.png)

= progress being made

![Strong performance icon](https://www.accenture.com/_ui/cdn/6513f0ba-e159-4ea2-9d75-28d0f5d2dd9d/strong-performance.png)

= strong performance

![Sustained excellence icon](https://www.accenture.com/_ui/cdn/01f1a8a8-0e92-4a6e-84d7-a42f4e708ed5/sustained-excellence.png)

= sustained excellence
Future priorities
Experts agree that developing connected health is a critical step to improve patient care, manage costs and respond effectively to delivery capacity challenges in Singapore. The progress over the past few years has been impressive, and the foundation is now set for the successful rollout of the NEHR and other connected health initiatives, all of which will likely place Singapore among the world leaders in optimizing healthcare IT.

According to experts, Singapore’s success to date is largely down to the government driving improvements through an ambitious but clear, realistic and achievable vision. In developing the strategy and designing solutions, the focus has been on the value, which healthcare IT can bring to patients, practitioners, organizations and networks and the wider system for public health improvement. This has been a key factor in securing political and practitioner support for proposed changes.

“Better health, better care and better value…. Within five years, these are all possible goals that can be achieved.”
— Dr. Lee Chien Earn, Ministry of Health

There are two important trends driving further progress toward connected health in Singapore. First, there is a significant growth in mobile computing via mobile phones and tablets. Second, people in Singapore are becoming more proactive in managing their own health. Experts predict that citizens themselves will soon become important advocates of connected health and increasingly expect their healthcare providers to make use of patient-enabled technologies.

Certainly, the journey ahead is not without its obstacles. Realizing the vision of “one Singaporean, one health record” will require greater engagement on the part of physicians, especially those in primary care operating in private practices, to increase adoption and use of healthcare IT. Experts place great hope in the GP IT Enablement Program, and some argue that the connected health program overall will hinge on its success. At the same time, experts note the importance of the government continuing to support local innovation and experimentations with new ideas. Learning from leading practice locally, monitoring progress and showcasing early benefits will be important factors to drive progress.

Singaporeans are optimistic in their government’s commitment and ability to manage the challenges and delivering on the vision. As such, experts predict that over the next five years Singapore will successfully move toward an electronic HIE system. This will bring great benefits. For example, physicians will be able to access timely, accurate and comprehensive information about their patients, sophisticated analytics will increasingly support the clinical care process and improve research for public health purposes, and patients will receive more personalized treatment and care, and be enabled to take more responsibility for their own care. As such, connected health will truly transform how healthcare is delivered in Singapore.

“I think we will have different data in five years, because I do believe that genomic information and so on will be available and used in terms of prospective and preventive medicine.”
— Dr. Sarah Muttitt, Chief Information Officer, Information Systems Division, MOH Holdings
The health system in Spain

- Total population: 46 million.
- The Spanish National Health Service (SNS) is regionally organized, with responsibility for healthcare provision sitting with the country's 17 autonomous regional governments.
- Healthcare is free at the point of need for citizens, with the system as a whole funded by taxpayer contributions.
- With life expectancy of 81.8 years, Spain ranked fourth in the latest OECD ranking (2011).
- There are 3.5 doctors and 4.9 nurses per 1,000 population (compared to an OECD average of 3.1 and 8.4 respectively) and 3.2 hospital beds (compared with the OECD average of 4.9).
The Spanish context

Spain is widely regarded as a connected health success story—showing widespread healthcare IT adoption, with a relatively high use of electronic medical records (EMR) and health information exchange (HIE) at the regional level. The experts we interviewed see Madrid, Extremadura, Cataluña, the Balearic Islands, Galicia and Andalucia as some of the most advanced systems in Europe, though almost every regional health system collects electronic patient data, even if HIE is more limited in some cases. In these regions, where investment and incentives have been strong, experts point to leading-edge practice in integrated healthcare delivery. In other regions, a lower government priority on connected health has led to slower development.

In Spain, regional health authorities, which are responsible for developing their own strategic health plans, are largely driving progress in connected health. Dovetailing with this is the national frameworks of the 2006 SNS Quality Plan and the national Plan Avanza—a five-year, €5.7 billion strategy for developing digital government and public services in the country.

The recent focus of central government has been on encouraging interoperability and data exchange among the different regional health systems, as well as providing funding to support developments in this area through Red.es, a body within the Ministry of Industry, Tourism and Trade responsible for rolling out digital public services in Spain. Central government’s role includes setting out minimum standards for data sets and parameters to facilitate comprehensive health information exchange, drawn from European and global frameworks.

“Great progress has been made, but we need to make that last leap to spread [progress] to all regional communities in Spain, and at the end of the day it is all down to political will. It should be a priority for the central administration.”

–Regional health system leader

Spain’s progress on the connected health journey

In this section, we describe Spain’s progress across the three stages of the connected health journey: healthcare IT adoption, health information exchange and insight driven healthcare.

Healthcare IT adoption

“Some regions allocate out of their budget larger investment [for] training doctors while others devote more money to technology, and at the end of the day, it shows.”

–Pedro Santos, Medical Director, Ibermutuamur

Spain’s regional communities all demonstrate a relatively high level of healthcare IT adoption, particularly within primary care, in which each region has developed its own autonomous EMR system. This progress is reflected in our survey: 81 percent of primary care physicians electronically enter patient notes during or after consultations, and 69 percent use electronic tools to reduce the administrative burden for their organization. A smaller percentage—just under half—of physicians receive electronic reminders or alerts when seeing patients, though all of these figures are above average across the countries we surveyed.

Healthcare IT adoption is less mature within secondary care settings. Sixty-two percent electronically enter patient notes during or after consultations, but fewer than three in 10 receive electronic alerts or reminders while seeing patients. Sixty-one percent of hospital or specialist care physicians report using electronic tools to reduce their organizations’ administrative burden. Our research showed that these national figures mask considerable regional variation, which has been a recent focus of central government as it looks to connect health systems and promote intra-regional interoperability. This is being done through the Digital Records Project (known by its Spanish acronym HCDSNS), a collaborative initiative between the national and regional ministries of health aimed at harmonizing regional e-health agendas and supporting system interoperability.

Health information exchange

“Great progress has been made, but we need to make that last leap to spread [progress] to all regional communities in Spain, and at the end of the day it is all down to political will. It should be a priority for the central administration.”

–Regional health system leader

HIE in primary care is common across Spain’s regional health systems. In some—particularly those regional governments that have prioritized investment in healthcare IT—information sharing between primary and secondary care settings is evident.

In most areas, Spain’s regional communities demonstrate progress in HIE above the average of all the countries we surveyed. For example, more than 60 percent of primary and secondary care physicians receive results electronically that populate their patients’ electronic medical record. More than 70 percent of primary care physicians and 60 percent of secondary care physicians electronically send laboratory order requests—against international survey averages of 37 percent and 36 percent respectively.
However, our survey data suggest that despite some leading-edge practice, there is still some way to go before HIE is universal. Slightly more than 40 percent of both primary and secondary care physicians communicate electronically with clinicians in other organizations. Against most other components, there is evidence of greater progress within primary care settings than secondary. For example, 36 percent of primary care physicians are electronically notified of their patients’ interactions with other healthcare organizations, as opposed to 22 percent within secondary care. About 56 percent of primary care physicians have electronic access to clinical data about a patient who has been seen by another organization, whereas only 42 percent of hospital and specialist doctors are able to do this. And 59 percent of primary care physicians report electronically sending or receiving referrals to or from health professionals in other organizations. Within secondary care, just more than three in 10 use this capability.
The charts below provide a visual depiction of the extent to which Spanish physicians in our survey use a range of healthcare IT and HIE functionalities in comparison to the international average of physicians’ use across the eight countries of our study.

Progress in primary care: percentage of physicians using a range of healthcare IT and HIE functionalities

Accenture survey question: How often do you perform the following functions (results show percentage of clinicians that use “routinely”)?

Healthcare IT adoption and HIE: primary care – Spain

In primary care, Spain is leading the way in many aspects of healthcare IT adoption and HIE, particularly in relation to e-referrals, CPOE and accessing data about patients seen by a different health organization.
Spain ranks above average in most aspects of healthcare IT adoption and HIE in secondary/specialist care, particularly electronic entry of patient notes and receipt of clinical results.
Insight driven healthcare

The extent of value that organizations are reaping from connected health is variable across Spain, though some regions are already well advanced in realizing social and economic benefits from healthcare IT adoption and information exchange.

Our survey data reflects this optimism. More than 80 percent of both primary and secondary care physicians told us that they share patients’ clinical data across their own organization and use it to help improve clinical care protocols. In addition, more than 60 percent said that they share electronic patient data with other organizations to help improve clinical care protocols and clinical outcomes, a comparatively high figure across the countries we surveyed. At a population level, clinicians are also positive about the use of data for public health reporting and disease management with close to 70 percent of both primary and secondary care physicians telling us that they share patient data with other organizations for these purposes.

Experts across several regions argued that while many see clear benefits to greater use of analytics, there are relatively few regional health authorities prioritizing investment in this area as a result of short-term budget pressures.

"If more efforts were placed in analyzing the characteristics of the population seen by specific doctors, including the difficult cases, rather than [just] determining the number of prescriptions made by a particular physician of a specific drug, the data would be much more powerful."

How electronic clinical patient data is used

Accenture survey question: To what extent do you use the clinical patient data you collect electronically in the following ways?

| Patients’ clinical data are shared across my organization and used to help improve our clinical care protocols and clinical outcomes | Spain | Global Average |
|---|---|---|---|
| Primary Care | Secondary Care | Primary Care | Secondary Care |
| 84% | 84% | 78% | 77% |

<table>
<thead>
<tr>
<th>Patients’ clinical data are shared with other organizations, including public health authorities, to improve protocols and patient care</th>
<th>Spain</th>
<th>Global Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Care</td>
<td>Secondary Care</td>
<td>Primary Care</td>
</tr>
<tr>
<td>66%</td>
<td>62%</td>
<td>44%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Patients’ clinical data are shared with other organizations, including public health authorities, for population health reporting, disease management</th>
<th>Spain</th>
<th>Global Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Care</td>
<td>Secondary Care</td>
<td>Primary Care</td>
</tr>
<tr>
<td>70%</td>
<td>67%</td>
<td>46%</td>
</tr>
</tbody>
</table>

Note: combines number of physicians who use electronic clinical patient data for different purposes to "some extent" or "to a great extent."
Regional health system leader
There are exceptions. The Regional Health Authority of Cataluña is establishing a healthcare IT and analytics center to provide descriptive analytics services for a variety of strategic IT projects including e-prescription, electronic health records (EHR) and medical imaging. In Valencia, a pilot initiative is evaluating the use of healthcare data for business intelligence and clinical pathway management. Integrating regional health and business intelligence systems is an area for future development, and there is some progress already in this area. In the future, regional governments are hoping to be able to integrate information to help improve clinical and administrative processes.

To explore the potential of analytics further, we surveyed how physicians currently enter data in their medical record systems. Their answers are instructive because use of sophisticated analytics requires organizations to systematically collect and store individual patient data in an easily accessible form that enables interrogation. This in turn requires health organizations to enter data in a structured, ideally coded, way.

As the table below indicates, a relatively low percentage of Spanish physicians enter coded patient data, but a higher proportion report entering data in a structured format, suggesting the potential for secondary use and analytics development over the longer term.

How patient data is currently entered in the system
Accenture survey question: Please indicate which statement most closely describes how you currently enter the following data in your electronic system.

![Survey Bar Chart]

The chart shows the percentage of physicians in different countries who enter patient data in coded, structured, and unstructured formats. The table indicates that a relatively low percentage of Spanish physicians enter coded patient data, but a higher proportion report entering data in a structured format, suggesting the potential for secondary use and analytics development over the longer term.
Patient-related technologies

Experts note that the use of patient-related technologies is on the increase in Spain. Telemedicine is generally seen as in the early stages of development. Online consultations are very rare, although there are projects underway to develop this capability, including a specific project in Extremadura—the Telemedicine Network for Primary Care (TmAPEx). Experts point to developments in admissions and booking using online and mobile technology. In most regions, patients can make appointments with their GP online. They can also receive confirmations via email, or in some cases through smart phones and SMS. Patient engagement in healthcare is growing, with major developments around access to electronic health records.

Our physician survey shows that Spain compares relatively well with other countries in the availability of patient-related technologies. For example, 45 percent of Spanish physicians indicate that their patients can electronically schedule or change appointments (compared to an average of 21 percent across all countries). They report that more than a third of patients receive electronic reminders when it is time for preventive or follow-up care. As our interviews with experts suggested, a smaller percentage—only about 8 percent—of physicians told us that patients can use telemonitoring devices for remote care and wellbeing.

The technologies available to patients

Accenture survey question: Please identify which of the following patient-related technologies are available to your patients:

<table>
<thead>
<tr>
<th>Technology</th>
<th>Spain</th>
<th>Survey average</th>
<th>Australia</th>
<th>Canada</th>
<th>England</th>
<th>France</th>
<th>Germany</th>
<th>Singapore</th>
<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients can electronically access their medical information</td>
<td>6.6%</td>
<td>8.2%</td>
<td>2.4%</td>
<td>2.8%</td>
<td>6.7%</td>
<td>5.2%</td>
<td>3.2%</td>
<td>42.6%</td>
<td>16.6%</td>
</tr>
<tr>
<td>Patients can electronically book/change/cancel appointments</td>
<td>44.9%</td>
<td>20.7%</td>
<td>2.6%</td>
<td>4.0%</td>
<td>33.3%</td>
<td>7.6%</td>
<td>22.8%</td>
<td>52.5%</td>
<td>16.8%</td>
</tr>
<tr>
<td>Patients receive electronic reminders when it is time for preventive or follow up care</td>
<td>32.3%</td>
<td>18.9%</td>
<td>19.8%</td>
<td>6.4%</td>
<td>17.1%</td>
<td>8.0%</td>
<td>16.9%</td>
<td>51.5%</td>
<td>18.8%</td>
</tr>
<tr>
<td>Patients can see health-related information during the consultation</td>
<td>22.6%</td>
<td>29.2%</td>
<td>41.5%</td>
<td>18.4%</td>
<td>35.9%</td>
<td>28.3%</td>
<td>24.8%</td>
<td>44.6%</td>
<td>26.6%</td>
</tr>
<tr>
<td>Patients can electronically request prescription refills</td>
<td>29.9%</td>
<td>20.6%</td>
<td>4.6%</td>
<td>7.2%</td>
<td>33.3%</td>
<td>12.0%</td>
<td>27.8%</td>
<td>29.4%</td>
<td>25.8%</td>
</tr>
<tr>
<td>Patients can communicate with me electronically, for example, through secure email or video conferencing</td>
<td>25.7%</td>
<td>27.4%</td>
<td>20.6%</td>
<td>19.2%</td>
<td>16.7%</td>
<td>29.5%</td>
<td>47.4%</td>
<td>45.1%</td>
<td>25.4%</td>
</tr>
<tr>
<td>Patients can use tele-monitoring devices to monitor and record their own health indicators and remotely inform me of their conditions</td>
<td>8.0%</td>
<td>7.5%</td>
<td>3.6%</td>
<td>4.4%</td>
<td>8.2%</td>
<td>6.4%</td>
<td>6.7%</td>
<td>26.5%</td>
<td>7.5%</td>
</tr>
<tr>
<td>Patients can electronically access health information/education to help them manage their own conditions</td>
<td>30.1%</td>
<td>19.3%</td>
<td>17.0%</td>
<td>14.2%</td>
<td>25.9%</td>
<td>14.5%</td>
<td>4.4%</td>
<td>39.2%</td>
<td>21.0%</td>
</tr>
</tbody>
</table>
Ongoing challenges for connected health

The Spanish healthcare system provides many examples of mature regional connected health infrastructure and some world-leading achievements in health information exchange and integration across care settings. But real challenges remain. Here, we give the experts’ perspective on what these challenges are.

- **System-wide fragmentation.** While Spain’s decentralized system has driven leading practice at the regional level in connected health, at the national level it is also seen as a barrier to development. Regional governments have had considerable leeway in developing their own systems, with relatively little health information exchange happening between regions, since systems have developed in different ways and with different standards. This is partly because of a lack of investment in healthcare IT infrastructure where priorities have been identified elsewhere. Some see this unequal prioritization of (and investment in) connected health across different regions as the central challenge for connected health in Spain. The central government currently plays no specific role in the implementation of connected health, other than assigning an overall budget to each region. The extent to which it should take a more proactive role is a key part of the debate among experts. It is, according to many, about politics, not technology.

- **Culture change and leadership at the front line.** Experts identify cultural resistance to new ways of working, particularly where physicians have not been involved in the development of healthcare IT systems, and where technology has been implemented with insufficient attention to attendant change management processes. Some argue that the development of healthcare IT infrastructures has been over-reliant on the views and opinions of information and communication professionals. Physicians have often been absent from the development phase, and their perspective not given enough weight. Some—especially older physicians—who are less supportive of IT solutions, tend to believe that “if something has worked for many years there is no point in changing it.” Experts point to the need for engagement, training and a co-evolutionary perspective to healthcare IT implementation as key to addressing these challenges.

  "[There is an opinion that] we have spent all our lives working this way, why should we change our way of working now.
  
  –Carlos Yoyo, Business Development Manager, GMV"

- **Public concerns over privacy and data security.** Privacy and security of personal data is an important issue for patients, and experts are well aware of the need for sensitivity in this area. Physicians know that clinical data belongs to patients, by law, and not to the health system. Without written consent—or the equivalent identification—from patients, doctors who are not directly treating an individual cannot access their medical records. Issues also result from a lack of awareness and understanding within the medical community. Experts point out that physicians do not always have a complete understanding of the regulations and issues around data security and patient safety, resulting in some being reluctant to use new technologies or share information between care settings.

  "The problem lies in the fear of some professionals to provide information, because of their lack of knowledge about patient data protection laws.
  
  –Regional health system leader"

While there are data privacy and security concerns in Spain, they are not as insurmountable as some other European settings, as patients can already see the value of health information exchange within different regional systems. Instead, experts point to the need for good communication—both with patients and within the medical community—as new systems and functionalities develop.

- **The funding challenge.** In Spain and other European countries, a combination of economic downturn, aging population, migration and changing demands on public services are all increasing the long-term pressures on the national health service. At a national level, Spanish investment in healthcare IT has been comparatively low. Experts note the long-term nature of investment in connected health and the returns that are now being realized in early-adopting regions such as Extremadura, Valencia and Cataluña. Yet within the context of deficit reduction and financial uncertainty, making the case for connected health is now more difficult than ever.

  "Over the past four to six years there has been strong investment in technology, but it is still quite far short of, for instance, what is being invested in banking systems.
  
  –Carlos Jiménez, Deputy Director of Specialized Care, Madrid Health Service"

Experts recognize that, in areas where connected health has not been a priority to date, the financial crisis will likely see spending frozen or even reduced. The results could be slower progress in poorer-performing regions, which could undermine the future interoperability and "connectedness" of the system as a whole.
In our quantitative survey, we asked physicians themselves to list the top five barriers for healthcare IT adoption and HIE. Forty-two percent of physicians were concerned about interoperability issues—healthcare IT systems that couldn’t “talk to one another”—as limiting the potential of EMR/HIE. A similar number reported concerns over the privacy and security of patient data, with slightly less noting the challenges of using outdated IT systems that were too “old and slow.” About 36 percent of physicians mentioned the potential downsides of incomplete or poor quality data entry, and the time and productivity cost of increased data entry. As the central Ministry of Health rolls out national initiatives such as the Plan Avanza 2 and HCDSNS, it will need to address these concerns in partnership with physicians and other stakeholders in the country’s regional health ecosystems.

Top five barriers experienced by Spanish physicians

Accenture survey question: Please select the five main barriers to the adoption and use of electronic medical record systems and health information exchange in your organization.
How Spain matches up against the connected health dynamics

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<tr>
<td>Vision and leadership focused on improved health outcomes</td>
<td>The vision and leadership to drive connected health in Spain has been strong—exemplified by the national Healthcare Online program as part of Plan Avanza digital roadmap. At a national level, efforts are being made—through Red.es—to coordinate regional systems and create the means to share patient data across the entire national health service. But Spain’s decentralized political system means that national frameworks must be balanced with regional priorities—and this is why progress in some regions has been faster than others. In regions such as Andalucia and Catalunya, early adoption has produced integrated EMR and e-prescribing systems that are already beginning to deliver a return on investment. The challenge at a national level is to make this good practice consistent and interoperable within a constrained fiscal environment.</td>
</tr>
<tr>
<td>Strategic change management</td>
<td>Change management is again regionally determined. In those regions where clinicians have been engaged with the development of healthcare IT and HIE, adoption and usage appears more advanced. In Madrid for example, the HORUS system has been developed in partnership with clinicians, engaging them at all stages of project development. Clinician-led disease networks (such as for cardiology, mammography and dermatology) are also growing across the country, with Castilla la Mancha’s YCONOS network a good example. Significant cultural barriers still exist, however. Experts report that, where clinicians have been disengaged from healthcare IT adoption, buy-in is poor. Concern over data security and HIE persists where training and engagement has not been prioritized, and where the benefits of technology have not been communicated.</td>
</tr>
<tr>
<td>Robust IT infrastructure</td>
<td>Healthcare IT infrastructure in Spain is regionally determined, but common to most is high usage of electronic patient records in primary care settings (around 98 percent), and a more fragmented picture across secondary care. Around 90 percent of patients in Spain have their healthcare data stored electronically, and most regions have well functioning EHR systems at primary care level that share some degree of health information between primary and secondary care settings. Regional connectivity has developed at a pace determined by the level of regional investment and commitment to healthcare IT adoption. At a national level, the NHS Digital Records Project (known as HCDSNS) is developing inter-regional interoperability around the NHS Central Node—an XML information exchange hub that will allow integration of health data at a national level, while allowing regional system autonomy.</td>
</tr>
<tr>
<td>Co-evolution</td>
<td>Spain provides some examples of co-evolution at a national and regional level. At a national level, the Ministry of Health has offered a framework for healthcare IT adoption (through common data standards) and capital investment (through Plan Avanza), but allowing regional Ministries to invest where regional priorities dictate. Within particular regions, the extent of co-evolution has varied. Those regions with advanced HIE systems—such as Madrid, Catalunya, Andalucia, Castilla la Mancha—have all developed systems in concert with clinicians; and in some, clinician-led initiatives such as Madrid’s Scientific Social Network (which is a closed intranet network facilitating collaboration between cancer specialists) are being trialed in different hospital settings.</td>
</tr>
<tr>
<td>Clinical change management</td>
<td>The use of analytics is relatively limited in Spain beyond the decision-support systems for physicians at a primary care level—though the integration of health information and analytics systems is an area of development. Experts argue that relatively few regional governments are prioritizing investment in analytics as a result of short-term budget pressures. Where exceptions exist, strong regional governance has been important. In Catalunya, the Regional Health Authority is developing descriptive analytics services for e-prescription, EHR and medical imaging services. In Valencia, a pilot is in place exploring the potential for health data to improve business management and clinical pathway design. Local governance arrangements will determine the pace of adoption, but many regions are exploring the potential of analytics as HIE matures.</td>
</tr>
<tr>
<td>Integration drives integration</td>
<td>For Spain, the benefits of healthcare integration are being felt to different extents in different regions. Those with relatively mature HIE, e-prescribing and digital imaging systems (such as Valencia, Andalucia, Extremadura, Catalunya or Madrid, for example) are beginning to realize real benefits in terms of usage, quality and cost. In the country as a whole, healthcare IT integration is increasing—seeing, for example, a 67 percent increase in online appointments capability between 2007 and 2009. Integration is also driving integration at national and European levels. The HCDSNS initiative is fostering interoperability between regional systems, and Spain is a key participant in the pan-European EPSOS health information exchange project.</td>
</tr>
</tbody>
</table>

= recognized need/initial steps  = progress being made  = strong performance  = sustained excellence
Future priorities
Spain is already a European leader in connected health with many of its regions having invested early and productively in healthcare IT adoption and health information exchange. There is general agreement that the priority now is to have an electronic medical record for each citizen, accessible from anywhere in Spain. This should go beyond imaging and diagnostic test results to include more patient data (such as previous diseases, surgery undergone and current medications) so patients can receive diagnosis regardless of where they are located. To this end, the next step for connected health is to move toward national interoperability and integration between regional health systems. The national government has a critical role to play in this regard, setting minimum standards for interoperability, which would apply in each region.

Most experts agree that there are some clear priorities for the future of connected health in Spain:

• Regions that are less advanced in connected health will need to invest more money in the coming years (with help from the government) so they can catch up with the most advanced regions. In five years, connected health will be much more effective if all 17 regions have met the agreed goals. Experts want to avoid the scenario where some regions progress more quickly, with even greater data sharing, while others fall behind.

• Regional governments should play more of a role in regulating connected health, coordinating and overseeing the process of enhancing systems in each AC. This might involve, for example, creating committees of experts in each region to review the steps taken, including the level of investment made. This will ensure that all regions are following the same national standards in terms of semantic codes, systems and interoperability standards. While this may take some time, it will result in clear benefits.

• The Spanish government and healthcare industry need to make a concerted effort to develop connected health in hospitals because of their large and complex structures. An important first step is to ensure the different departments within hospitals come together and work toward common goals rather than working in silos. In five years there should be real and comprehensive information exchange among hospitals, regardless of whether they are in the same region or not. Similarly, experts expect to see even more sharing among hospitals and the more technologically advanced primary care sector.

• Patients should play a bigger role in managing their own care. While many patients can already undertake basic tasks like making appointments online, the next step is for doctors to be able to carry out online consultations, reducing the need for face-to-face visits. Patients should also be able to access more of their clinical records online to check what medication they have been prescribed, view the results of diagnostic tests and access other personal health data that doctors consider appropriate. However, most experts think patient access should be subject to some restrictions, set by government or independent committees of experts.

• Some experts advocate the wider integration of connected health across Europe. They view Spain as a potential leader in developing this approach, particularly in addressing the interoperability issues involved in sharing data among national systems. The ability to share more structured and coded data will also help the health system make much more of the data that is already collected for analytics—such as population health reporting—and to drive improved outcomes for patients.

“On realistic expectations for connected health in five years’ time: “That we could have normalized and standardized most of the data we are currently entering and sharing between regional communities and also between different European countries.”
– National health system leader

While the current strategy for connected health in Spain is generally believed to be the right one, moving from success at a regional level to greater national and even European-wide integration will truly transform the potential of connected health in Spain in the coming years.
The health system in United States

- Total population: 304 million
- Healthcare spend: 17.4 percent of GDP in 2009, compared to OECD average of 9.6 percent.
- The health system is fragmented with a wide range of disparate public and private payers and providers.
- Of the 5,815 hospitals registered with the American Hospital Association, half are nongovernmental not-for-profit enterprises, state or local governments run a fifth, less than a fifth are for-profit businesses, and 4 percent are operated by the federal government.
- Office-based physicians tend to work in small practices, with one-third working in solo practices and three quarters working in practices with five or fewer physicians.
- With a life expectancy of 78.2 years, the United States ranked 28th in the latest OECD ranking (2011).
- 2.4 practicing physicians per 1,000 population (compared with the OECD average of 3.1) and 3.1 hospital beds per 1,000 population (compared with the OECD average of 4.9).
The US context
Recent government legislation—including the Affordable Care Act, which aims to extend access to healthcare while improving care quality and outcomes, and the American Recovery and Reinvestment Act (ARRA, “the Stimulus Bill”)—are providing a strong impetus for change. Under the Health Information Technology for Economic and Clinical Health Act (HITECH), $27 billion has been set aside to foster increased use of Electronic Health Records (EHR) by physicians and hospitals, through the use of incentives for healthcare providers that set up and demonstrate “meaningful use” of such medical record systems.

The introduction of the HITECH Act signals a strategic shift, with the federal government now taking a more active role in driving healthcare IT adoption and shaping physicians’ use of technologies that facilitate greater connectivity across the system. The federal effort is underpinned by the Office of the National Coordinator (ONC), which is charged with setting the strategy and goals for connected health, implementing HITECH, and establishing a framework for standards and interoperability. The American healthcare IT experts interviewed highly commend the work of the ONC and suggest that its continued strong involvement is needed to establish the connected health architecture and encourage progress locally.

"The ONC has articulated the view that the role of the federal government is to set standards, set broad directions in policy and set reimbursement incentives, and not to micromanage any of those things.”

–Mark Smith, President and CEO, California Health Care Foundation

At the state and local level, governments—in particular those that are further advanced in their use of healthcare IT—also take a key role in promoting connected health. Given the decentralized nature of the US health system, however, most connected health development is happening through a “bottom-up” process, whereby independent provider organizations or hospital networks pursue their own solutions, where possible, in line with ONC frameworks to meet the criteria for meaningful use. The imminent introduction of value-based compensation models has been a major driver for adoption. In addition, some payers have begun to subsidize local providers to adopt and implement EHRs in return for agreeing—with patient consent—to share core clinical data.

“There is a recognized need to change payment models for healthcare providers—one that focuses on quality as opposed to quantity. At the end of the day, in a lot of ways, technology becomes the easy part. It’s policies, it’s standards and change in the ways things are being done that become the bigger challenges.”

–Daniel Porreca, Executive Director HEALTHeLINK

United States’ progress on the connected health journey
In this section, we describe the US’s progress across the three stages of the connected health journey: healthcare IT adoption, health information exchange (HIE) and insight driven healthcare.

The experts interviewed for this study describe connected health progress to date as “patchy” and “fragmented.” While there are pockets of significant advancement at the federal, state, regional, hospital system and community levels, those examples are the exception rather than the rule. Significant variation remains in healthcare IT adoption levels across different states, networks and care settings.

Healthcare IT adoption
While the ARRA stimulus funds have driven rapid progress in healthcare IT adoption over the past few years, there is still some way to go before adoption levels reach a point that enables comprehensive information sharing.

But our physician survey shows that progress is being made in healthcare IT adoption. The results show that:

• Three in five physicians across both primary and secondary care report that they electronically enter patient notes either during or after consultations.
• A similar proportion uses electronic tools to reduce the administrative burden for delivering healthcare.
• Approximately one-third of physicians receive electronic alerts and reminders while seeing patients.
• Approximately 20 percent use more advanced computerized clinical decision support systems to help make diagnostic and treatment decisions while seeing their patients.

Interestingly, our survey reveals only minor differences in healthcare IT adoption levels in primary and secondary care settings.

The expert interviews suggest that there are significant differences across size of organizations and health networks; they point to a “digital divide” where larger, more affluent organizations are making much quicker progress than smaller groups that have fewer resources. The large integrated delivery networks, for example, are perceived to have an advantage over smaller hospital systems and private physician practices that lack aligned incentive models and funding to drive strategy and implementation of EHRs and HIE.
"We have made tremendous progress among the larger, less financially strapped organizations in connecting to their facilities, hospitals and labs."

−Laura Adams, President/CEO, Rhode Island Quality Institute

That said, at the community level, HIEs and regional health information organizations (RHIOs) have enabled progress in connected health through federal programs such as the Beacon Community Cooperative Agreement Program. The program has provided $250 million in funding to 17 selected communities throughout the US that have already made inroads in the development of secure, private and accurate systems of EHR adoption and health information exchange.

There is also great variation in healthcare IT adoption across different states and organizations. Comparing the progress in different states, the health experts interviewed point to Indiana, Michigan, Rhode Island, Massachusetts, New York, Delaware and Colorado as leaders in connected health. Experts emphasized that the leaders tend to have more diversified funding models (not simply relying on federal funding), clearly defined priorities and plans, strong governance and—in the development of solutions—a strong focus on physician and community needs, and creating value for end users.

"HIE takes a great deal of planning, consensus building and trust. HIEs … [that] started long before the HITECH funding boom and ONC leadership that came along with it … were grassroots projects that relied on community funding and built services that met the needs of their community….Those HIEs that were formed to respond to the federal funding requirements have not had the time to build the trust and cooperation that the older HIEs have had nor will they likely have services that are as robust. Therefore, the funding may help them get started, but the foundation they have is not as strong so when the federal funding runs out, they will have greater difficulty unless they can develop services that gain widespread adoption and use, and provide value to healthcare organizations and providers that are willing to pay. Since healthcare is not static, they must also continually evolve to meet the changing needs of the community they serve in order to establish long-term financial viability and relevance."

−Gina Bianco Perez President and CEO, Advances in Management, Inc. and Former Executive Director, Delaware Health Information Network.

Health information exchange

Despite recent government efforts to build momentum around health information exchange as a critical part of the meaningful use criteria, there is still a long way to go before health information is shared widely across the system. The level of HIE is generally low and occurring primarily within single organizations or networks, rather than across different organizations and settings. According to the healthcare IT experts interviewed, the reality is that many providers are still using paper and fax machines to document and share relevant health/clinical information even when electronic billing and administration systems are in place.

From our survey of physicians, we found that:

- Only 16 percent of doctors in primary care report that they communicate with clinicians in other organizations by means of secure email, whereas in secondary care this number rises to 34 percent.
- E-notification functionalities are used by approximately one in five of all US physicians surveyed.
- E-referrals are sent and received by nearly 30 percent of physicians across primary and secondary care.
- Nearly two in five physicians from primary care have electronic access to clinical data about a patient who has been seen by a different health organization. In secondary care, this happens slightly less frequently (mentioned by 31 percent).
- Just less than half of primary care physicians receive clinical results electronically to populate their patients’ medical records and electronically send order requests to laboratories. The level of use of these functionalities is slightly higher in secondary care, with 53 percent and 48 percent respectively using them on a routine basis.
More than half of primary care physicians—54 percent—electronically send prescriptions to pharmacies. This is the highest level of usage of e-prescription across all the eight countries surveyed in this study. In secondary care, 44 percent of surveyed physicians make use of e-prescription functionalities, which experts suggest is a significant increase over the past few years.

Nationally, the rapid progress in e-prescribing is, in part, down to the HITECH incentives and the e-Rx incentive program, which experts argue have been highly successful in encouraging adoption and use. Another critical driver has been the emergence of national e-prescription networks such as Emdeon, Surescripts and RelayHealth/Mckesson, as well as niche networks such as Navinet and Availity.

In primary care, physicians who are operating in solo practices are less likely to make use of HIE functionalities compared with those physicians operating in larger practices, hospitals or more mature health systems and networks such as the Veterans Administration, Cleveland Clinic, Partners Healthcare, Kaiser Permanente or Geisinger.

The charts below provide a visual depiction of the extent to which US physicians in our survey use a range of healthcare IT and HIE functionalities in comparison to the international average of physicians’ use across the eight countries in our study.

The US ranks above the survey average in in e-prescriptions and e-orders, but lags behind in the use of electronic patient notes and clinical alerts.
Progress in secondary care: percentage of physicians using a range of healthcare IT and HIE functionalities

Accenture survey question: How often do you perform the following functions (results show percentage of physicians that use "routinely")?

Healthcare IT adoption and HIE: secondary care – US

US specialists and hospital physicians are ahead of the survey average in many dimensions of healthcare IT adoption and HIE, particularly clinical results and electronic patient notes.
"The biggest concern is that we tend to have an enterprise approach, and every enterprise wants to do things slightly differently. The ability to seamlessly transfer information will take longer than people expect."

−Dr. William Jessee, President and Chief Executive Officer, Medical Group Management Association

While there are pockets of good practice across health systems and even in specific states, experts suggest that connected health capabilities are generally more advanced when it comes to managing or treating specific diseases or conditions—such as cancer, diabetes, congestive heart disease, hypertension and asthma—what one executive called the "low-hanging fruit." Experts point out that the need—and the business case—for connected health is particularly strong when it comes to managing chronic conditions, which requires a more interactive provider/patient relationship as well as care coordination with other caregivers. Some HIEs are focusing their initial efforts on chronic care because this is where there are the greatest opportunities to reduce costs, improve the quality of care and demonstrate value (since the data necessary to measure and demonstrate value is being collected and reported at the disease-specific level). Moreover, the focus of innovation is around these chronic diseases.

As the population continues to age and people are living longer, healthcare IT-supported care coordination across organizations and with patients themselves is particularly critical to manage the rising demand and cost of care. New care delivery models such as patient centered medical homes and accountable care organizations are thought to hold great potential for improving chronic disease management, while the development of mobile solutions will enable patients to manage their own care.

Regarding connecting different organizations across healthcare settings, experts feel that progress is being made slowly and incrementally but not as fast as they would like. Many of the community-based HIEs and regional RHIOs struggle with developing a sustainable model to provide monetary support outside of federal, state and/or independent grant funding. Progress depends on whether or not the organizations carry out good foundational and sustainability planning and provides value to the community. There is typically less progress or success if the model centers on satisfying federal or grant requirements, rather than community needs.

**Insight driven healthcare**

Given the fragmented picture of healthcare IT adoption and information exchange across the US healthcare system, it is perhaps unsurprising that value optimization is as yet in the early stages. The experts interviewed, however, are very optimistic about the potential value once the levels of meaningful use of healthcare IT matures and the ONC standards are used across the system.

"The ultimate business case was that all of our investment in healthcare IT and HIE is ultimately rooted in the ability to accelerate the transformational innovation and learning cycles, so that we can more efficiently and effectively discover new knowledge ... implement new knowledge, test the outcome and refine it."

−John Mattison, Chief Medical Information Officer (CMIO), Kaiser Permanente

In the survey of physicians, we asked how patient data is currently shared. In both primary and secondary/specialist care settings, approximately three-quarters of physicians state that their patients’ clinical data is shared across their own organization and used to help improve their clinical care protocols. As is the case in most countries around the world, electronic patient data is less regularly shared across other organizations to improve protocols and patient care: Only 37 percent of primary care clinicians and 43 percent of secondary care clinicians state that data is used for this purpose. The picture is similar when it comes to sharing patients’ clinical data for population health reporting and disease management. Comparing US progress in this area to the other countries surveyed, US physicians are slightly less likely to share data within and across organizations.

www.accenture.com/connectedhealthstudy
How electronic clinical patient data is used

Accenture survey question: To what extent do you use the clinical patient data you collect electronically in the following ways?

<table>
<thead>
<tr>
<th>Patients’ clinical data are shared across my organization and used to help improve our clinical care protocols and clinical outcomes</th>
<th>US Primary Care</th>
<th>US Secondary Care</th>
<th>Global Average Primary Care</th>
<th>Global Average Secondary Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>73%</td>
<td>76%</td>
<td>78%</td>
<td>77%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Patients’ clinical data are shared with other organizations, including public health authorities, to improve protocols and patient care</th>
<th>US Primary Care</th>
<th>US Secondary Care</th>
<th>Global Average Primary Care</th>
<th>Global Average Secondary Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>37%</td>
<td>43%</td>
<td>44%</td>
<td>45%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Patients’ clinical data are shared with other organizations, including public health authorities, for population health reporting, disease management</th>
<th>US Primary Care</th>
<th>US Secondary Care</th>
<th>Global Average Primary Care</th>
<th>Global Average Secondary Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>39%</td>
<td>44%</td>
<td>46%</td>
<td>47%</td>
<td></td>
</tr>
</tbody>
</table>

Note: number of physicians who use electronic clinical patient data for different purposes to "some extent" or "to a great extent."

As is the case in most other countries around the world, the use of data analytics for organizational and public health reporting is still in its early stages in the US, but it is likely to be an important focus of connected health development in the future. Experts welcome this development as they feel that analytics has a huge potential for improving quality of care at the local level, shaping improvements in public health and developing more cost effective solutions across the system. The meaningful use criteria will, experts feel, drive future progress and accelerate the use of analytics.

The relatively limited use of patients’ clinical data for analytical purposes is largely due to a lack of comprehensive and comparable patient data sets. To enable sophisticated analytics, individual patient data needs to be systematically collected and stored in a form that is easily accessible and enables interrogation. This in turn, requires data to be entered in a structured, ideally coded, way. To shed light on the extent the US—along with the other seven countries surveyed—is able to apply analytics to drive improvements, we asked physicians to indicate how they currently enter data in their medical record systems. In the US, we found that just one in five of the physicians surveyed enter patient data in a coded way. By international comparison, this level of coded data use is among the lowest levels across the eight countries surveyed. However, nearly three in five US physicians report that they enter data in a structured way. As such, there is a relatively solid information base for some level of analytics.
In terms of technologies that directly engage patients, the US is relatively well progressed compared with the other countries surveyed. For example, 17 percent of US physicians indicate that their patients can electronically access their medical information. With the exception of Singapore, all other countries surveyed are far behind in this area. Approximately one quarter of US physicians report that their patients can see health-related information from their medical records during consultations, use e-channels for communications and electronically request prescription refills. Slightly fewer physicians report that their patients can electronically book, change or cancel appointments (mentioned by 17 percent), receive electronic reminders when it is time for preventive or follow up care (mentioned by 19 percent) and electronically access health information/education to help them manage their own conditions (mentioned by 21 percent). Progress toward remote monitoring of patients with chronic conditions is relatively limited in the US (and indeed across all countries), with only 8 percent of physicians stating that their patients can use telemonitoring devices to monitor and record their own health indicators and remotely inform physicians of their conditions.
The technologies available to patients

Accenture survey question: Please identify which of the following patient-related technologies are available to your patients:

<table>
<thead>
<tr>
<th>Technology</th>
<th>US</th>
<th>Survey average</th>
<th>Australia</th>
<th>Canada</th>
<th>France</th>
<th>England</th>
<th>Germany</th>
<th>Singapore</th>
<th>Spain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients can electronically access their medical information</td>
<td>16.6%</td>
<td>8.2%</td>
<td>2.4%</td>
<td>2.8%</td>
<td>5.2%</td>
<td>6.7%</td>
<td>3.2%</td>
<td>42.6%</td>
<td>6.6%</td>
</tr>
<tr>
<td>Patients can electronically book/change/cancel appointments</td>
<td>16.8%</td>
<td>20.7%</td>
<td>2.6%</td>
<td>4.0%</td>
<td>7.6%</td>
<td>33.3%</td>
<td>22.8%</td>
<td>52.5%</td>
<td>44.9%</td>
</tr>
<tr>
<td>Patients receive electronic reminders when it is time for preventative or follow up care</td>
<td>18.8%</td>
<td>18.9%</td>
<td>19.8%</td>
<td>6.4%</td>
<td>8.0%</td>
<td>17.1%</td>
<td>16.9%</td>
<td>51.5%</td>
<td>32.3%</td>
</tr>
<tr>
<td>Patients can see health-related information during the consultation</td>
<td>26.6%</td>
<td>29.2%</td>
<td>41.5%</td>
<td>18.4%</td>
<td>28.3%</td>
<td>35.9%</td>
<td>24.8%</td>
<td>44.6%</td>
<td>22.6%</td>
</tr>
<tr>
<td>Patients can electronically request prescription refills</td>
<td>25.8%</td>
<td>20.6%</td>
<td>4.6%</td>
<td>7.2%</td>
<td>12.0%</td>
<td>33.3%</td>
<td>27.8%</td>
<td>29.4%</td>
<td>29.9%</td>
</tr>
<tr>
<td>Patients can communicate with me electronically, for example, through secure email or video conferencing</td>
<td>25.4%</td>
<td>27.4%</td>
<td>20.6%</td>
<td>19.2%</td>
<td>29.5%</td>
<td>16.7%</td>
<td>47.4%</td>
<td>45.1%</td>
<td>25.7%</td>
</tr>
<tr>
<td>Patients can use tele-monitoring devices to monitor and record their own health indicators and remotely inform me of their conditions</td>
<td>7.5%</td>
<td>7.5%</td>
<td>3.6%</td>
<td>4.4%</td>
<td>6.4%</td>
<td>8.2%</td>
<td>6.7%</td>
<td>26.5%</td>
<td>8.0%</td>
</tr>
<tr>
<td>Patients can electronically access health information/education to help them manage their own conditions</td>
<td>21.0%</td>
<td>19.3%</td>
<td>17.0%</td>
<td>14.2%</td>
<td>14.5%</td>
<td>25.9%</td>
<td>4.4%</td>
<td>39.2%</td>
<td>30.1%</td>
</tr>
</tbody>
</table>
Ongoing challenges for connected health

While there is progress toward connected health in the US, significant challenges remain. Health leaders identified five key barriers that are holding back progress. Of these five barriers, the two mentioned most often are the need to encourage behavioral change across the system to address physician skepticism, including cultural and workflow changes, and the need to provide incentives for sharing information in what is essentially a competitive system. Other challenges experts cited include cost, lack of interoperability of systems and concerns over privacy and security. While the health system leaders and experts we interviewed do not perceive technology to be a critical challenge to the widespread adoption of connected health, they do acknowledge a number of issues that need to be addressed, for example, the unique identification of patients.

“ The biggest barriers aren’t the technical capabilities; they are the political will or policies to do that kind of information sharing.”

—Jennifer Covich, CEO, eHealth Initiative

In the quantitative survey, we asked physicians themselves to list the top five barriers to healthcare IT adoption and HIE. More than half said that cost to their organization and concern about loss of productivity is a major barrier. Two in five also mentioned concerns about investing in IT systems that are not interoperable, and they said they feel that lack of financial incentives, despite the ARRA stimuli and other locally provided incentives, remains a significant barrier to adoption. Finally, physicians pointed to lack of technical knowledge as a major barrier, citing that their “system is too difficult to use.” Many of the experts interviewed for this study also discussed this barrier. They argued that more needs to be done to provide non-financial and ongoing support to physicians, especially those in small or solo practices in primary care and those of the baby-boom generation, who are less likely to be healthcare IT literate.

Top five barriers experienced by US physicians

Accenture survey question: Please select the five main barriers to the adoption and use of electronic medical record systems and health information exchange in your organization.
The main barriers are briefly described below.

- **Physician skepticism**: For physicians, the transition to connected health typically requires a large investment of time and resources in implementing new systems as well as significant workflow changes. The older generation of physicians, who are typically nearing retirement age, are most resistant to adopting connected health tools whereas the younger generation, which is more technologically savvy, more readily embraces the move toward connected health.

  "It’s often said that physicians were afraid of technology, and that’s why they didn’t adopt these changes so quickly. It’s not that they were afraid of technology, but they are afraid of the technological burden and not benefiting from it. We must show benefits of the changes we are putting in place.”

  –Dr. Robert Murphy and Dr. Shawn Griffin, Chief Medical Information Officer & Chief Quality and Informatics Officer, Memorial Herman Health System

- **Misalignment of incentives**: Most experts agree that incentives for connected health are not always in place and that new outcome based payment models are needed for connected health to move forward more quickly. The aim is to allocate more resources to upfront preventive and primary care, as well as care coordination, reducing the need for costly acute and emergency care services down the road. While many experts argue for the importance of financial incentives in encouraging physicians to connect, they also believe that once clinicians see that there is a value proposition, they are quite ready to move ahead and connect. Under this view, clinicians need to be shown that changes will increase their revenues and decrease their overall costs if reluctance to adopt connected health solutions is to be overcome.

- **Cost**: Many of the experts interviewed pointed to the high cost and lack of capital investment as a main barrier for healthcare IT adoption. According to some experts, one of the fundamental problems with connected health is that investment in health technology does not pay immediate dividends. In the early stages, benefits are relatively limited and the real value in cost savings in healthcare IT comes only after there is a critical mass of providers using the system. Because most of the country is not yet at the tipping point where most providers are connected, the value of connected health is more difficult to ascertain. However, some experts believe that the lack of money for investment is not as much of a barrier as is a lack of entrepreneurial spirit and a long-term approach to change.

- **Privacy and security concerns**: Most experts agree that privacy and security issues pose challenges to the progress of connected health. However, some experts feel that this challenge is actually not as great as the current debate suggests. They argue that the majority of patients in fact are willing to share their personal information, assuming their data is being kept secure, in return for improved service delivery.
# How the US matches up against the six dynamics of successful connected health

<table>
<thead>
<tr>
<th>Dynamic</th>
<th>How does the US match up against these dynamics?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vision and leadership focused on improved health outcomes</td>
<td>In March 2010, the Affordable Care Act was passed. The act aims to extend health insurance coverage and reduce the number of people who cannot access health insurance, ensure secure and stable health coverage for all, slow the growth of total health spending and reduce federal health outlays, improve care quality and outcomes, and reform the payment and delivery system to increase coordination, integration, accountability and value-based reimbursement. The federal government, through the HITECH Act, has set aside $27 billion to support the adoption of healthcare IT in support of these aims. Led by the Office of the National Coordinator (ONC) for healthcare IT, the meaningful use requirements of the healthcare IT program offers financial incentives for healthcare providers to implement EHR technology that follows a defined development path and adheres to an agreed set of standards. Given that federal leadership in healthcare IT is very recent, historically local hospitals and networks of hospitals have set their own agenda for healthcare IT, resulting in varying levels of progress and disparate systems across the US.</td>
</tr>
<tr>
<td>Strategic change management</td>
<td>Formal health information exchange (HIE) organizations are beginning to emerge across the US, supported by grants provided under the HITECH Act. These organizations are making progress in EHR adoption. Healthcare IT policy committee workgroups make recommendations to the ONC on a range of issues, and there is physician representation on these groups. However, physician resistance to the adoption of healthcare IT is an issue in the US, and experts highlight the need for change management support and a stronger program of engagement and education for physicians. Demonstrating the benefits and ROI from EHRs to physicians is seen as important in overcoming resistance.</td>
</tr>
<tr>
<td>Robust IT infrastructure</td>
<td>The ONC is now driving the development of robust IT for connected health. Its Standards and Interoperability (S&amp;I) Framework is an investment by the federal government in a set of harmonized interoperability standards and specifications for EHRs, which are strongly enforced by the financial incentives provided through the meaningful use requirements of the healthcare IT program. It also leads the Nationwide Health Information Network (NwHIN) initiative, which defines standards, services and policies that enable secure health information exchange over the Internet. While experts do not view technical issues as a major barrier to the progress of connected health, they do acknowledge the legacy of healthcare networks (IDNs, HIEs and RHIOs) working in parallel, but recognizing that these tools must become more sophisticated before they can be effectively used in routine practice.</td>
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<tr>
<td>Co-evolution</td>
<td>The Affordable Care Act includes a number of provisions relating to healthcare IT, one of which is &quot;controlling the use and innovation of health IT.&quot; The criteria set out in the meaningful use requirements of the healthcare IT program clearly define in detail the standards of a certified EHR. Therefore, innovation and experimentation are not nationally encouraged or financially supported. Most experts feel that if the government is too prescriptive and that micromanaging this could stifle progress and innovation. However, locally led developments, especially in healthcare networks such as Intermountain and Kaiser Permanente, have produced innovative approaches to healthcare with demonstrable benefits. Experts believe that the government should enable implementation and innovation at the local level but should take the lead in bringing together all the major stakeholders—including payers, providers, patients, vendors and employers—so that the interests of all groups are represented in determining what is best for a community. While experts cite physician resistance as a major barrier to connected health, they suggest it is the role of local organizations to engage and empower physicians to adopt EHRs.</td>
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<tr>
<td>Clinical change management</td>
<td>Given the patchy picture of healthcare IT adoption and the fragmented information exchange across the US healthcare system, there is currently little scope for data analytics. Experts see a huge potential for analytics in terms of improving outcomes and reducing the costs of healthcare, with disease management as a priority area. However, they recognize that this relies on the successful implementation of connected health across the US. They are particularly optimistic about the benefits that clinical decision support tools might bring about in the future, but recognize that these tools must become more sophisticated before they can be effectively used in routine practice.</td>
</tr>
<tr>
<td>Integration drives integration</td>
<td>The federal government has only recently started to actively drive connected health developments in the US. While rapid progress is expected to occur in the next four years, currently there is insufficient momentum to establish a cycle of integration driving integration. With the shift toward patient-centered integrated care models, such as accountable care organizations (ACO) and patient centered medical homes (PCMH), patient empowerment and access to information in patient health records becomes an important driver for connected health.</td>
</tr>
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</table>

= recognized need/initial steps  = progress being made  = strong performance  = sustained excellence
Future priorities

The experts and health system leaders interviewed for the study generally agreed on a common vision for connected health in the next five years: an infrastructure that allows for a core set of patient information to be captured and to “follow the patient” through the healthcare system, enabling any authorized medical professional to access appropriate levels of information to improve individual, community and population health, with appropriate privacy and access controls in place.

Experts commented on their expectations for progress over the next five years in a number of specific aspects of connected health:

- Experts believe there will be progress in developing new models of care delivery that reward quality and efficiency improvement. Some believe this is happening now and have observed cultural change in larger organizations where meaningful use is already being put into practice. Progress will continue to be driven through new delivery models such as patient centered medical homes, which have been given reinvigorated momentum by the new reimbursement models that support them.

- Within five years, it should be possible to improve the coordination of care across the system, not necessarily across the whole country, but certainly in the larger areas where systems are more sophisticated and are advancing more quickly. One of the principle barriers that needs to be overcome to improve coordination of care is breaking down silos between organizations and care settings. In long-term care, for example, the ability to coordinate across the system will continue to face difficulties because of the different requirements for certification and documentation payments. As a result, the automation of information is virtually impossible.

- Progress is expected in improving patient engagement and accountability. Some experts point to specific examples, such as MedEncentive, an innovative program that helps employers and insurers achieve cost control by rewarding both patients and their doctors for mutual accountability in incorporating “best medical practices” into their care while encouraging healthy behaviors.

- Within five years, some improvement in clinical protocols should be possible through better use of data, as should a much better understanding of what drives population health improvements. Currently, though, gaps in technology exist around population health management, analytics, patient engagement tools and provider coordination tools.

- From the patient perspective, the vision is for a Patient Health Record (PHR) and portal that contains a repository from every health provider the patient has seen, where the patient can seamlessly interact with his or her healthcare provider and where the providers can seamlessly interact with each other at all levels. Experts would like to see progress move more quickly and in a more organized, coordinated way.

Most health leaders agree that the government will continue to play a critical role in connected health development, specifically in setting the strategy, vision and direction, setting standards and providing incentives for take up. This is particularly important if the Nationwide Health Information Network is to become a reality. However, most feel that if the federal government is overly prescriptive and micromanaging the process, it could stifle progress and innovation at the local level. As one expert put it: “The government can be a facilitator or catalyst because of its market position, but it can’t provide the solution.”

To build and sustain momentum for further progress, the key challenges will have to be addressed, particularly those relating to sustainability of funding and payment models and overcoming physician skepticism to change.

“They [the government] have provided the initial capital but haven’t driven organizations to a sustainable model. An organization like Geisinger has had some success, but that model doesn’t necessarily work where you have consumer choice and competing organizations without providing support for sustainability. The stimulus money has not been enough to provide for long term success or viability.”

– Augusta Kairys, VP of Provider Technologies and Strategic Partnerships, Highmark Blue Cross/Blue Shield

The government should continue to have a strong role in changing and improving payment and reimbursement models. The meaningful use program is believed to be a good first step. This, along with federal grant programs like Beacon Communities for HIEs and state grant programs have gone a long way toward accelerating the adoption of connected health. But experts also expressed the view that the successful organizations going forward must have funding models that include private funding sources in addition to any grant money they receive. In New York, for example, all grant programs already must include a 50 percent local match to secure community support and ensure sustainability once the grant money runs out.
Experts also believe that sustainability will require strong stakeholder buy-in to the value proposition that connected health provides. HIEs need to first meet the needs and create value for the community rather than focus on just complying with federal or state requirements. The government can help facilitate bringing together all the key stakeholders—including payers, providers, patients, vendors and employers—to ensure that the interests of all groups are represented in determining what is best for a community. By addressing each community's needs, there will be greater potential to realize value from connected health investments.

Experts identify some promising signs that the funding challenge is beginning to be addressed. Some payers are already moving in the direction of helping pay for the connected health infrastructure and offering incentives for providers to connect. For example, Highmark, the largest health insurer in the state of Pennsylvania, has put $29 million into the community to advance technology adoption among providers by setting up a HIE. The initiative, which will be payer-neutral and open to all providers, will allow providers to meet meaningful use requirements and offers an analytics package to help practices, hospitals and organizations succeed in a medical home environment and to better manage care across the system.

Experts also believe that it will be important to make the business case for connected health investment, demonstrating the value that this brings for the healthcare community and the general public—whether through cost efficiencies or improved quality of care.

“I would like to see robust empirical research demonstrating the value of connected health, whether through administrative savings or quality improvement initiatives, because if the value isn’t there, we’ve all moved forward on an interesting premise.”

—Ted Kremer, Executive Director, Rochester RHIO

To overcome the cultural change barrier, experts highlight the importance of supplementing financial incentives with non-financial support, including a strong program of communication to demonstrate the value of connected health—both in terms of cutting costs and of providing better patient care and customer service. For example, when doctors are using order sets in a hospital, they can start thinking about how they can get the order set to be not just evidence-based medicine, but also how they can get it to decrease readmission and be more efficient.

“Once physicians see the immediate value of data, and they see they are getting payment incentives from health plans, we’ll start to make some more progress.”

—Rachel Block, Deputy Commissioner for IT Health Transformation, New York

Other suggested forms of non-financial support include better technical assistance and guidance. Having a dedicated resource to help physicians through the transitional process is, according to experts, particularly important in small physician practices where there are short-staffed and they are unlikely to have the knowhow for technical change.

While there is still some way to go before the foundation is laid for optimizing value for providers, payers and patients, experts suggest that once a tipping point in physician healthcare IT adoption is reached, there will be more rapid progress toward connected health.
Case Studies
Connecting Health through Collaboration

Denmark

<table>
<thead>
<tr>
<th>Description</th>
<th>National public health system</th>
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<tbody>
<tr>
<td>Population served</td>
<td>5.4 million</td>
</tr>
<tr>
<td>Public Hospitals/Clinicians</td>
<td>43 hospitals (down from 117 in 1980); more than 8,000 hospital doctors and approximately 3,600 general practitioners</td>
</tr>
<tr>
<td>Connected health vision</td>
<td>Optimize IT to improve quality, productivity and service to patients</td>
</tr>
<tr>
<td>Key focus of initiative</td>
<td>Multi-stranded initiative, including EHR, health portal and telehealth</td>
</tr>
<tr>
<td>Architecture</td>
<td>Hybrid</td>
</tr>
<tr>
<td>Funding</td>
<td>Publicly funded through mix of national and regional structures</td>
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A world leader in the adoption of healthcare IT, particularly in primary care, Denmark’s approach is to encourage collaboration and local innovation. A national strategy determines the overall direction for connected health. Within broad guidelines and legislation set by the central government, a decentralized system gives Denmark’s five regions responsibility for the design and delivery of most areas of healthcare, with contribution from its 98 local authorities. The five regions collaborate closely when it comes to healthcare IT and base their cooperation on the principle of “comply or explain.”

As total spend on healthcare continues to rise—an aging population, increases in chronic and lifestyle diseases, growing patient expectations and advances in expensive technological and medical treatments are all contributing factors—Denmark is prioritizing healthcare IT in helping to manage costs as well and achieve improved health outcomes.

The national health strategy is focused on using healthcare IT to generate value specifically for patients and professionals across the healthcare sector locally, yet guided effectively by the national government’s well-defined vision and overall direction.
Denmark's approach to connected health

Denmark has a long tradition of healthcare IT development and health information exchange (HIE), a major reason for the maturity of connected health in the country today. Denmark launched its first national strategy in 1996, but the first HIE systems had been developed in the 1980s by a group of physicians in one of the regions. By 1992, that regional project—called FynCom—allowed lab results and discharge letters to be transmitted electronically to some GP practices.

Building on this early progress, in 1994, the FynCom project was nationalized, with support from the Ministry of Health. Under the new name MedCom, the agency would serve as an independent, non-profit, national health system task force, funded by a mix of the Ministry of Health, Ministry of Social Affairs, Danish National Board of Health, Danish Regions, Copenhagen Hospital Corporation, Association of Local Authorities in Denmark and the Danish Pharmaceutical Association. MedCom's role—which over the years has expanded in line with the increasing importance that governments placed on healthcare IT—includes developing the infrastructure in the healthcare data network, facilitating interoperability across the healthcare system, developing standards for healthcare IT, and promoting patient involvement. MedCom also certifies all healthcare IT vendor systems and provides technical assistance to providers.

In developing policy and practice, Denmark has a strong tradition of collaboration and working through agreement rather than legislation and mandates. Central government seeks to use negotiation rather than legislation as the main way of influencing the direction of change. In the healthcare sector, the central government usually sets broad guidelines and standards, which support the development of local tailored solutions. The norm is not to impose a specific solution, but to encourage compliance with overall goals and standards. This has been supported by a policy of engaging physicians in all aspects of the connected health journey, from defining problems to designing solutions for implementation and evaluation.

"Nurses and other clinical staff are like most of us—they go to work today in the hope of doing it a bit better than yesterday. And they too see the health[care] IT solutions as an aide to improving administrations and the way they provide care. So, while concerned about disruption and change, they do tend to support new connected health initiatives"  
—Michael Hansen, CIO, Health Region Zealand

The connected health journey in Denmark can be characterized as an incremental process, with built-in flexibility to adapt to wider system changes and the very rapid pace of technological change. The emphasis is on encouraging innovative activities with well-defined projects, which are implemented and refined through an iterative process. As stressed by survey respondents, the guiding principle for any investment is needs-based: An initiative only goes forward if there is a strong business case for how it will improve the clinical or administrative processes.

"There is a clear business case every time we allocate public funds to health[care] IT. During the past two years, we have fine-tuned the way in which we develop the business case and ... now seek to quantify expected savings and clarify when they are to be realized. Gains in quality improvements are of course difficult to quantify.... Nevertheless, we only pursue those IT solutions [that] improve administrative and clinical processes or health outcomes."
—Vagn Nielsen, Head of Department, Ministry of Health

"We always start with the clinical problem, which we think can be solved in a better way through the use of health technologies."
—Claus Duedal Pedersen, Head of Centre for Clinical Innovation, Odense University Hospital

A key factor in driving uptake has been the "comparative culture" within Danish healthcare and—particularly for GPs—what survey participants describe as "positive peer pressure." Early adopters of healthcare technologies have been encouraged to share their learning. Their peers regard them as trailblazers, and many of their colleagues are keen to follow suit as early adopters to demonstrate return on healthcare IT investments.

Public expectations are also influential. Danish citizens are among the most advanced IT users in the world and, as a result, they expect their healthcare providers to use patient-related technologies to make it easier—and cheaper—to access health services.
Key connected health initiatives

Figure 1 is an overview of Denmark's healthcare IT infrastructure. At its center is a national IT hub, the health data net, which allows information exchange among different parts of health services.

Figure 1: Overview of the Danish health sector IT infrastructure
Ninety-eight percent of Denmark’s 3,600 GPs, and all pharmacies and hospitals use the health data net, as do 74 percent of specialists and 44 percent of local authorities. The health data net allows for referrals, discharge summaries, exchange of clinical data, e-prescriptions, teleradiology services and much more.

An essential element of connected health is making patient data available to concerned parties, usually in the form of an electronic health record (EHR). Denmark’s EHR centers on the “e-Journal.” The e-Journal project began in 2009 and is now available to all hospitals and all GPs across the country. The e-Journal makes extracts of registered patient data available via the MedCom secure network, and it ensures that hospital doctors and GPs have access to patient data no matter where the patient has been hospitalized previously. Moreover, all Danish citizens can access their own e-Journal via the national e-health portal. The functionalities of the e-Journal are in the process of being expanded to provide deeper clinical information for the users.

Part of the health data net, the national e-health portal—Sundhed.dk—acts as a single access point to healthcare services for both citizens and professionals. The portal offers directory services, general and disease-specific health information, access to national guidelines and more. Citizens can use services such as booking GP appointments and renewing prescriptions. More than 1 million Danes now have a digital signature—“NEM-ID”—which allows them to access information from their e-Journal through Sundhed.dk, and to see who has accessed their data.

The use of a universal ID number (UID) has been a major enabler of change. National registers have been in use for decades, largely made possible through unique identifiers for all residents in Denmark—introduced in 1966. The state and public service agencies have a long track record of safeguarding public data and, as a consequence, Danes generally place a high level of trust in their government to keep their personal data safe and secure, which in turn has built a prevailing culture of openness and willingness to share personal information. Danish citizens today generally feel that with regard to questions of privacy and security, the benefits of information sharing outweigh the risks.

"It is really critical for the success of our health[care] IT initiatives that patients feel that we safeguard their personal data. We are somewhat blessed with the fact that we have such a long tradition for keeping registers of personal data—something enabled by the introduction of the UID numbers back in the 1960s. It has not only given us valuable experience of sharing data early on, but it has also been a major reason for the public trust we enjoy today."

−Vagn Nielsen, Head of Department, Ministry of Health

The strategy is dynamic, without a fixed number of initiatives or a set implementation plan. It has been kept flexible and non-prescriptive, particularly because of the fast pace of IT developments and health system changes overall. There is great emphasis on sharing learning and developing an evidence base as well as building on lessons learned abroad.

"The strategy builds on incremental digitalization of the whole health sector. Solutions will be developed that fulfill specific needs, and with the overall vision of a digitally connected health sector in mind."

−From the Ministry of Interior and Health website: http://www.sum.dk

In January 2008, Denmark launched the National Strategy for Digitalization of the Health Sector 2008–2012. It was developed by the newly established organization National Health-IT (NSI), which aims to ensure “the coherent development of digital solutions at a national level.” With a strong emphasis on engaging with patients and citizens, the strategy’s overall goals are to:

- Underpin quality and productivity by using IT to reduce manual registration and create better monitoring information.
- Create better services to patients and citizens, creating coherence in treatments by reusing and sharing data.
- Create more digital coherence through stronger cooperation between regions and municipalities.

1http://www.sum.dk/Aktuelt/Publikationer/Publikationer/UK_Healthcare_in_DK/Chapter%2007.aspx
Impact and benefits

Very focused efforts, closely allied to a policy of early discharge with more aftercare in people’s homes or through primary care provision, have reduced the demand for hospitalization and increased efficiencies within hospitals. In total, the five regions operate 43 hospitals and 10 psychiatry centers—30 years ago, there were 117 hospitals. Healthcare IT has greatly helped streamline work processes and thereby reduced the length of hospital stays. There have been efforts to centralize different specialties, and in 2008 the government announced a budget of DKK 41.4 billion to build a number of “super hospitals.” These modern facilities would further optimize the use of new technologies to achieve efficiencies, improve quality of care and empower patients to do more for themselves.

Healthcare IT adoption has been most notable in primary care. Nearly all GPs in Denmark (17 percent of all doctors) work in single or small private practices. GPs act as gatekeepers to specialists and hospitals: 90 percent of all patient contact is between patients and their GPs, and only 10 percent of GP-patient contacts are forwarded to other parts of the healthcare system. More than 1,000 specialized practitioners cover 17 medical specialties, and there are 318 pharmacies.

In primary care, nearly all (98 percent) use the full clinical functionality of their computerized physician order entry system (CPOE). Ninety percent of all communication in primary care is sent as “electronic data interchange,” and more than 90 percent of all clinical communication between primary and secondary care is exchanged electronically. Furthermore, a “one-letter solution” allows doctors to use one electronic form for all types of letters between primary care physicians. It is used in more than 5,000 healthcare institutions with 50 different systems, greatly reducing inaccuracies and speeding up processing.

Financial incentives such as increased payments to GPs who use email have helped accelerate adoption among GPs. So has offering technical support. Data consultants (funded by central government) have provided technical assistance to GPs across the country. This has helped to strengthen the use of computers in primary care and, in particular, promoted greater consistency in treatment through the timely exchange of clinical data. And some IT use is mandated. Since 2004, for example, the primary care physician contract has made it mandatory for GP practices to use computers and, since 2009, to use email.

An important benefit to Danish physicians is simplified repeat medication prescribing, including access to lists of generic drugs. In addition to providing much quicker access to patient data, particularly recent reports and results, electronic prescribing overcomes difficulties associated with handwriting and allows dovetailing with pharmacy systems.

The healthcare system also looks to international best practices for inspiration. MedCom regularly reports on primary care IT developments abroad, and many Danish healthcare IT leaders are actively engaged in international practice exchange networks. Denmark has always tried to work collaboratively across borders, and the national strategy aims to expand this.

An important international project is epSOS, the main European electronic health interoperability project co-funded by the European Commission and its partners. The project has a number of elements including providing access to medical data—with a patient’s consent—for those being treated abroad, and cross-border electronic prescription services. The Baltic eHealth project provides another good example of cross-border initiatives (see callout).

2http://www.himss.org

Odense University Hospital is one of the world leaders in healthcare IT and has reached stage 6 on the HIMSS maturity model. Sharing clinical competence and supported assisted healthcare IT solutions has proved to be of great value in minimizing the amount of “in days” in the medical ward, especially for patients suffering from chronic diseases. The hospital’s investments have already resulted in bringing down the average stay to 2.9 days per patient, compared with a European average of approximately seven days. The goal is to seek solutions that are safe for the patients, save time for the specialists and bring down the costs. Working with MedCom International, the hospital has developed healthcare IT solutions to facilitate high-quality care at home. For example, patients with COPD (often referred to as smokers’ lung disease) are equipped with a “briefcase” that allows live images and sound as well as data measurement to be monitored at home and quickly transferred to the hospital either via the Internet or a satellite connection. At the hospital, the doctor can evaluate and guide the patient as if the patient were at the hospital. The data transmitted from the patient’s home enables the hospital to perform systematic monitoring and control the quality of the treatment. Early evaluations demonstrate key benefits: Patients feel safe and comfortable at home, readmission rates are down by more than 50 percent, patient hospital stays have been reduced by five days on average and the relationship between staff and patients are significantly improved. As a result of this and other healthcare IT initiatives, the overall cost of care has fallen, and the hospital continues to further invest in IT systems and telemedicine to deliver more care in people’s own homes.
Telemedicine in the Baltic region

The objective of Baltic eHealth, which is coordinated by MedCom, is to facilitate the use of telemedicine across national borders in the region. Having established a secure Internet-based infrastructure between Denmark, Norway, Sweden and hospitals in Estonia and Lithuania, the next step is to consolidate this and increase the number and type of services available. The initiative has already changed ways of working within Danish hospitals. For example, images are sent from Denmark to radiologists in the Baltic countries, who then analyze them and send back their assessments. This is significantly reducing costs and represents an effective response to a shortage of radiologists in Denmark.

"Telemedicine is increasingly on the political agenda, not least because telemedicine can be a solution to the capacity and cost pressures facing our healthcare providers. It is simply not sustainable to deliver care in the same way as we are doing today."

–Vagn Nielsen, Head of Department, Ministry of Health

Challenges

While a connected health journey characterized by broad agreements and local solutions—rather than imposed systems—has been an enabler of change, it also raises problems of compliance and interoperability. Denmark is still lagging behind in these areas and cannot afford to do so. Greater interoperability and consistent use of standards will allow aggregated datasets for analytical purposes and insight driven health improvements. As more data is coded, classified and analyzed, better quality control and public health improvements will follow.

Developing a sound evidence base for proposed IT changes remains a challenge—in particular in relation to some mobile health solutions that directly affect care. Similarly, evaluating the impact of healthcare IT initiatives is complex—it is difficult, if not impossible, to isolate cause and effect.

Next steps for connected health in Denmark

Those surveyed were confident that mobile IT-health solutions will consistently reduce demand for formal healthcare in hospitals. More care—especially for those with chronic diseases—will happen in people’s own homes.

Use of telemedicine solutions will be rolled out across the system. This will help optimize the care process, enable efficiency gains and make better use of specialist expertise—an important element in the strategy to respond to future workforce shortages and cost management.

A National Patient Index (NPI), which is in the process of being rolled out, will be implemented in 2012 and 2013, pulling together information from more registers and databases. This will enable healthcare providers to transfer and receive data directly from NPI. Security components ensure that confidential information can only be accessed in line with privacy legislation.

Perhaps most important, people will take greater responsibility for their own health, supported by access to their personal information. While some are beginning to use the patient portal, Sundhed.dk, the trend has not yet been significant. Nevertheless, the potential is widely recognized and, over time, encouraging patients to take more personal responsibility for their health will inevitably improve health outcomes and reduce demand on the system.
What can we learn from Denmark?

Denmark's long tradition for using healthcare IT—particularly within primary care—has brought the healthcare system to high levels of connected health maturity today. The progress has, to a large extent, been facilitated by a culture of openness to healthcare IT and HIE. For decades, physicians have been keen to exploit technologies to aid their work, and patients have long recognized the benefits of sharing information. Indeed, from an international perspective, Danish patients have a high level of trust in their government's ability to keep their personal information safe and secure. While these cultural factors are important, there are a number of lessons to learn from Denmark's approach.

Healthcare IT is considered a critical enabler of improved patient care and care integration. The connected health journey in Denmark is underpinned by a clear vision of how technologies can contribute to improving core outcomes for patients and aid care integration. As such, patients have been at the center of the change program with portals and mobile health solutions specifically designed to enable people to take more responsibility for their own health.

A strong emphasis on cross-national governance of healthcare IT. Clear protocols, which are well embedded, along with a comprehensive and secure infrastructure, allow for the effective and secure sharing of data across Denmark's five regions. As a result of the strong governance, the end users are comfortable sharing data and clinical work processes—a key factor in creating further appetite for information sharing across the system.

Optimizing value early from healthcare IT investments, in particular in telemedicine, has improved efficiencies and access. Throughout the healthcare system in Denmark, leaders have sought to implement connected health solutions with the end goal in mind. As a result of remote consultations, for example, access to clinical specialists has dramatically improved, and the national focus on telemedicine solutions are showing the way to reduce the average length of stay in hospitals and reduce the cost associated with treatment of chronically ill patients. The improved access, savings and home-based care solutions have spurred broad support—from policymakers, clinical staff and patients—for further use and optimization of technology-supported integrated care delivery.

An approach that supports co-evolution between the different levels in the system can be the key to success. In Denmark, the central government’s role is to provide strong political support and clear strategic direction, while that of regional government is to develop solutions within and across the five regions. At the local level, Denmark’s strategy of encouraging local innovation as a foundation for a national rollout of successful projects—as well as a long tradition of engaging clinicians in developing solutions—has provided the impetus and flexibility to adapt to wider healthcare system changes and the rapid pace of IT developments.

Bringing in national development of the healthcare IT business, while addressing connected health issues. Denmark has a unique focus on modernizing the healthcare sector with healthcare IT technology while creating local jobs and promoting the regional and national healthcare business. The national program is called “Healthy Growth” and is inspired by the “Green Growth” paradigm from the energy sector. The focus is on testing and introducing new innovative technologies and work process across the care and healthcare sectors. One of Denmark’s regions has even taken this approach further and is in the process of creating a "living lab" platform as the basis for supporting public-private innovation.
Using a Homegrown System to Achieve Reform

Hong Kong

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<thead>
<tr>
<th>Description</th>
<th>Dual public/private health system</th>
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<tr>
<td>Population served</td>
<td>7 million</td>
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<tr>
<td>Public Hospitals/Clinicians</td>
<td>41 hospitals; 122 outpatient clinics; 58,000 professional staff (5,000 doctors, 20,000 nurses)</td>
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<td>Connected health vision</td>
<td>Improve patient care, safety and efficiency</td>
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<tr>
<td>Key focus of initiative</td>
<td>Clinical management system; Electronic patient record system</td>
</tr>
<tr>
<td>Architecture</td>
<td>Internally developed, centralized architecture</td>
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<tr>
<td>Funding</td>
<td>Public funding—US$343 million on IT spend since 1991. $130 million allocated up to 2019</td>
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Hong Kong’s 7 million citizens have a healthcare system divided into public and private provision. Patients can use either and often use both.

Public healthcare is provided at low cost (through government subsidies) to all citizens: there is a high demand for inpatient care, which can be expensive. Public healthcare accounts for approximately 47 percent of Hong Kong’s US$10 billion healthcare expenditure and 2.2 percent of GDP, serving 79 percent of inpatients and 29 percent of outpatients, as well as providing public health services. Private healthcare is provided on a cash basis and, although it is underused, delivers the majority of Hong Kong’s outpatient and clinic care. It accounts for approximately 53 percent of Hong Kong’s healthcare expenditure and 2.5 percent of GDP, serving 71 percent of inpatients and 21 percent of outpatients.

With funding from the Hong Kong Special Administrative Regions (SAR) government—and leadership, development, implementation and outreach from the Hong Kong Hospital Authority (HA)—public providers have developed and embraced a wide range of successful health information exchange (HIE) tools. The tools are homegrown systems developed module by module with a high level of clinician input and ownership and, most important, built to support clinician workflow. All 41 public hospitals and 122 outpatient clinics use these common integrated clinical IT systems and are connected to enable data sharing. All public care settings access and add to an enterprise-wide electronic patient record (ePR) for all patients. Clinicians on the public side see the benefits of healthcare information technology tools daily and donate their time to expand and enhance the HIE tools.
Private providers, on the other hand, lag behind in healthcare IT adoption. Systems are still largely paper-based. Private providers receive no government subsidies for healthcare IT investment and primarily self-fund IT investments.

Hong Kong is in the midst of a significant healthcare reform to address multiple challenges ahead, including over-reliance on public healthcare, an aging population, increasing care costs due to new medical technologies, early occurrence of chronic illness and heavy demand for hospital services.

Fundamental to this planned reform is a territory-wide electronic health record (EHR)—combining patient data from both the private and public side—to enable patient-centered healthcare, enhance primary care and connect the public and private health sectors. In 2009, the Legislation Council committed approximately US$90 million to finance the first stage of EHR development through 2014.

Hong Kong’s approach to connected health

Without question, the Hong Kong government’s significant investment in its public healthcare system and ongoing commitment to its improvement—including its willingness to fund organizations and projects—has been critical to the success of public sector IT.

Hong Kong’s public health sector faced many challenges. Demand for healthcare services was ever increasing with long wait times as a result. Medical errors and adverse events had to be reduced. Consistent and up-to-date patient data as well as clinical information needed to be maintained and shared among clinicians. And planning, care coordination and quality improvement all needed a base of reliable information from which to work.

It was clear that healthcare IT could contribute a solution. It would also make clinical workflow more efficient by improving processes such as laboratory orders, prescription orders and diagnosis coding.

The Food and Health Bureau, part of the Hong Kong SAR government, forms policy and allocates resources for Hong Kong’s health services. It is responsible for ensuring lifelong healthcare to all Hong Kong citizens, regardless of individuals’ ability to pay.

The Food and Health Bureau oversees and funds the Department of Health, which manages public health (and regulates and monitors the private healthcare sector), and the Hong Kong Hospital Authority (HA), which manages public hospitals and the technology that connects them.

Although it is publicly funded, the government does not run the HA, instead maintaining a hands-off approach that supports rather than interferes with it. Formed in 1991, the HA has an annual operating budget of approximately US$4 billion and relative autonomy over how it allocates its funds. Information technology receives a little more than 2 percent. With steady bureau funding, the HA has served as the driving force in successful healthcare IT adoption in the public healthcare sector.

In addition to managing its own CMS development, the HA is also building the territory-wide EHR for the bureau.
Figure 2: Organizational structure
Key connected health initiatives

When the HA was formed in 1991, it quickly identified IT as a strategic asset to coordinate care across the public health sector. Constrained by a modest budget, the HA was unable to look outward to available vendor solutions, and instead focused internally on the building blocks of connected health—standards, coding, terminology, formulary and identifiers—and on its own in-house software development capability.

The HA introduced its first clinical management system (CMS) in 1996 and began with simple clinical support modules, such as a discharge summary, which also included prescription components. Over time, the HA added appointment booking, laboratory, radiology and referral modules to its CMS. Since public care is government funded and not paid on a DRG-basis, a billing module was not necessary.

“Our software is designed to fit like a surgical glove. We don’t break with clinical flow like a lot of packages. CMS is designed for doctors’ use. It’s intuitive, and they don’t have to be trained to use the system. Otherwise the change management would have been horrendous.”

– Andre Greyling, Chief Information Officer, Hong Kong Hospital Authority

The CMS provides integrated healthcare IT capacity across 41 public hospitals and 122 outpatient and specialist clinics. While each hospital and clinic may have more specialized modules, the CMS provides a core functional set across the system. An electronic patient record (EPR) allows for interoperable core data sharing across HA sites.

Healthcare IT development within the public healthcare sector has always been focused on clinical care. The HA designed its CMS system to fit clinical workflow. The design philosophy centers around three key principles: “time is key,” “don’t radically change the clinical process” and “data needs to be structured.”

The CMS is designed to be intuitive to users. The HA offers short training sessions to introduce the end-users to new features. If lengthy training is required, it indicates that the software needs to be reworked.

“We didn’t have the billing system drivers for our IT system, so we only had to focus on the clinical, and didn’t have to burden our doctors with all the other stuff that doctors have to do elsewhere.”

– Dr. Ngai-tseung (N T) Cheung, Chief Medical Informatics Officer, Hong Kong Hospital Authority; Consultant in eHR Development, HK SAR Government

The CMS was designed to be intuitive, and they don’t have to be trained to use the system. Otherwise the change management would have been horrendous.”

The HA’s Clinical Informatics Program Steering Group and its 44 functional groups guide healthcare IT development across the enterprise. Functional groups assess clinical requirements for the various care departments. These are clinician-led groups that coordinate with other groups focused on IT requirements, implementation, clinical systems development, standards, policy and technology needs. The governance structure provides a frontline perspective about IT needs in various clinical areas. Enterprise-wide initiatives, such as patient safety and risk management, have clinicians leading the associated functional group as well. Within Hong Kong’s seven regional clusters, senior clinicians correlate clinical IT needs. Individual hospitals must correlate with other units within clusters to push specific priorities. There are approximately 160 clinicians, all volunteers, involved at various levels of development.

Several other initiatives enable the level of interoperable health information exchange and care coordination throughout the HA. Every Hong Kong resident has a unique identification number that can tie together multiple episodes of care. Hong Kong’s Patient Master Index contains more than 8 million records. The HA extensively uses barcoding to link episodes of care and coordinate computerized physician order entry, e-prescriptions and more. And the HA-wide electronic patient record, stored in a centralized database, provides a longitudinal record for each patient, used for core data sharing.

There is limited clinical decision support, apart from clinical reminder messages. These reminders inform clinicians about drug allergies, drug interactions and other patient-critical factors, for example, indicating that a patient’s blood sugar level is abnormally high and needs immediate action. It is interesting that clinicians are more accepting of these critical factor reminders than of reminders in the form of complex care plans. Evidence-based protocols are...
available for frontline staff, such as nurses in the patient support call service center.

Data analytics and clinical outcomes is a growing area. Analysis is conducted on ten parameters—mortality rates, clinical waiting time, surgical site infection, diabetic control, MRSA infection rates and so on—with a penalty and reward scheme in place, based on best outcomes or best improvement.

In an effort to widen information sharing, since 2006 the HA has piloted a system that allows private healthcare providers to view data—although they cannot amend it. The Public Private Interface-Electronic Patient Record (PPI-ePR) is available to private sector providers who agree to participate. They must also have the agreement of individual patients, which allows patients a level of control over their health information. To date, the PPI-ePR program has 1,500 private providers registered and more than 165,000 patients. With the eHR system, the Food and Health Bureau hopes to expand on this pilot to create a single, interoperable, longitudinal record for every Hong Kong resident across both public and private sectors.

The CMS platform is also being extended to the private sector. Private clinician professional organizations, such as the Hong Kong Medical Association, can get sponsorship from HA to implement a CMS-based platform among its members. This will also ensure that data interoperability and coding standards are consistent across the entire healthcare sector and may help to ease the high demand on public services by moving more cases to the private sector.

It is still true, however, that private healthcare providers have little incentive to invest in IT. Indeed, some strong disincentives get in the way. Some private practices worry that when patients own their health records they may move to other providers. Others fear loss of revenue, especially as healthcare IT can reduce duplicative or unnecessary tests.

Impact and benefits

IT systems in the HA have produced numerous benefits, and providers now consider the CMS and ePR systems to be the most important tools in their daily practice. Patients see the benefits as well.

"At first, patients complained about doctors looking at the computer. Now they are concerned if doctors don’t."

—Dr. Chun-por (C P) Wong, Physician and Cluster Service Director, Hong Kong Hospital Authority

The system is more efficient, reducing consultation times and waiting times for dispensed drugs. Electronic order entry has improved workflow efficiency as well as electronic diagnosis coding. In Ruttonjee hospital, data-mining techniques identify elderly "at-risk" patients with a high probability of readmission, and call centers follow up with those patients after discharge. The program has been successful in assisting patients by phone and reducing readmissions. For example, the call centers have reduced readmissions for elderly diabetic patients by 25 percent.

The system has also helped reduce the prevalence of errors—including medication, prescription, transcription and transfusion errors. For example, after comparing incidents of misidentifications in laboratory tests before and after introducing a barcode system, the number of incidents at Hospital A had dropped from 132 to two. And, in 2009, when thousands of patients had received a batch of contaminated medication, the HA system was able to identify 35,000 patients and contact the 2,000 most at-risk chemotherapy patients within a day.

The Cataract Sharing Program is a good example of how extending the CMS can bring efficiencies. Demand for cataract surgeries has outpaced the limited supply of public providers, and the program subsidizes patients who volunteer to go to a private provider. Patient data is shared via the PPI-ePR. The program has reduced wait times for cataract surgeries from eight years to less than two years.

The system allows for enterprise-wide analytics. Clinicians run approximately 16,000 queries per month. Data can also be analyzed for peer review and planning. In 2008, a surgical outcomes system was launched in 17 surgical HA hospitals. It captures and tracks data on preoperative risk factors, laboratory tests, intra-operative factors, 30-day mortality and postoperative complications.

Because healthcare IT development is clinician-focused, end user satisfaction is high. The HA has also provided increased access to services by shifting some demand to the private sector and ensuring private providers have up-to-date data. Since 1995, all medical students have been trained on HA clinical systems, and this is making the uptake of CMS systems more likely in private practices.

Finally, CMS was critical in tracking the spread of the SARS outbreak in Hong Kong.
Next steps for connected health in Hong Kong

The next version of the CMS platform (CMS 3) will be implemented within 2012, and two more phases are planned: Advanced CMS, with more functionality, and Intelligent/Smart CMS, with analytics and intelligent systems.

The HA also seeks to reduce film costs by using diagnostic images across the enterprise (the “Filmless Hospital”). The Pharmaceuticals Procurement project will improve patient safety by enhancing pharmaceutical product procurement controls and processes. Traditional Chinese medicine is also a factor to consider when developing the IT platform. HA is also considering strategies and technologies for mobile health and seeks to support other HKSAR programs, such as the Communicable Disease Information System Initiative.

The Food and Health Bureau’s eHealth agenda calls for a territory-wide electronic health record for every Hong Kong resident by 2015. The goal is for the record to cut across the entire lifespan of the resident, from prenatal care to post-mortem. Initial steps along this path include the PPI-ePR program. The next overall goal would be to engage patients in their own healthcare. The eHealth Agenda calls for a territory-wide patient portal by 2018.

What can we learn from Hong Kong?

Clinician engagement is key. The HA recognized early on that without the support and acceptance of clinicians, healthcare IT ventures would be unsuccessful. To that end, clinical system development is based on the recommendations of a complex, clinician-led governance structure. Usability should be intuitive and not seek drastic changes in clinical workflows.

An enterprise-wide single patient identifier is essential. The Hong Kong Patient Master Index, based on each patient’s resident identity number, links orders, labs, prescriptions and other episodes of care to a patient.

An enterprise-wide solution must have a strong governance structure. The HA’s Clinical Informatics Program Steering Group (CIPSG) uses the expertise of clinicians to provide leadership, engagement and empowerment over the CMS. Its teams establish system requirements based on provider workflow and functional need. Other clinician-led teams address issues of implementation, security, standards, policy and technology.

An organization must have internal IT staffing capacity. A strong and agile internal workforce in the HA allows for rapid deployment, patches and critical fixes without relying on outside organizations.

Start small and build with patience. The HA has developed its healthcare IT capabilities in incremental steps. Over time, functions have been added as clinicians have seen the need.

“Build first, talk later.” The HA emphasizes building out and demonstrating good ideas quickly rather than spending time in discussion. Of course, this is possible only with deep clinician involvement and understanding of the workflows being supported.
Providing Reliable Clinical Data at the Point of Care

Indiana Health Information Exchange

<table>
<thead>
<tr>
<th>Description</th>
<th>Nonprofit health information exchange</th>
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<tbody>
<tr>
<td>Population served</td>
<td>10 million</td>
</tr>
<tr>
<td>Public Hospitals/Clinicians</td>
<td>80 hospitals and other health facilities, 19,000 physicians</td>
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<tr>
<td>Connected health vision</td>
<td>Improve the quality, safety and efficiency of healthcare in the state of Indiana</td>
</tr>
<tr>
<td>Key focus of initiative</td>
<td>Public Health Emergency Surveillance System; Clinical Messaging/Results Delivery; Virtual Patient Record; Quality Monitoring/Pay for Performance</td>
</tr>
<tr>
<td>Architecture</td>
<td>Centrally stored federated model</td>
</tr>
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</table>

Indiana Health Information Exchange (IHIE) is the largest statewide health information exchange (HIE) in the United States, based in Indiana and connecting more than 80 hospitals, long-term care facilities, rehabilitation centers, community health clinics and others. It serves 10 million patients and more than 19,000 physicians across five states. IHIE provides patient-specific information directly to physicians in a secure standardized format, improving care coordination and access to information for its member hospitals.

IHIE’s primary aim is to provide reliable, up-to-date clinical data at the point of care, driving improvements in the efficiency, quality and safety of healthcare delivery. It offers services that assemble health information in ways meaningful to providers, increasing their ability to achieve improved health outcomes for patients, particularly those with chronic conditions.

The structure of IHIE has and continues to evolve over time as its services expand and mature. The services now included within IHIE were originally developed and managed chiefly by the Regenstrief Institute, an informatics and healthcare research institution, working in close collaboration with hospitals and other healthcare leaders and stakeholder bodies in the local market. As the services grew, IHIE was founded as a separate, not-for-profit organization in 2004 with the primary purpose of managing the operations of the HIE and transitioning it to a self-sustaining organization.

"The ultimate dream is that no matter where you go, your information follows you."

Bill Tierney
President and CEO, Regenstrief Institute
Indiana’s approach to connected health

IHIE has been driven by a consistent vision to use clinical information to improve the quality, safety and efficiency of healthcare in the state of Indiana, create unparalleled research capabilities for health researchers and establish a model of health information exchange for the rest of the country.

"To each of [the regions bordering IHIE] I have said we will either be your health information exchange or we will work with whoever it is."

– John Kansky
VP Product Development, IHIE

A central tenet and driving force to IHIE has always been the improvement of patient care. Understanding socio-political issues surrounding security and privacy concerns, and the potentials of monetizing data, IHIE has taken an incremental approach to development. General themes to its approach include: a framework for ethical oversight on the use of data (overseen by a stakeholder-based governing body); stacking new lines of service on top of pre-existing lines of service; and positioning itself to continually propose, anticipate and respond to emerging models of quality improvement and care provision.

Following this approach, IHIE has continually expanded and matured its services from its initial, relatively simple information delivery to a system with advanced analytic capabilities.

Initially providing services predominantly in the city of Indianapolis, IHIE grew and continues to grow—within and outside of the state of Indiana. IHIE began through establishing data-sharing relationships between large metropolitan hospitals with shared patient populations. This was followed by the participation of smaller and more rural hospitals that saw value in access to this growing database of health information. IHIE’s service area borders or overlaps with five other HIE initiatives. This geographic overlap has created an atmosphere described as “co-opetition.” All HIEs are actively working together to ensure interoperability wherever possible, while at the same time competing for customers in untapped geographic regions.

Source: Indiana Health Information Exchange 2010 Annual Report
**Key connected health initiatives**

IHIE's history goes back to the early 1970s with the Regenstrief Institute's early efforts to develop electronic health records collecting patient information intended to support diagnostic decision making. Grant-funded initiatives to connect information flows began between hospitals in the early 1990s and have continued to expand ever since, developing into the Indiana Network for Patient Care (INPC). These initiatives were focused on supporting basic data sharing and public health disease and syndromic surveillance. Incremental development led to the development of clinical messaging services, data repository and retrieval services, and eventually support of pay-for-performance and quality initiatives. While development is always continuing, IHIE now provides four major services, outlined below.

"We designed the system to be highly leveraged and highly usable because the same transaction, the same piece of data, can be used for public health, clinical decision support, it can be used for administrative purposes and research."

−Shaun Grannis
Director and Principal Investigator, Regenstrief

The Public Health Emergency Surveillance System (PHESS)—still owned and operated by Regenstrief—is a core early component of IHIE. PHESS collects information from Indiana hospital emergency departments to support analysis to identify bioterrorism, disease outbreaks and other public health emergencies. The development of PHESS expanded the reach of Regenstrief projects beyond a single metropolitan area to eventually connect to 120 of Indiana’s hospitals. Connections to ERs, labs and outpatient pharmacy systems supported automated case reporting. This was seen as a relatively simple and inexpensive way to begin to build HIE services.

Often described as IHIE’s flagship product, Docs4Docs is an electronic results delivery service for more than 18,000 participating providers. It allows hospitals and laboratories to deliver lab results, radiology reports and more to providers via a Web-based repository, fax or directly into an authorized clinician’s EMR. Use of the service is growing rapidly, from 43.4 million messages delivered in 2008 to 77.6 million in 2010.

The Indiana Network for Patient Care (INPC) provides a virtual patient record that combines patient information from all 80 participating hospitals and other associated organizations. Patient data is collected and standardized and can then be compiled across organizations as needed. Most prominent use is within hospital emergency rooms where patient registration initiates creation of a basic clinical summary and provides access to an expanded patient history through a provider portal.

Quality Health First (QHF) operates as a clinical quality and value-based reimbursement service. Combining data from insurance providers with data within the INPC, QHF provides quality reporting and an integrated pay-for-performance program across multiple payers in the state. The program is both intended to generate revenue from participating payers and provide quality-based information to participating physicians through monthly reports. The program provides physicians with patient-specific alerts and reminders based on best practice measures and quality indicators. Insurance providers, too, reap financial benefits from the improved health of their populations, while providing funding both for the operations of QHF and to supply incentive payments to providers who improve their quality of care.

**Impact and benefits**

Users of IHIE services believe it is having a strong positive impact, improving clinical decision-making and the efficiency of patient encounters. The value IHIE provides to its customers is clear in the consistently growing demand for its services.

"If you look at the leading institutions, we’ve been doing [healthcare IT] for years because it’s the right thing to do, because it provides us mechanisms and safeguards for patient care and gives us ways of capturing the data so we can use that for quality analysis."

−Chuck Christian
CIO, Good Samaritan Hospital

At each phase of its development, IHIE has conducted analyses detailing cost, benefit and quality impact of its services. For example, the use of Docs4Docs to deliver public health alerts to clinicians was found to save $3,638 per alert and reduced message delivery times from several days to minutes.1 Although there has not been broader, long-term analyses, Indiana hospitals have reported that tangible cost savings are not their primary motivation. Access to a complete patient record is seen as a requirement for the delivery of high-quality patient care.

Clear benefits in patient safety are apparent. IHIE participants see strong value in a more complete medical history, particularly in emergency situations or in areas where patients receive care at multiple institutions. They felt this improved clinicians’ ability to make informed decisions about their patients’ care.

Medication reconciliation is a complex and often error-prone activity in the hospital environment. By providing pharmaceutical information received from both providers and commercial pharmacies, IHIE has supported clinicians in developing a more accurate list of medications, reducing opportunities for clinical error and curtailing inappropriate drug-seeking behaviors.

During an acute clinical encounter, physicians may not be aware of a patient's preventive or chronic care treatments. QHF provides clinicians with patient-specific data, which has supported their ability to identify and treat patients in need of regular chronic care services.

Docs4Docs and the INPC have also improved efficiency. Clinical messaging has increased the speed with which physicians can retrieve results, significantly reducing unnecessary delays. Participants reported increased ability to initiate care before patient arrival for patients transferring between institutions. A physician end-user reported that a short review of INPC summaries allows for less time reviewing patient histories and increased time focusing on their current needs. Results available through Docs4Docs and INPC are also found to reduce unnecessary laboratory and radiology testing.

Challenges
The challenges IHIE has experienced are common to HIEs across the United States. Gaining and maintaining stakeholder trust to share data, maintaining financial stability and overcoming the technical complexities of data sharing are all common themes of HIE initiatives. A few specific areas, however, are worth noting.

"You need standards to integrate, there is no question about that, but it is a more nuanced story than that."
−Shaun Grannis
Director and Principal Investigator, Regenstrief

Interoperability is always challenging. Information aggregation through the INPC makes extensive use of standards, but standards alone do not create an interoperable network. IHIE recognizes that even within standardized data formats, each organization will have unique customs and methods. Further, information in documents may not always be in a format appropriate for secondary data analysis. IHIE has deployed a strategy of promoting standardization where it is beneficial and achievable for the frontline provider, and using customized interface engines, messaging processors and other data transformation services to ensure data is standardized and reusable once in the INPC. This process, however, creates a significant amount of manual programming effort. IHIE hopes to advance its analytic capabilities to automate parts of the interfacing process and decrease operational burden.

Provider identification and authentication is clearly essential. IHIE relies on provider organizations to create and supply lists of authenticated users. But these can vary greatly in format and often contain errors. Again, much manual processing is required to check the information for accuracy and ensure updates are properly recorded.

"Clinical data is first and foremost shared for patient care purposes, everything else is viewed as ‘secondary use.’"
−Shaun Grannis
Director and Principal Investigator, Regenstrief

IHIE recognizes that the quality of its analytic capabilities will increase with the amount of patient information available and that an HIE needs to cover the whole market to provide a complete patient history to its users. With these driving forces, IHIE is continually seeking to expand its service area. But it has found constraints, particularly at political boundaries such as state lines: many potential IHIE participants are hesitant to enroll in IHIE rather than their own state’s program. In response, IHIE is exploring methods of working together with other HIE initiatives.

Stakeholders need to be able to trust a system, confident that its value will be high and its risks low. IHIE works very closely with stakeholder boards such as the INPC management committee to ensure all uses of data are approved by all participating organizations. Additionally, IHIE uses a technical architecture that stores all data separately by organization and only combines information when a specific query is run. This allows any organization to maintain control of its data and remove it at any time, should it need to.

Transitioning from a grant-funded project to a sustainable service is often where HIEs come unstuck. IHIE strives to overcome this challenge through a variety of approaches, including creating multiple use cases that provide value to multiple stakeholders, and continuing to pursue government funding where it can. Although it still relies on government grants for 50 percent of its operations, IHIE hopes to reach full sustainability by 2012.
Finally, IHIE’s founding organization, the Regenstrief Institute, was not an appropriate organization to sustain the day-to-day operations of a technical project as large as IHIE. As a result, IHIE was created as an independent organization. However, Regenstrief still retains the intellectual capital and access to grant funding necessary to continue to grow and evolve the HIE’s services. IHIE strives to take advantage of the historical knowledge and research capabilities of Regenstrief while continuing to focus on the operations and sustainability of IHIE’s current services. The challenge lies in sustaining a cooperative environment, but one where the governance structures and relationships continue to be well defined.

Next steps for connected health in Indiana
IHIE sees opportunities for growth, both in populations served and in the services it provides. Short-term goals center on expanding INPC participation beyond the current 80 hospitals. This is being pursued both in competition and in collaboration with smaller HIEs in Indiana and in bordering states. IHIE is also increasingly collaborating with independent physician practices that are in the process of adopting EMRs through the EHR Incentive program.

Chief among IHIE’s pursuits is continuing to seek new methods of applying analytics to health information. The work involved is broad and ongoing, and includes furthering clinical research and translational science, enhancing and expanding decision support capabilities, leveraging innovations in natural language processing and exploring ways of automating processes that are currently performed manually.

“As a country, we’ve just begun to scratch the surface of how we can use health information technology to improve public health.”

– Chuck Christian
CIO, Good Samaritan Hospital

In the area of public health, IHIE and the Regenstrief Institute are continuing work on a “notifiable conditions detector,” which is built to identify conditions of public health significance from diagnostic data. Development work on a protocol for accessing IHIE services in times of emergency is also ongoing.

IHIE leadership continues to monitor the potential for including patients as data consumers and suppliers, for instance, by creating an integrated personal health record (PHR) or patient portal. As yet, security concerns over public access to HIE data, and the lack of strong demand for existing PHR services, have kept this a long-term ambition.

IHIE sees the potential for government-supported health reform initiatives, such as accountable care organizations, to be a potential market. Health insurance organizations that run initiatives such as organized systems of care and patient-centered medical homes also create market opportunities.

"At the very least we want to continue to be perceived as a model, we want to continue to be a leader, we want to show the country a way that can work."

– John Kansky
VP Product Development, IHIE

Regenstrief and IHIE also continue to pursue grant-funded opportunities as well as explore the use of metadata with the Office of the National Coordinator for Health Information Technology, serving as a World Health Organization collaborator to support global healthcare IT development and continuing its participation in national strategies regarding data standardization.
What can we learn from Indiana?
Incremental development both reduces costs and increases stakeholder buy-in. IHIE began with the development of basic public health monitoring and reporting services. This established relationships and technical connections with Indiana hospitals, laboratory and pharmacy services that could later serve as a framework for building and expanding IHIE services. This model was both financially and operationally efficient.

HIE as a service, combined with strong stakeholder involvement, provides opportunities for innovation. IHIE participates in many collaborative efforts at the national and local levels for a variety of topics including HIE, standards, analytics and care improvement programs. IHIE encourages stakeholder involvement in identifying new ways to use this health information to support advancement in the use of health information throughout the region and across the country.

Multiple use cases are required to support HIE. IHIE is pursuing financial sustainability by providing a number of valuable services focused on multiple stakeholders in the region. IHIE believes that a strategy of aligning payment with individual stakeholder value is required to spread the cost of services and ensure involvement (and data availability) from a wide breadth of stakeholders.

Maintaining stakeholder control of data supports building trust and participation. IHIE is supported by a stakeholder-based governing body that approves all use cases of IHIE data. Further, all data within IHIE is stored separately for each organization. This stakeholder control of information and its uses is essential to gaining and maintaining stakeholder participation, particularly in competitive environments.

Business models must evolve with services. As IHIE grew from a research project to an ongoing business, it required different governing bodies and management strategies. IHIE and Regenstrief have continued to work to evolve their business model to match their growing services and client base.

Focused and preventive care oriented decision support is most effective and most readily accepted by physicians. Through targeted studies and direct experience, IHIE has found that physician acceptance and use of decision support services is increased when those services are focused on basic preventive care requirements rather than advanced diagnostic support. It theorizes that the complexity of diagnostic decision-making is not yet well supported by IT, and clinicians will more readily accept basic reminders for care.
Using Evidence-based Care Protocols to Improve Quality

Intermountain Healthcare, Utah, United States

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<thead>
<tr>
<th>Description</th>
<th>Nonprofit integrated health system</th>
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<tr>
<td>Population served</td>
<td>3.6 million</td>
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<tr>
<td>Public Hospitals/Clinicians</td>
<td>23 hospitals and 165 clinics, 800 physicians in Intermountain Medical Group and approximately 3,200 affiliated physicians</td>
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<td>Connected health vision</td>
<td>The best clinical practice delivered in a consistent and integrated way at the lowest appropriate cost to the population</td>
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<tr>
<td>Key focus of initiative</td>
<td>Electronic Health Record (EHR); Evidence-directed clinical process management</td>
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<tr>
<td>Architecture</td>
<td>Internally developed EHR. Now partnering with General Electric for service-oriented architecture platform and custom EHR</td>
</tr>
<tr>
<td>Funding</td>
<td>NA</td>
</tr>
</tbody>
</table>

Intermountain Healthcare is a nonprofit, integrated healthcare system headquartered in Salt Lake City, Utah. Consistently one of the highest-ranked integrated healthcare systems in the United States, Intermountain was founded in 1975 when The Church of Jesus Christ of Latter-day Saints donated its 15-hospital system to the communities it served. Over the years, Intermountain has become a model healthcare system that exhibits many attributes of a learning organization that strives to deliver best clinical practice in a consistent and integrated way.

In addition to an emphasis on fostering best practice, Intermountain also demonstrates a commitment to the communities it serves and a mission that emphasizes integrity, service and financial stewardship. Intermountain leadership employs several tools to carry out this mission, including an intense focus on measurement and analysis of clinical processes, efforts to align physicians, hospitals and the system’s health plan in the pursuit of high-quality care at the lowest appropriate cost, and development and use of evidence-based care protocols.

In the 1980s, Intermountain centralized its management and restructured its hospital system, allowing hospital leaders to focus on advancing operational efficiency through quality of care and cost-reduction efforts in an environment of growing healthcare need and declining reimbursements. By the mid-1990s, Intermountain was a structurally integrated health system consisting of hospitals, a physician group and a health plan. As part of this evolution, Intermountain has given physicians a prominent voice in the decisions of the organization while also holding them accountable for adhering to best practices.
Intermountain’s approach to connected health

Intermountain’s evidence-based approach to care delivery is built upon data collection, clinical process modeling, a measurement-intensive quality improvement philosophy and the use of custom-developed information systems. As an integrated delivery system, patient data flows between organizational units and affiliated providers to offer a longitudinal perspective of patients and their outcomes. The use of robust clinical and financial information systems has enabled Intermountain to analyze clinical process variations and uncover linkages between those processes and observed clinical and financial outcomes.

Intermountain’s core strategy of clinical integration coupled with internally and externally derived evidence to drive quality and cost improvements requires an environment that fosters multidisciplinary collaboration, a clear and consistent vision and a management philosophy of continuous improvement. To this end, Intermountain has focused on consistent leadership direction and commitment to clinical improvement, the engagement of frontline clinical staff, development of management and accountability structures and the continual development and refinement of clinical process models and protocols.

The Intermountain enterprise data warehouse contains 30 years of medical and financial records, providing a knowledge base that supports the aggregation and analysis of outcomes related to the care provided across the system. This infrastructure provides the backbone for Intermountain’s internally developed ambulatory and inpatient medical record systems as well as its financial system.

To foster a culture of improvement and curiosity about the relationship between process and outcomes, Intermountain offers training to its clinical and administrative leaders through the Advanced Training Program (ATP). ATP incorporates lessons on health services research methods, severity adjustment and data analysis, process modeling, outcome measurement, protocol development and implementation, effective design and use of healthcare IT tools with hands-on projects that focus on quality improvement. All Intermountain administrators and clinical leaders must graduate from the program, instilling a culture focused on the core strategy.

Key initiatives

At the heart of Intermountain’s clinical improvement strategy is the use of evidence-based clinical process models. Incorporating these models into decision support systems “codifies knowledge through expert system support,” reducing variation in care delivery. Based on a strategic prioritization, clinicians collaboratively map clinical processes (in those program areas that account for the majority of patient volume and cost) as conceptual flow models to represent the inherent decision points and intermediate outcomes of the clinical process.

Measures are condition and non-condition-specific and include service quality and other measures that are administrative in nature. These flow diagrams also incorporate evidence-based practice guidelines and result in workflow-aligned clinical protocols. When building the clinical process models into workflows, there is an emphasis on default values, default orders and documentation or charting by exception (noting when standards of care are not followed, changes in patient status, and so on). Clinicians refer to these flow diagrams to identify key measures and desired outcomes that they—and others—can effectively track. These are then built into reports using data elements retrieved from Intermountain’s information system and presented to care providers in multiple forms (various levels of aggregation, variance and control charts, for example).

Doctors also use patient-level worksheets and other decision support tools to relay treatment or follow-up protocols, passive reminders based on patient registries, patient medical information (such as medications, labs, exams and chronic conditions) and reports of performance as compared to peers based on key process and outcomes measures. Care providers may then either vary treatment decisions based on individual patient needs or proceed with the standard protocol of care based on the evidence at hand.

A key attribute of Intermountain’s clinical process improvement is the dynamic nature of clinical protocols, which improves provider acceptance and use. Clinical improvement teams are constantly working so that care protocols evolve based on new external evidence (clinical trials, among other things) as well as outcome data derived directly from Intermountain’s own clinical systems.
Example of a simple clinical process model (for Labor and Delivery)
The prioritization of clinical process model development comes from clinical program goals set by Intermountain’s board of directors. Frontline clinical staff, working with other members of the clinical management team, are engaged heavily in the development and maintenance of clinical process models. They develop protocols, rapidly test them to identify and address problems and modify them accordingly. They repeat this process until the protocol is safe, effective, aligned with workflows and acceptable to users. Clinical teams work on a maximum of four clinical process models in a clinical setting at one time, adapting the majority of models every six months. This environment also fosters an inquisitive approach to improvement, with clinicians and leaders noticing new patterns and differences in practices and outcomes.

Intermountain’s robust and flexible information system, Health Evaluation through Logical Processing (HELP), was one of the first knowledge-based, hospital clinical information systems for the episodic medical record. Its successor, HELP2, was expanded to include a clinical data repository (CDR), data dictionaries and decision support applications.

The clinical data repository serves as the centralized patient database from which all clinical applications retrieve and contribute data, including decision support. The enterprise data warehouse combines this clinical data repository with Intermountain’s billing and financial system, creating a base for developing and tracking measures of clinical process improvement. While all generated clinical data is copied into the CDR, Intermountain must still contend with fragmented data held in multiple department-based systems. However, Intermountain is moving toward a new platform that will support one common user interface across multiple department-based functions. With a number of unit-based systems, each with its own set of patient demographic needs and data stores, Intermountain must reconcile differences in demographics before attributing data to a patient’s record. Intermountain uses IBM’s Initiate product to support its master patient index and align patient data across all departments and settings.

Intermountain places a particular emphasis on ensuring the integrity of data from health information exchange before incorporation into Intermountain clinical data stores. To accurately inform Intermountain’s evidence-based care models, data must be reliable. To mitigate the risk of unreliable data—related to patient identification and missing or redundant information—Intermountain carefully filters all incoming data, only incorporating it into the data warehouse once it is free from errors. Once data is within its walls, Intermountain is responsible for upholding its integrity.

To inform care models and provide decision support at the point of service, the Intermountain infrastructure must support reasoning that combines and compares data about a patient’s current disease state, disease progression and similar patient cases. Intermountain adjudicates patient data based on several factors, including its relevance to the clinical disease process at hand, its fit with disease management protocols, its contributions to data models, its ability to enrich data already stored and its ability to supplement new diagnoses.

Intermountain supports many ambulatory clinics, some of which use additional information systems that contain useful, longitudinal patient data. The interoperability of this data is critical to inform disease models, protocols and an understanding of the patient at the point of care. Intermountain uses Medicity’s Novo Grid health information exchange solution to aggregate discrete patient data across its affiliates and provide them with Intermountain reports and data. Intermountain also benefits from health information exchange by receiving more nuanced external data, including those from state registries.

Impact and benefits

As a non-profit health system accountable to patients, payers and communities for providing care at affordable rates, Intermountain seeks to operate efficiently by optimizing work processes. Intermountain’s annual revenue is more than $3 billion, and it is estimated that Intermountain saves more than $100 million through clinical quality improvements. These include internal savings from specific improvement projects, as well as using evidence of improved results to leverage contract negotiations with payers. Intermountain also partners with external purchasers to share risk, particularly for more expensive initiatives. Although Intermountain does not have a formal reinvestment savings plan, savings are evident through excess system capacity and are directed toward capital investments. Its systems were responsible for an improved accuracy of patient charges from 65 percent to more than 98 percent, and Intermountain was recently able to refund 6 percent of its annual insurance premiums to members of its health plan.

Intermountain’s quality and cost improvement strategy has resulted in measurable and dramatic impacts on the care provided. By using longitudinal patient data to drive the development of clinical process models, Intermountain has markedly improved quality of care while controlling cost growth. Intermountain has published numerous studies showcasing its clinical improvements and cost savings (a few of which are highlighted below).

The proportion of cardiac patients receiving appropriate medications at discharge increased by 50 percent to proportions of more than 90 percent. This has resulted in significant reductions in mortality and readmission rates of congestive heart failure and heart disease patients, and helped to place Intermountain in the top 3 percent US-wide for low readmission rates for heart attack, heart failure, and pneumonia patients.
By standardizing care for patients on ventilators, Intermountain reduced the average number of days for each patient on a ventilator by more than a day and reduced the rate of ventilator-related pneumonia by 10 percent. Shorter lengths of stay in the ICU helped reduce costs by more than $3,000 per ICU patient through lower sedation use and faster mobility practices, and resulted in better long-term patient outcomes. Likewise, evidence-based guidelines for dealing with community-acquired pneumonia resulted in a 40 percent decline in mortality rates.

Introducing guidelines in Intermountain Healthcare hospitals and outpatient facilities about community-acquired pneumonia has resulted in a 40 percent decline in mortality rates.

An increase in the screening for bilirubin from 12 percent to 99 percent over three years has resulted in a significant decrease in the number of babies born at Intermountain Healthcare that develop hyperbilirubinemia and associated complications.

Rather than being one individual’s or one hospital’s responsibility, quality improvement is a system imperative at Intermountain that requires discipline, data-driven analysis and prioritization of key value-added processes. Intermountain found that 10 percent of clinical processes account for 90 percent of patient volumes. By focusing key improvement strategies on these clinical activities, Intermountain has been able to fundamentally improve the quality and cost of care with limited additional investments. It is estimated that Intermountain’s clinical teams reach 80 percent of its board and internal improvement goals, and that the variable costs savings resulting from the clinical integration strategy is four times the annual investment.

Intermountain’s leadership also believes that its clinical protocols and focus on data integrity can help the greater healthcare system as it increasingly exchanges healthcare data. Intermountain approaches this task by employing thought leaders in health informatics and examining what is best for the community at large. In many instances, the greater healthcare system can benefit from the lessons learned at Intermountain.

Challenges
Intermountain has faced a number of challenges over the years in deploying its quality improvement strategy. It has had to accommodate conflicting aspirations of different parts of the system, notably employed and non-employed providers, hospitals and insurers. It has also had to cope with an initial reluctance to use the electronic health record on the part of physicians and other clinicians, some of whom also feared that the use of protocols would interfere with their professional autonomy. More recently, Intermountain has had to deal with system deployment failures and development delays, and address “alert fatigue” caused by notifications and reminders.

While a system that addresses continuous quality improvement head-on faces many challenges (not least of which is misalignment of financial incentives), Intermountain’s leadership has demonstrated that consistency in direction and commitment can foster an organizational culture that provides a stable foundation for long-term success. The increased productivity and quality has helped many physicians overcome their concerns that the use of protocols comes at the cost of local and professional autonomy. Physicians approach these protocols as shared baselines that they can use to monitor and vary their own processes. Intermountain leadership hopes that the achievements of those physicians closely aligned with the system will help to encourage similar approaches by less closely affiliated physicians.

The future
Intermountain signed a contract with General Electric in 2005 to build a new clinical information platform for release in 2012. This will replace the existing HELP system infrastructure with a service-oriented architecture model that will better support Intermountain’s quality improvement strategy. Intermountain anticipates challenges in switching to a new enterprise system and is taking a phased approach to implementing the enterprise service bus (ESB) and new clinical applications. The aspirations of this new system include a rapid application development environment, dynamic workflow configuration adherence to standard data models and terminology, efficient decision support authoring and deployment, and effective information exchange both within and external to Intermountain. This new architecture and the custom clinical applications that leverage it are the cornerstone of Intermountain’s continued leadership in quality improvement.
What can we learn from Intermountain Healthcare?

Quality improvement is a process, not an event. Intermountain’s care models work by finding variations in processes, practices and outcomes, and drawing attention to them. By noticing patterns in variation, clinical leadership begins to inquire into their underlying causes, serving as the foundation for clinical process improvements. Intermountain has demonstrated that reducing variation through the use of clinical protocols improves quality of care and overall outcomes.

The aim defines the system. Information systems designed to monitor quality support comprehensive quality improvement strategies. By combining clinical data with administrative and financial data, Intermountain can codify knowledge and build it into clinical workflows. The emphasis on clinical decision support defines the structure of the information system.

Internal software development supports process models. Current commercial products do not effectively support intensive clinical process management and measurement. Using Intermountain’s own internally developed applications allows internal development teams to provide the necessary support and flexibility to enact rapid changes.

Engaging frontline staff fosters a culture of improvement. Intermountain has been extremely successful at maintaining a system-wide culture of improvement through intense engagement of frontline staff in evaluation, goal setting and protocol development. Based on this engagement in protocol development and refinement, users are convinced of protocol benefits and workflow alignment.

Information systems must be rapidly extensible. Intermountain’s improvement cycle is continual—the organization has reduced variation, refined protocols and regularly developed new measures of effectiveness. Flexible information systems and structure of the clinical management teams allow for agile development and focus on future growth.

Consistency of direction is key to successful IT deployment. Intermountain’s long-term strategy, driven by clinical goals, has been in place since the organization’s inception and has helped create a culture that was focused on using data collected from information systems to improve quality and cost.

Longitudinal patient data is essential to truly understanding outcomes. Despite the rich data within Intermountain’s information systems, there is also a need for the exchange and integration of longitudinal clinical data to support more accurate disease models.
Appendix: Case Studies

Transforming the quality of healthcare delivery through a common EHR

Kaiser Permanente

<table>
<thead>
<tr>
<th>Description</th>
<th>Nonprofit integrated health system</th>
</tr>
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<tbody>
<tr>
<td>Population served</td>
<td>9 million</td>
</tr>
<tr>
<td>Public Hospitals/Clinicians</td>
<td>36 hospitals; more than 450 medical offices; more than 15,000 physicians</td>
</tr>
<tr>
<td>Connected health vision</td>
<td>To transform care and service delivery—home as the hub</td>
</tr>
<tr>
<td>Key focus of initiative</td>
<td>Single organization-wide EHR and patient portal</td>
</tr>
<tr>
<td>Architecture</td>
<td>Centralized</td>
</tr>
<tr>
<td>Funding</td>
<td>Organizationally funded with $3 billion over 10 years</td>
</tr>
</tbody>
</table>

Founded in 1945, Kaiser Permanente is one of the largest integrated healthcare delivery organizations in the United States, serving more than 9 million members across eight regions: Northern California, Southern California, Northern Colorado, Southern Colorado, Georgia, Mid-Atlantic (Maryland, Virginia and Washington DC), Northwest (Oregon and Washington) and Ohio. Its care delivery encompasses a broad range of services including preventive care, well-baby and prenatal care, immunizations, emergency care, hospital and medical services, and ancillary services such as pharmacy, laboratory and radiology.

Kaiser consists of three organizational entities: Kaiser Foundation Health Plans (KFHP), which provide insurance coverage; Kaiser Foundation Hospitals (KFH) and their subsidiaries, which own and operate hospitals as well as medical centers and outpatient facilities; and eight regional, multispecialty, physician-owned Permanente Medical Groups (PMGs), which exclusively contract to provide medical services to KFHP members. Each medical group operates as an independent, separate, for-profit partnership or professional corporation in its individual region and receives nearly all of its funding from its respective KFHP. The hospital foundations are not-for-profit and rely on the KFHP for funding, and they provide infrastructure and facilities that benefit the PMGs.
Kaiser Permanente's approach to connected health

Kaiser has long been committed to improving clinical outcomes and patient safety through the development of evidence-based treatment guidelines and, historically, there has been a widely held belief among Kaiser leaders that the introduction of an enterprise-wide electronic health record (EHR) could assist in meeting these goals.

In 1999, Kaiser began to build a nationwide clinical information system (CIS), but the project was delayed, had failed to keep pace with developments in technology and ran over budget before it achieved widespread implementation. In addition, the CIS addressed only the outpatient medical office, rather than the whole enterprise. Meanwhile, Kaiser was facing increasing competition in the market and needed to take action to differentiate itself and improve competitiveness. The combination of these two factors created a perfect storm.

In 2002, George Halvorson, the organization’s new chairman and CEO, approved a major strategic investment in Kaiser’s future—a 10-year, $3 billion capital investment (which grew to more than $4 billion) to support the implementation, staffing, technical infrastructure, clinical/administrative training and ongoing maintenance required to build a common EHR for the enterprise. The development of KP HealthConnect™ was based on a desire to transform the overall quality of healthcare delivery across Kaiser, but was also part of a much broader strategy to build care around the patient and drive organizational excellence within a fiercely competitive market.

Before any final decisions were made about the technology, it was deemed essential to develop a shared organizational vision for healthcare in 2015 that would guide the development of KP HealthConnect™ and unite all leaders, clinical teams and system users around a common goal. The “Blue Sky Vision” described a future in which the true primary care provider is the patient and his or her network of family and friends. The vision also pictured the patient’s home as the hub of early diagnostics and service, with caregivers serving as facilitators and advisers on service options, clinical efficacy and cost considerations.

"The Blue Sky vision gave us a point of view on what we were trying to do with all this electronic information... The idea was to put the patient at the center of the care, recognizing home as the hub, and healthcare anywhere the patient is."

– Terhilda Garrido, VP Healthcare IT Transformation and Analytics

HealthConnect™ Goals: The Kaiser Promise

<table>
<thead>
<tr>
<th>Quality Our Patients Can Trust</th>
<th>Personal &amp; Convenient Service</th>
<th>Affordable Health Care</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High Quality</strong></td>
<td><strong>Personal</strong></td>
<td><strong>Affordable</strong></td>
</tr>
<tr>
<td>• We have clinical information available 24/7.</td>
<td>• We have and use up-to-date clinical, social and patient preference information.</td>
<td>• We reduce the cost of care and improve visit experiences.</td>
</tr>
<tr>
<td>• Our clinical outcomes are unsurpassed.</td>
<td>• We provide patients information for shared decision making.</td>
<td>• We eliminate waste associated with paper medical records and missing medical records.</td>
</tr>
<tr>
<td>• Our clinicians know in real-time the recommended best practices.</td>
<td>• We enhance personalized care.</td>
<td>• We eliminate costly in-person services unless medically necessary or desired by the patient.</td>
</tr>
<tr>
<td>• We are the national leaders in patient safety.</td>
<td><strong>Convenient</strong></td>
<td>• We streamline IT and administrative processes and costs.</td>
</tr>
<tr>
<td>• We enhance our research to support evidence-based care.</td>
<td>• Our patients access information via telephone, Web and email.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• We actively support our patients’ participation in their own care.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• We minimize wait times and out-of-pocket costs with efficient access to care.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• We achieve superior integration and continuity of care.</td>
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www.accenture.com/connectedhealthstudy
After the vision was created, leaders from the operational side of the organization then looked at the practical and actionable steps and technologies that would change processes and start moving Kaiser toward achieving the vision. Kaiser chose Epic Systems as the software vendor on the basis of its strong track record for implementation and partnering. Its full suite of products was closely aligned with Kaiser’s program strategy and business needs.

Once the technology was selected, hundreds of doctors, nurses, clinical experts, key business stakeholders and IT experts worked together to figure out how to customize the product for Kaiser’s specific needs and identify what features and functions could best serve its members. Beyond thinking about how the technology should work, these professionals and experts also helped change some of KP’s operational processes and procedures to make sure that the organization’s technology and services would work well together.

It was critical that KP HealthConnect™ be seen not as an IT project, but one that was jointly managed between operational leaders and the IT function. Once the national leadership team was in place, each region created its own project team, with senior leaders named as key sponsors to drive the implementation forward.

Halvorson laid down the challenge to implement the new EHR system in all eight regions within three years. The executive board gave HealthConnect™ much more than financial backing—it designated HealthConnect™ as the number one priority in the business plan for three years. This meant that executive compensation was tied to the achievement of development and deployment milestones. Progress was reported to the board quarterly, and progress against plan was a condition for other capital expenditures, such as new facilities. The journey, from the decision to implement, through pre-planning and implementation spanned approximately seven years.

### Key connected health initiatives

#### KP HealthConnect™ functionalities

KP HealthConnect™ was designed to provide instant and continuous real-time access to medical records for clinicians, patients and designated family members. It securely connects members’ medical records across both outpatient and inpatient settings, coordinating care between the physician’s office, the hospital, radiology, laboratory and the pharmacy, and linking with existing insurance and finance systems. KP HealthConnect™ also provides members with access to personal health records through the organization’s online member portal on kp.org.

KP HealthConnect™ includes the following broad suite of applications:

- Outpatient practice management (including billing, registration, check-in/scheduling).
- Outpatient clinical (including e-prescribing, test ordering and results, computerized physician order entry—CPOE—referrals and clinical documentation, such as history of medical visits).
- Inpatient billing.
- Inpatient pharmacy records.
- Inpatient administrative systems (including admissions, discharge, transfer and an emergency department tracker).
- Inpatient clinical (including clinical documentation, CPOE, as well as modules to support specific medical specialties).
- Pre-existing applications, including outpatient pharmacy systems, inpatient and outpatient lab systems, and radiology systems).

In addition to these core functionalities, KP developed evidence-based rules and documentation tools and embedded these in KP HealthConnect™, giving clinicians access to evidence-based recommendations and decision support at the point of care. These tools include medication-safety alerts, preventive-care reminders and online clinical guidelines. Clinicians from all specialties, disciplines and regions continually refine the clinical content that underpins these tools.

> "We have access to many more types of decision support than we did on paper. Now we all use order sets that are developed regionally with an evidence basis to guide people towards best practices... We have things like drug allergy alerting and drug interaction alerting, maximum dose alerting—and that all happens at the point of care, so when I enter an order I am warned about those things immediately. I do not have to wait for a pharmacist or a nurse to notice an issue and call me."

—Ben Broder, M.D., Ph.D., Kaiser Permanente SCAL, Systems Solutions and Deployment, Inpatient EMR Physician Lead

In addition to the basic KP HealthConnect™ system, there are several tools to help clinicians improve the effectiveness and efficiency of the care they provide.

KP involves clinicians from all specialties, disciplines and regions in the collection and ongoing refinement of the clinical content that underpins KP HealthConnect™. For example, through the Beacon Oncology initiative, oncology chiefs across all the regions saw an opportunity to come together for the first time and share information about protocols and clinical trials. They identified and standardized approximately 200 clinical protocols, which are made available at the point of care through Smart Tools, a set of tools that help clinicians streamline clinical
documentation and communication tasks. By tracking outcomes over time, they will build up a better evidence base for future enhancements to protocols, beyond what they could get through randomized clinical trials. So far, this has led to improvements in patient safety through fewer medication errors and better adherence to clinical protocols.

Some KP regions are using Panel Support Tools (PST), which enable clinicians to offer proactive—rather than reactive—care. Panel Support Tools sit alongside KP HealthConnect™ and combine KP's own clinical data with data from other systems (such as from hospital claims, ancillary tests and the membership system). A typical PST might combine clinical decision support functions, disease registries and continual performance feedback, allowing primary care teams to examine all care recommendations for individual patients, defined groups of patients or an entire panel. A report flags "care gaps" between evidence-based recommendations and delivered care, and calculates a monthly care performance rating for each provider team. The program has increased adherence to evidence-based care and improved outcomes for patients with a variety of chronic conditions. It has also enhanced continuity of care and reduced reliance on resource-intensive office visits.

Enabling patient self-management is an important part of KP's vision. To this end, an online portal, MyHealth Manager, allows members to view most parts of their medical records online, send secure messages to doctors, schedule or cancel appointments, request prescriptions, complete an online health risk assessment and receive customized feedback, access tailored behavior change programs, view health and drug information and manage their health benefits. Patients can view most lab test results online: in 2009, patients viewed more than 21 million lab test results using MyHealth Manager. Demonstrating the growing consumer interest in online health management, up to 80,000 members sign on to MyHealth Manager each month, and patients send more than 850,000 secure email messages each month to doctors and care teams. More than 3.3 million KP members are active users, and 41 percent of patient primary care contacts are now conducted via secure email messages or scheduled telephone calls (versus face-to-face visits).

### Optimizing the tools

Getting the technology platform in place across the whole organization was a huge achievement that provided the foundation for new and innovative approaches, but it was the commitment and enthusiasm of the people who used the system that would truly enable care transformation.

"Because of our model and our design, we have always made innovation a priority."

—Kaiser Permanente executive

The 21st Century Care Innovation Project supported the transformation of its primary care teams’ ability to improve patient care delivery and members’ experience, while also addressing workflow issues. Changes included:

- Understanding the needs of patient population: Designing work and building the care team to meet these needs by, for example, maximizing team roles and optimizing team communication.
- Developing relationship-based care and demonstrating that KP “knows” its members by, for example, convening member councils and completing after-visit summaries (AVS). The AVS produces a summary of medical information and latest visit instructions, and the patient receives a paper version of it at the end of each visit. It also becomes available in a secure online format.
- Providing alternatives to traditional office visits by, for example, offering telephone visits and group visits and using secure messaging.
- Creating total patient panel ownership by, for example, conducting outreach to patients with chronic conditions and following up with patients on new medicines.
- Engaging members in collaborative care planning by, for example, using goal sheets with diabetic patients or convening chronic care support groups.

In assessing the results of these changes, it was noted that most teams created some capacity through the replacement of office visits with more phone and email consultations. Physicians commented that they saw improvements in workflows, resulting from (1) being able to conduct consultations by phone without the need to see the patient and (2) optimizing workflow through care teams.

KP promotes cross-learning among sites and regions in many ways—innovation funds and awards, site visits, learning collaborations and workshops are just some examples. System-wide resources are available, such as those of the Care Management Institute, which convenes interregional working groups of clinical experts to develop evidence-based guidelines, tools such as health risk assessments and model care management programs, and investigates the causes of interregional variations to identify best practices for better patient outcomes. Local clinical champions receive resources and tools to educate and engage their colleagues in improving practice and outcomes for patients.

One of the key tools for operations leaders is the SmartBook for Value Realization and Optimization, an online, searchable collection of demonstrated best practices for quality, cost management, revenue enhancement and other potential benefits. As the organization learns from each region’s experience in using KP HealthConnect™, a small national team updates the SmartBook with new evidence of successful practices.
"It's not just about the technology. It's figuring out how to interpret the data.... There is a huge amount of analysis involved in determining which treatment is better.... The other issue is knowing what questions to even ask because there are a billion things one could ask and frame differently—it's sort of limitlessness.... But it is more than just having software in a box that you can pound on every day. It's the people, it's the process, it's the workflow, it's the support, it's all the people around it that really make the thing work, understand what it can do and then maximize its potential."

– Dr. Paul Minardi, M.D., Medical Director of Operations, Southern California Permanente Medical Group

**Challenges**

The aggressive timeframe and scale of the implementation of KP HealthConnect™ created a number of challenges. Prior to its implementation, KP had numerous disparate IT systems, limited standard data elements, expensive IT maintenance costs and largely paper-based medical records. The goal to move nine semi-autonomous entities—eight regions, each with their own strategies, budgets, culture, work processes and needs, and the national level organization—to a single system was a daunting one.

The move to a common IT platform required significant IT infrastructure upgrades, as well as a level of cross-regional collaboration that had not previously been seen. To accommodate this massive organizational change, flexibility was key to HealthConnect’s design and implementation across the eight regions. KP developed a common data structure and a core set of collaborative clinical content at the outset, while regions worked together to synchronize implementations according to their strategic priorities and operational constraints. This federated approach to IT infrastructure support is still in effect today.

As part of what was called the “collaborative build,” KP held design-build-validate sessions with national and regional teams to develop the baseline for the KP HealthConnect™ system. It also devoted significant resources to standardizing data formats and medical terminology across the eight regions, to ensure that KP could leverage the data to evaluate performance and identify best practices. Today, KP has a permanent national team—the Convergent Medical Terminology team—that continues to devote time and effort to improving terminology, which it subsequently makes available to the US government for wider use. KP established “communities of practice” comprising physicians, nurses, pharmacists and others, based on areas of specialty or care setting, developed clinical content and determined the degree of data standardization.

The conversion to KP HealthConnect™ also had a major impact on the day-to-day work of physicians, clinicians and other staff. Many found that the additional coding and documentation required to use KP HealthConnect™ took away time they had previously spent with patients, while some struggled with using the system itself. KP used a range of training tools at implementation and on an ongoing basis, including self-service training opportunities.

The transition was a culture shock for many, particularly those doctors who had been using paper records for 30 or 40 years. Some were more resistant to change than others and struggled to adapt their work practices to the new system. KP developed “Pathways to Proficiency” as a grassroots initiative that originated from a local physician who identified the problem. The KP HealthConnect™ optimization team became involved and helped to design the program, which identified clinicians who were struggling with the new EHR and new systems. These clinicians were brought in for a two-day course (mandatory for a few people), and Kaiser hired workflow experts to improve optimization, usability and time-efficiency. The coaching they received on using the system has helped to improve their proficiency and saves significant time in providing care in ambulatory settings.

"It is important not just to train people to use the system but to 'move the curve,' and by continually improving the standard of user ability, ensure the system’s utility is made full use of. It is important to identify those users who have been 'forgotten' and are falling behind and use programs like Pathway to Proficiency to get them up to speed."

– Ken Murtishaw, Southern California Regional Manager, Systems Solutions and Deployment, Kaiser Permanente

Over time, resistance was overcome and enthusiasm built as it became clear that KP HealthConnect™ offered the potential for better quality of care and because KP made the change as easy as possible. As an example, of the 6,000 physicians in the KP Northern California region, only two left because they could not adjust to the EHR.

Beyond moving from paper to electronic processes, KP did extensive examinations of workflows and care practices to optimize the care members received throughout the system. In the Southern California region, for example, having started to implement KP HealthConnect™ in ambulatory clinics, it was found that the tool had some gaps in addressing their particular needs. This led to a six-month halt in implementation, which allowed time to reconfigure workflows to optimize use of the system.
Impact and benefits

KP HealthConnect™ has enabled some standardization that brings much more information and evidence to bear on care delivery. Physician leaders report that access to the EHR in the consultation room is helping to promote compliance with evidence-based guidelines and treatment protocols, reduce medication errors, eliminate duplicate tests and enable physicians to handle multiple complaints more efficiently within one visit. Physicians have also seen workflow improvements from being able to conduct consultations by phone and through optimizing their workloads.

All KP regions have built clinical evidence and guidance into ordering and charting templates, such as “SmartSets” and “Order Sets.” All regions have also implemented both nonintrusive and intrusive alerts and advisories. The Northwest region in 2009, for example, had more than 70 custom medication safety alerts and more than 50 other safety-related advisories, mostly focused on recognizing high-risk diagnoses in the emergency department. Following implementation of alerts for high-risk drugs in the elderly, these prescriptions showed a sustained improvement of about 22 percent compared to baseline. A similar alert, triggered when the anti-nausea medication promethazine was prescribed in children under the age of two, reduced medication promethazine was prescribed in children under the age of two, reduced this hazardous event to essentially zero.

In KP’s multispecialty medical groups, physicians and other clinicians now share a vast clinical knowledge base that helps them practice physician-led team-based care (comprising physicians, clinical pharmacists, nurses, care managers, medical assistants, technicians and others), and in so doing improve patient outcomes and reduce costs.

Through the proactive office encounter program, clinical care teams work together to identify opportunities to engage patients and improve preventive and chronic care management across the continuum of services. For example, KP’s Southern California region is using electronic health information to improve disease screening and treatment rates, which lower long-term health costs by preventing or successfully managing problems. Along with other concurrent improvement initiatives, the proactive office encounter has contributed to a 30 percent increase in colon cancer screenings, an 11 percent increase in breast cancer screening, five percent increase in cervical cancer screening and a 13 percent improvement in cholesterol control. If the program continues to advance at its current rate, it is projected that it will help save 10,000 lives per decade.

Kaiser Permanente’s Northwest region carried out a study3 to monitor the impact of using a Panel Support Tool on primary care teams’ performance. Over 20 months, the study found that 207 teams increased their performance on 13 care recommendations by 7.1 percent. These care recommendations spanned therapeutic and monitoring needs in patients with heart failure, coronary artery disease (CAD) and diabetes, as well as routine preventive care.

Care teams in Colorado have tackled CAD by creating a new electronic care registry and support program called the Collaborative Cardiac Care Service. Through Collaborative Cardiac Care Service, every Kaiser Permanente Colorado patient with a history of CAD has been enrolled in the program for both short- and long-term care. The program involves physicians, nurses and pharmacists, using proven CAD risk-reduction strategies and working collaboratively with patients. It uses evidence-based guidelines and protocols, and coordinates lifestyle modification, medication management, patient education, laboratory results monitoring and adverse event management across a multifunctional team. The results: 76 percent reduction in overall mortality, 73 percent reduction in cardiac mortality, an estimated avoidance of 135 deaths and 260 costly emergency interventions annually, and approximately $30 million in annualized cost savings.

Another example of the use of population care tools is e-consults between primary care and specialty providers. The Hawaii region used e-monitoring and intervention by nephrologists in partnership with primary care teams to increase early intervention among those at risk for chronic kidney disease. Outcomes data indicate a 67 percent reduction in incidents of late referrals (four months prior to end-state renal disease).

Kaiser Permanente’s patient portal, MyHealthManager, has had a positive effect on use of services and patient engagement. A study in the Northwest region found that patient satisfaction with physician encounters increased after introducing the EHR and online portal. For example, three-quarters of online users surveyed agreed that the portal enables them to manage their healthcare effectively and makes interacting with the healthcare team more convenient.

Patients’ use of secure messaging service has also reduced the number of physician office visits and of appointment no-shows. A study in Hawaii found that between the implementation of KP HealthConnect™ in 2004 and 2007, office visits per member decreased 26.2 percent, while total scheduled telephone visits per member increased nearly 900 percent. Secure e-mail, which began in late 2005, increased nearly six-fold by 2007. The largest published study to date of secure messaging at KP found that those who use secure e-mail are 7 percent to 10 percent less likely to schedule routine office visits and make about 14 percent fewer phone contacts.

Members have embraced the use of secure email, and the positive impact has been gauged against certain healthcare effectiveness data and Information sets (HEDIS) as “effectiveness of care” measures, specifically for patients with diabetes, hypertension, or both. A study of 35,423 adult patients with those conditions in KP's Southern California region compared the rates at which nine HEDIS measures were met two months after patients began using secure email with providers. They observed 2.0 to 6.5 percent improvement on all nine measures. The association between use of email and HEDIS scores, as well as the reduction in primary care office visits from members using secure messaging, suggests that secure email can help improve individual care experiences and the health of populations while reducing per capita costs of care.

Many other examples of return on investment are clearly measurable: for instance, KP has seen huge reductions in dictation and printing costs, and in space previously needed for storing medical records. KP has also saved millions by retiring multiple legacy systems after the implementation of KP HealthConnect™.

Among its other benefits, KP HealthConnect™ has enabled a greater focus on performance measuring and reporting to improve quality of care and patient safety. Regions now generate a standard range of process and outcome measures at clinical department or even the individual clinician level. KP's periodic “Core Value Metrics” report, based on analyzing and interpreting the impact of EHR data on care delivery, has led to a number of improvements in KP HealthConnect™. For example, the “After Visit Summary” (AVS) produces a summary of medical information and visit instructions that are given to the patient and made available securely online. Polling data found that use of the AVS correlated strongly with patient adherence to treatment plans and patient satisfaction. Providers using the AVS score up to 14 points higher on patient satisfaction surveys.

Likewise, a performance quality dashboard (called “The Big Q”), which integrates a broad range of whole-system measures such as clinical quality, member satisfaction, patient safety and risk management into a single, comprehensive and easily understandable view, makes performance reporting easier and more transparent and has been a powerful catalyst for change.

Next steps for connected health at Kaiser Permanente
KP is continually looking to extend the functionality of KP HealthConnect™ and find new ways to realize more value from it. A national level team is tasked with strategic optimization. Some key areas of focus for KP in the future include:

- **Patient self-management**: KP sees a future of more sophisticated care in patients' homes. E-visits can work alongside in-home monitoring devices, making care more convenient and less costly. This will also enhance team-based care through more real-time virtual consults involving personal care physicians, specialists and allied health professionals. Intelligent Web-based questionnaires will help patients to manage their own health better in their homes.

- **Better use of clinical data**: Now that KP HealthConnect™ is fully implemented, research challenges are moving away from issues of data access and toward the mechanisms through which raw data can create meaningful clinical knowledge based on rigorous research. Future priorities include:
  - Getting more data out of the system to compare best practices: For example, using natural language processing (extracting data for analysis from free text entries to the EHR), NLP will provide an automated method to unleash the potential value of 50 percent of information within KP HealthConnect™ that is unencoded
  - Enhancements in decision support: There continues to be a lot of room for evolution in decision support as more data becomes available for developing evidence-based protocols. Though regions have separate databases, creating a virtual data warehouse will facilitate information exchange and expand capabilities of secondary data use.

- **Genomics and personalized medicine**: In Northern California, Kaiser Permanente's Research Program on Genes, Environment and Health (RPGEH) is assembling one of the world's largest “biobanks” of genetic, environmental, and health data. The biobank—which is working on DNA data from approximately 400,000 volunteers—will enable research to determine which genes and environmental factors, and lifestyles and habits, are linked to specific diseases such as heart disease, diabetes, cancer, asthma, mental health disorders and others. The findings will increase the health system's ability not only to diagnose illnesses and deliver the best possible treatments, but also to prevent people from becoming ill in the first place.

"I feel like we are just on the verge of really starting to take advantage of some of the long-term benefits. The data is a goldmine, and that portends for our ability to contribute to clinical knowledge to improve guidelines, protocols [and] improved operations."

—Terhilda Garrido, VP Healthcare IT Transformation and Analytics

- **Health information exchange within and beyond Kaiser**: Today, there is the possibility of accessing members' records across KP's regions, and there is likely to be more sharing of information in the future. Kaiser Permanente also successfully shares data with the Veterans' Administration in San Diego and Hampton Roads, Virginia, and is expanding that work to include the U.S. Department of Defense. It is also a founding member
of the Care Connectivity Consortium, which brings together both the latest technology and a shared mission among five provider organizations to deliver patient-centered care to patients, using standards-based healthcare IT to share data about patients electronically.

- **Performance measurement and reporting:** One of the most valuable tools for driving change and value realization is KP's periodic "Core Value Metrics" report, based on analyzing and interpreting the impact of EHR data on care delivery. This kind of tracking has led to a number of improvements in KP HealthConnect™ and Big Q, the new performance dashboard.

- **Improvements in care delivery/workflows:** There will be more work to analyze operational metrics to improve the efficiency of the system. For example, the Hospital "air traffic control" system will use data in KP HealthConnect™ to improve the flow of patients through hospitals and emergency departments. This will help ensure more efficient handoffs between clinicians, real-time information about bed demand and capacity, better scheduling of personnel, improving overall care coordination and enabling more efficient use of people's time.

What can we learn from Kaiser Permanente?

**Strong leaders at the top must have a clear vision about “why we are doing this.”** KP started with the idea of improving the quality of care delivery. The Blue Sky Vision created a future conception of the implementation and use of KP HealthConnect™, and it united leaders, teams and users alike around a common goal.

**Clinician involvement is critical in designing the system.** For the KP HealthConnect™ implementation, doctors, nurses and clinical experts worked with key business leaders and IT experts for months to figure out what the system needed to best serve its members. Collaboration between clinical professionals and management is particularly essential to establish successful process for learning from both successes and challenges.

A culture of continual innovation and performance improvement. Building infrastructure for performance improvement and innovation created focus and capability for value realization. Developing rigorous tracking and evaluation processes enabled KP to develop, identify and adopt innovations and effective new practices from the very beginning. Operational leadership is essential.

Flexibility and innovation at the local level is essential. KP was successful in reaching a balance between a nationally mandated initiative and the need to allow for local flexibility, experimentation and innovation. The result is that health teams are able to take a more active role in healthcare delivery improvement and system reconfiguration, such as in a recent kidney treatment project in Hawaii that reduced late specialist referrals by two-thirds as a result of early intervention from kidney specialists.

The application of analytics plays a key role in value optimization. Identifying further needs for change, especially to clinical practice, requires strong local governance, collaboration between professionals and between professionals and management, and a coordinated process for learning from both successes and challenges. Advances in clinical decision support will be key to value realization.

Alignment of incentives is critical. The integration of finance and care delivery services creates the ability to allocate resources where needed to achieve the best health outcomes for the patient. KP's pre-paid payment model and integrated structure place as much emphasis on keeping people healthy as it does on providing treatment for members when they are ill.

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Practice changes culture. The implementation of KP HealthConnect™ gave KP an opportunity to develop a new way of working together, which changed the semi-autonomous regions into sharing, learning partners linked by technology but, more important, by trust and a shared mission—resulting in more effective and efficient service delivery to patients.
In 1999 the region of Lombardia, in the north of Italy, began a concentrated effort to develop a robust infrastructure for healthcare IT and health information exchange (HIE). Lombardia’s reforms aim to move the region toward a new model of patient-centered services, tailored to citizens and oriented to a better integration of the healthcare service with an emphasis on health promotion.

The strategy centered around introducing and deploying a “Carta Regionale dei Servizi della Lombardia” (CRS), a smartcard giving access to patient information, and the development of the Sistema Informativo Socio Sanitario (SISS), which connects all healthcare providers into a single information system. Together, these are referred to as the CRS–SISS.

<table>
<thead>
<tr>
<th>Description</th>
<th>Regional health system (70 percent public)</th>
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<tr>
<td>Population served</td>
<td>10 million</td>
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<tr>
<td>Public Hospitals/Clinicians</td>
<td>15 local health authorities; 29 hospitals; five medical research institutes; 7,900 clinicians</td>
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<tr>
<td>Connected health vision</td>
<td>Improve quality of healthcare provision and services to citizens</td>
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<tr>
<td>Key focus of initiative</td>
<td>Local EMR systems linked over SISS network</td>
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<tr>
<td>Architecture</td>
<td>Federated model, integrating existing systems</td>
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<td>Funding</td>
<td>Public funding, 2 percent of €17 billion budget spent on IT</td>
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Lombardia’s approach to connected health
Using the backbone of CRS–SISS, Regione Lombardia’s overall objective is to promote information sharing and exchange among healthcare providers and professionals to improve quality of care and services to citizens. The aim is to simplify procedures, reduce wait times and improve quality by sharing clinical data among healthcare professionals. This includes improving healthcare providers’ internal processes through the use of healthcare IT. CRS–SISS also makes information available at an analytical level to monitor healthcare quality and expenditures and support administrative processes, enabling better planning at the regional level.

SISS is a modular system allowing all existing local systems and technology to be progressively integrated over time. This “non-invasive” approach respects the independence of existing hospital information systems and sets out to integrate rather than replace them. The result is a federated model enabling information sharing and exchange. The responsibility for the quality of data shared throughout the network remains with healthcare providers.

The SISS health information network works through a virtual private network (VPN) operating at three levels of architecture: the regional central data “warehouse,” the databases of the local health information systems where the health information is stored and an integration “middleware” which allows them to be connected. Using information contained in electronic health records (EHR), the data warehouse also enables data analysis for administrative purposes such as healthcare planning, resource planning and epidemiological analysis.

The main principles on which the project is built include the use of Web technologies, the integration rather than replacement of legacy applications, strict enforcement of data protection, security and privacy, usability, minimal disruption of daily activities and large-scale deployment of digital signature and election documents.

Lombardia employed several strategies to encourage adoption, including financial incentives and legislation. From 2003 to 2004, GPs and pharmacists received financial incentives for actively using SISS by feeding it with data and promoting it with their patients. Additionally, a regional law in 2007 made participation in SISS mandatory (with minor exceptions) for the public sector.

Health information exchange infrastructure design
Key connected health initiatives

The regional government, Regione Lombardia, sets the e-health strategy for the area, oversees the organizations tasked with executing it and determines the allocation of funding. It has entrusted the design and execution of CRS–SISS and the maintenance of the existing systems to Lombardia Informatica, a publicly owned IT service company. Founded in 1981, Lombardia Informatica’s sole client is Regione Lombardia, which both appoints Lombardia Informatica’s top management and defines its mission in accordance with the e-health strategy. In the last few years, the company’s focus has shifted from direct delivery of services to program management as it subcontracts direct services to other Italian companies.

The CRS–SISS project has been the main thrust of HIE in the region over the last decade. Following a feasibility analysis in 1999, the project began with a pilot of the SISS network in the sub-region of Lecco. A positive evaluation led to the rollout of the SISS network across the rest of Lombardia between 2003 and 2009. By 2005, the majority of the public sector regions was connected and expansion to the private sector began.

The CRS–SISS project included deploying an electronic identification system (CRS) using smartcards that allow access to the network for both citizens and healthcare providers. There are two types of smartcards, one for the citizen that serves as identification and authentication, allows access to public administration services and certifies the presence of the citizen at a healthcare delivery location. A health professional’s card authorizes providers to access the SISS network and serves as their electronic signature, which must be used on all documents made available to the SISS.

Health professionals connected to SISS have access to a variety of reports complementing the information in their local patient record systems with information from other providers, pharmacies and hospitals. Documents such as outpatient reports, letters of discharge, lab results, referrals and e-prescriptions are published to the SISS network, and the original remains in the relevant provider’s own electronic patient record system. SISS storage and indexing service allows the complete clinical history of each Lombardia citizen to be kept updated and available to all regional hospitals and health professionals.

Prescriptions are the vehicle through which citizens are able to access specialty referrals, labs, diagnostic tests and any other healthcare service not provided by their GP. All prescriptions for medications and services in Lombardia are created, sent and electronically signed through the SISS (although national level legislation also requires a paper prescription be given to patients.)

Additionally, SISS includes an e-booking system that citizens can access online or by phone to schedule diagnostic tests or visits with a specialist. This automated system greatly reduces the number of redundant appointments and “no shows.”

Citizens must give their initial consent for any of their information to be available through the SISS. Once they provide this, their regional EHR is created and can be accessed by healthcare professionals and—to a certain extent—by the patients themselves. GPs can access their patients’ EHR data at any time. Authorized healthcare professionals at hospitals, by contrast, normally need the patient’s card whenever they wish to view the documents available in other providers’ EHR systems. Citizens have the power to give or block access by some or all healthcare professionals to all or part of the information in their record.

Regione Lombardia has also developed pathology networks supported by the data and exchange capabilities of SISS. The networks gather data to obtain an in-depth study of the pathology, to define better care paths and compare different treatments. The providers participating in the networks exchange chart data and lab results in an attempt to build their evidence bases. They work on developing guidelines of care and protocols and determining what data need to be in SISS to continue gathering evidence.
Impact and benefits
SISS affects all public healthcare services in Lombardia—from primary care at GP practices to inpatient and outpatient secondary care at specialist practices and hospitals. As of August 2010, about 80 percent of the 350 private healthcare providers in the region were connected to SISS, as were all 2,500 pharmacies.

Currently, the system covers referrals from primary care physicians to hospitals, laboratory tests, drug prescriptions and dispensing and access to patient information in emergency situations. For patients, SISS also makes it easier to access services and schedule appointments. Over the last few years, use of SISS has steadily increased with the number of prescriptions entered electronically increasing almost five-fold from 2004 to 2007, while SISS transactions rose from a few million a year in 2003 to more than 100 million in 2009.

The main benefits so far have been in data sharing and e-booking. Data sharing renders safer healthcare provision, especially in cases where patients do not bring their referrals or discharge letters. It allows healthcare providers to validate data and counter-check test results, prepare for consultations and help create new healthcare models, while saving time and increasing productivity. E-booking fosters health provider organizations’ resource planning and allocation, saves time and travel costs and makes scheduling far more convenient for patients.

Pathology networks provide additional benefit through a forum for expert sharing and development of clinical best practices. There is the potential to improve healthcare quality across the entire region through widespread use of the guidelines for care that these networks develop. If a significant number of providers use these guidelines, the result will be increased consistency in care and evidence-based medicine.

It is estimated that the total investment in SISS over 10 years was between €800 million and €1 billion. A 2010 EHR impact study, conducted by Emperica Communication and Technology Research and Tanjent Consultancy, found an overall positive socio-economic impact of the SISS health information platform over 10 years. In 2007, about five years into SISS, the program first started realizing net benefits. After temporary accelerated growth in 2007 and 2008, annual net benefits reached a sustainable and stable level. In 2010, cumulative net benefits were about €143 million.

Another study conducted in 2009 jointly by Politecnico di Milano and Bocconi University revealed a savings of 2 percent a year on the region’s health expenditures. These savings are expected to grow in the years to come. The savings are calculated as direct and non direct savings on the full health value chain—from region to local health providers and GPs—and are due to better control of the expenses, higher productivity, process efficiency and resource optimization.

Challenges
Implementing the region-wide infrastructure for CRS–SISS was not without challenges. The experience of more than 12 years of implementation, maintenance and continued development is also a rich source of lessons for HIE and advanced use of health information data.

Some aspects of Italian privacy measures are so stringent there is a feeling that they may actually hinder advancement. Patients have to opt in to the system and must authorize every access of their data other than by their own GP. National privacy laws also limit the government’s ability to use the data in SISS for research purposes.

Choosing an approach that allowed each hospital and GP office to keep their existing IT systems created tremendous need for integration and interoperability of systems requiring a significant amount of Lombardia Informatica’s technical assistance and personnel time. There were approximately 30 different systems in place in GP offices, some of which were being used by as few as two or three practices. GPs, in particular, often found it difficult to keep up with the necessary technology. Since 2004 the regional government has required GPs to use systems that are certified and compliant with SISS, and they are working on expanding this requirement to labs, clinics and hospitals.

Although almost all providers are now integrated with the SISS network, many of them do not use the system to the extent they might. Some providers only use it to view patients’ lab results. Also, it is estimated that only 50 to 60 percent of citizens have given their initial consent to make their information available. Many don’t even know what their smartcard is or what services are available through SISS.

Regione Lombardia and its healthcare providers have been able to analyze administrative data in SISS to leverage improvements and changes in its delivery system. Unfortunately, the same type of analysis has not been realized with clinical data, in large part because the data is unstructured—usually in static PDF documents. Pathology networks already exchange documents based on structured data, however, and five of the larger hospital labs in the region are conducting a pilot for exchanging structured data. Structured data requires coding standards. Regione Lombardia wanted to execute a regional strategy for coding sooner but has run into roadblocks including sub-regional strategies for coding, the need to use the Italy-wide official standard (the "national price list") rather than its own preference, individual hospitals’ systems coding practices and European standards.

The smartcard initially was an important enabler of the success of SISS but now seems to be a limiting factor. Currently, the card has to be used in a reader, and most citizens do not have a reader in their homes. Personal records can only be accessed at locations where a reader
is available such as pharmacies. While there is a desire to increase patient access to health records to help them manage their own health and wellbeing, this is being held back by the reliance on the smartcard technology. Lombardia Informatica is now working with its partners to explore other options such as password authentication or use of mobile phones for authentication.

Next steps for connected health in Lombardia

For many years, the regional e-health strategy was almost exclusively focused on the SISS infrastructure, but it is increasingly expanding to encompass broader e-health goals. For the near future, the goal is to finish the complete rollout of the system and its integration with the private sector. Going forward, there are plans to enhance the extent of the health data and EHR records and use structured formats so that more advanced use and analysis of the data will be possible. Moving to structured data and the use of common standards are important priorities.

The challenge will be to leverage the large amount of data available through SISS to improve healthcare clinical quality and cost. Lombardia is still in the early stages of using the clinical data in SISS for research and clinical decision support, which both rely on the successful transition to structured data. Achieving clinical decision support functions is particularly important because most GPs’ individual systems are very simple and do not provide them with registry, reminder or other support functions.

Lombardia Informatica is working on determining an alternative to the current smartcard to help create opportunities for citizens to engage more in their own healthcare. Addressing this issue will help in the development of a “personal zone” for citizens to view the information in the EHR and add personal information to it if they wish.

What can we learn from Lombardia?

There are a number of lessons healthcare professionals and policymakers can take away from Lombardia’s model of connected health:

**Consistent leadership and organizational stability are vital.** They are necessary to maintain the consistent vision, direction and objectives that are the hallmark of successful connected health programs. Lombardia Informatica appears to be a strong and stable institution that maintains a sense of purpose, core value frameworks and commitment to long-term improvement. A stable political leadership also enables long-term perspectives and consistent investment to be maintained.

The exchange of unstructured clinical data can offer benefits. Although Lombardia is not in a position yet to make good use of structured data, its focus on awareness, access and efficient exchange of largely unstructured data has enabled it to realize many first order benefits of information exchange without having to address some of the more complex issues surrounding data standardization and codification.

**Some privacy and security requirements can be burdensome.** Complex and sometimes conflicting laws governing the privacy and security of healthcare data has significantly hampered the effectiveness of exchange in Lombardia.

Federated exchange models have costs as well as benefits. Because Lombardia decided to approach data exchange by allowing providers to keep their existing IT systems, considerable technical assistance had to be given to help set up and maintain data connections. It was expensive to develop complex interface engines capable of finding and exchanging data among different products and data stores. On the other hand, this approach reduces the disruption of widespread system replacement and fosters decentralized data maintenance.

Evaluate whether solutions will be able to accommodate future needs. Predicting the extensibility of architectures is quite complex, and it is rare to find one that will still be effective a decade down the line. The smartcard provided a clear answer to issues of patient identification and consent, and therefore enabled much of the progress in the region over the last decade. Now, however, it is proving to be a hindrance to the future of the program and needs to be replaced with an updated mechanism.
Spain has a high-quality healthcare system providing citizens with universal coverage that is normally free at the point of use. Spain’s decentralized political system means that each of its 17 regions— “autonomous communities” (ACs)—has its own governmental structure and regional health service. Although there is a national health service (NHS), the planning and provision of healthcare—including connected health—is the responsibility of regional ministries of health.

A European leader in e-health, Spain’s best performing regions—including Madrid—have embraced paperless working, health information exchange (HIE) and patient engagement.
Madrid’s approach to connected health

Spain’s central government takes an oversight role, setting broad public health plans, national standards and pharmaceutical policy, promoting intra- and inter-region interoperability and ensuring consistency of training, regulation and quality control. The national Ministry of Health’s policy framework is based on the 2006 SNS Quality Plan and the national Plan Avanza—a five-year, €5.7 billion strategy for developing digital government and public services. The plan’s objectives range from the dissemination of healthcare IT strategies across welfare and public services to specifically targeting healthcare IT as an opportunity to promote connected health.

Madrid’s healthcare IT adoption is relatively high in both national and European terms. Almost all primary care facilities use an electronic health record (EHR), e-prescription is increasingly common and digital information sharing is widespread. Many hospitals have their own electronic medical record (EMR) system, and some are now entirely paperless.

To guide implementation nationally, the ministry has employed a strategy of building on the information systems already in place rather than trying to overlay them with top-down prescribed systems. In this way, it has facilitated better health information exchange (HIE) without having to re-engineer existing primary care or hospital information systems within the region. The strategic change management dynamic is particularly important: Madrid has been able to focus on manageable targets and develop its own tailored HIE infrastructures to improve access and make services more responsive to people’s needs.

Key connected health initiatives

Two key programs have supported Madrid’s journey to connected health: CESUS, an integrated healthcare IT back-office and performance management system, and HORUS, an HIE tool for the region. CESUS provides what one expert called “the muscle”—the back-office functionality, process management and technical support for a complex system of primary and specialist healthcare. HORUS is the specific tool for connected health, allowing health professionals to share structured and unstructured healthcare information across a range of institutions.

Madrid chose to outsource both programs, and Accenture has been involved in their development and deployment.

The starting point for these programs was political: a “freedom of choice” policy of allowing Madrid’s citizens to choose their own doctor or nurse in primary care or hospitals. For this policy to work, professionals need to be able to share ways of identifying patients and need quick access to essential health information. This helps to avoid duplication and thereby reduces costs, but also improves quality and patient satisfaction. Connected health became the key means to achieve the “freedom of choice” policy, with CESUS and HORUS, two complementary sides to Madrid’s approach.

CESUS was established to meet the ministry’s vision for an integrated center that would “not only provide comprehensive technology and system management services, but also facilitate the availability and security of information for Madrid’s healthcare professionals.”

"CESUS is contributing substantially to the authority’s goal of developing a healthcare system that is more accessible, of a higher quality and capable of responding more rapidly to citizens’ needs.”

Run through a central IT center, CESUS provides the means to look holistically across the system and develop appropriate IT functionality and processes. It provides end-user support for almost 16,000 hardware elements, 340 servers and 179 health centers. It proactively supports system management, including remote connection to PCs in health facilities, as well as IT process management and software procurement and distribution. The SEGECA change management software it uses oversees the whole Madrid health system, allowing CESUS to be responsive to clinical leadership and monitor the impact of new systems and functionalities.

Outsourcing its IT capacity in an integrated way has brought demonstrable results. Since its establishment, the CESUS call center has resolved more than 750,000 incidents, greatly improving IT service levels in areas such as responsiveness and efficiency.

The second program, HORUS—the region’s “integrated clinical information viewer”—is the key driver of information-sharing in the region, providing clinicians with a means of access to patient data from primary and specialist care settings.

“Through the system HORUS, in the community of Madrid, with the proper authorization given by the patient, physicians can access the basic clinical records of patients, at any of the centers, including hospitals.”

2Accenture (2011) “Helping the Madrid Health Authority Improve Patient Care through IT Outsourcing”

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HORUS does not contain data and information. Rather, it is a viewer that facilitates access to information—both structured and unstructured—from a range of care settings that already exist, and it presents it in an integrated way to allow rapid access.

Key information available through HORUS includes:

- EHR from primary care settings.
- Stored clinical discharge reports from hospital information systems.
- Digitized documents from hospitals.

Most data that comes from primary care facilities is structured via a localized version of Spanish-developed OMI-AP and AP-Madrid software—and HORUS can recognize and integrate this data into its digital front page.

Data from specialist care settings, on the other hand, is unstructured, largely comprising patient discharge reports in PDF format.

“Even if the hospital has no health information system ... they always write a discharge report. We can digitize this, and you will see the information in HORUS.”

HORUS itself does not hold the health data—it recovers information from different proprietary systems. This includes administrative and demographic information and clinical information (vaccinations, medication, allergies and so on) from 258 primary care systems, paper records (which it digitizes) and electronic reports and episodes from the information systems of 28 hospitals. Figure 1 illustrates this.

Accountability and security safeguards for the proper use of patients’ health data are built into HORUS. Clinicians will have free access to their patients' data on the system, although patients are able to request that some of the data be partially deleted or hidden. Others who wish to access the system must justify their use of it, and cannot override system safeguards. All use of HORUS is tracked, so auditors can monitor who has accessed particular records and assess any inappropriate usage.

HORUS is the central element of a suite of connected health-related initiatives in Madrid, and, as the program develops, can be expected to integrate with these even further. One of these initiatives is the Scientific Social Network initiative.

Figure 1: How HORUS centralizes and shares information. CIBELES is the national "master patient index" being developed by the central Ministry of Health, into which basic information from HORUS is also integrated.
Madrid's scientific social networking pilot

SaludMadrid is currently piloting a "scientific social network" (SSN) initiative at the Gregorio Marañón University General Hospital. A collaborative Web platform allows cancer care specialists to share knowledge, collaborate and present and review cases online to the network.

The aims of the project are to provide better care management, reduce duplication of lab tests, reduce hospital wait times and improve clinical workflows. In the medium term, the aim is to integrate the initiative with existing picture archiving and communication and EHR systems.

Challenges

Europe's fiscal crisis will inevitably have an impact on the climate for connected health. Madrid is in a relatively strong position, having already implemented HORUS and CESUS as a consolidated back-office able to squeeze more from existing providers. Nevertheless, the experts we spoke to expected very little investment in new systems and technologies in the near future. One area where this is particularly significant is in the use of analytics, which is not currently used systematically and would require significant investment across the system as well as a shift in organizational and clinical cultures.

The other area where reduced investment will inevitably make a bite concerns the need to connect up regional systems and to prioritize national and European standards for interoperability. Dealing with these issues is now a national priority. They are being addressed, although the lack of long-term thinking at the investment stage—perhaps the inevitable result of a tradeoff between regional flexibility and national system homogeneity—is hampering progress.

Citizen participation is also a challenge. The region's connected health infrastructure (and HORUS in particular) has been developed in continual consultation with medical professionals, but citizens cannot access the information and are currently unaware of developments in information sharing. Nor has the potential in areas such as remote care, interactive health "games" or "apps" been fully explored. On the other hand, remote, automated primary healthcare appointment booking and e-prescriptions are widespread and proving successful.

Impact and benefits

HORUS is still in its early stages, so no comprehensive evaluation yet exists. Nor is one likely at this early point in the project or within the current economic climate.

However, early system feedback shows that usage has increased dramatically since startup, with more than 90,000 documents and 86,000 patient records viewed between December 2010 and June 2011. It is clear that clinicians are using HORUS for a variety of data, but some types—such as radiology images—are more frequently viewed than others.

Positive clinical outcomes for physicians and for policymakers from HORUS and CESUS are only indicative at this stage. Officials have quantified a range of savings from CESUS in financial terms, but the impact of greater administrative efficiency on healthcare delivery and outcomes has yet to be systematically explored. Nevertheless, emerging benefits in patient administration are clear—for instance in the proportion of primary care appointments being administered by telephone or online.

Across Spain's regions, there is broad acceptance of the value of connected health, and hard evidence (from EU impact studies, for example) of the benefits of HIE, e-prescribing, digital imaging and online citizen interactivity. This, combined with the relative pragmatism and affordability of the HORUS program, suggest that Madrid's model of connected health provides useful lessons for other countries.
Next steps for connected health in Madrid

The future for connected health in Madrid and, more broadly, in Spain will be contingent upon the country’s macroeconomic climate. In the medium to long term, two dynamics will be key.

First, HORUS will continue to encourage integration of the Madrid health system by offering a citizen portal, albeit a limited one, incrementally extending physician interactivity with the system and digitizing more hospital discharge records. Thus, the “integration drives integration” dynamic will come into play over the long term.

Second, efforts at a national and European level will continue to improve information exchange across the Spanish NHS. For example, HORUS is already compatible with HCDSNS—the digital clinical history for the NHS—and uses central ministry standards for data management. At the European level, meanwhile, EpSOS (the EU’s pan-European HIE initiative) is involving HCDSNS and several Spanish regions, including Madrid.

The HORUS infrastructure itself will continue to develop in response to the needs of its users. Interviewees talked about integrated functionality with hospital viewers, other existing portals and laboratory information systems. There are also plans for tools for other users such as hospital admissions services, emergency care providers and epidemiologists.

What can we learn from Madrid?

Connected health is a means to an end. In Madrid, the key driver for developing CESUS and HORUS was the “freedom of choice” policy. This political impetus meant that connected health became the means, not the ends—which is an essential part of building a business case around improved access, quality and cost control. Trust between political, administrative and clinical partners matters over the long term, but especially in the early stages when it is harder to visualize the likely impact of a program.

"If they didn’t have [the political will], the project would have taken years more.”

Stakeholder engagement throughout the process is critical. Madrid’s connected health journey shows how a strong vision, good communication and a strategic approach to change management and behavioral change can drive real developments. HORUS demonstrates the importance of the starting point and context, and of generating clinical and political buy-in.

Engagement with those clinicians and policymakers who will use the system—and communicate its benefits to others—has been a key part of the process. The system has been designed to continually incorporate clinical feedback about people’s preferences and issues. Trust between stakeholders is always vital.

"HORUS hasn’t experienced much resistance to change [because] from the beginning, doctors have been integrated into its development. So they feel HORUS is their own system.”

Building on existing systems can help drive progress. Fundamental system redesign or re-configuration is not always necessary: interviewees stressed that HORUS has succeeded because it builds on and works with the grain of what already exists. If integration is itself the driver of innovation within closed health systems, then Madrid has the potential to control escalating costs, maintain citizen access and improve the quality of care in the future.

HORUS may be a limited HIE system that currently lacks interactivity, but it was relatively quick and inexpensive to establish, does what it is meant to do and is driving further integration and HIE.

A consistent and committed internal team is key to progress. HORUS has succeeded because of hard work at the outset and from a committed team throughout. The Madrid case shows the value of a consistent back-office team, which understands the connected health impact across the system and how new technologies can drive further integration.

"The [behind the scenes] work in the early stages is important—building the databases, getting the hardware right, understanding how to link the systems….."
Securing Health for Remote Patients through Telemedicine
Midi-Pyrénées, France

<table>
<thead>
<tr>
<th>Description</th>
<th>Regional health system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population served</td>
<td>2.5 million</td>
</tr>
<tr>
<td>Public Hospitals/Clinicians</td>
<td>More than 24,000 healthcare establishments; more than 74,000 salaried employees</td>
</tr>
<tr>
<td>Connected health vision</td>
<td>Providing all patients access to high-quality healthcare, regardless of location</td>
</tr>
<tr>
<td>Key focus of initiative</td>
<td>Telemedicine; DMP (full rollout began in 2011)</td>
</tr>
<tr>
<td>Architecture</td>
<td>Regionalized, with some national enablers</td>
</tr>
<tr>
<td>Funding</td>
<td>The GCS Télésanté Midi-Pyrénées operating budget for 2011 (8 months) is €3.5 million, and the investment budget is €1.6 million. Approximately 93 percent of the budget is from public funds. The rest is covered by members.</td>
</tr>
</tbody>
</table>

There are approximately 2.5 million residents in the Midi-Pyrénées region of France, and about half of them live in the regional capital, Toulouse. The rest of the region is sparsely populated, with densities ranging from 12 to 60 inhabitants per square kilometer, a figure among the lowest in Western Europe.

The disparity in the population density contributes to an unequal distribution of providers. Furthermore, there is a general shortage of physicians, particularly in certain specialties, and an increasing “hyper-specialization” of private physicians. For these reasons, healthcare resources outside of major medical centers, in isolated or remote areas, as well as in suburbs and prisons, are often scarce. Telemedicine emerged as a solution, especially for patients who needed specialty care from physicians who were unable or unwilling to travel or relocate to sparsely populated areas.
The Midi-Pyrénées approach to connected health

Each region of France has its own regional health agency (ARS) charged with implementing the system's electronic health record, the Dossier Médical Personnel (DMP) and other healthcare IT initiatives. As part of the Hôpital 2012 plan, each ARS manages a pool of money it receives from the national level. From its pool, ARS Midi-Pyrénées provides grants to regional public and private hospitals to develop healthcare IT systems. Going forward, hospitals will not receive funds until they have demonstrated a certain level of use of the developed healthcare IT systems.

Regional plans consist of three schemas and were expected to be released in late 2011. The three schemas are organization of health (hospital and ambulatory care), medical-social organizations (elderly/handicapped) and prevention. Each schema has objectives associated with it, which correspond to programs and are broken down into specific actions.

Aspects of telemedicine cut across all three of the schemas to address the digital hospital program, medical-social strategies, the DMP and secure messaging strategies. Together, the schema will comprise the five-year roadmap for healthcare IT and will reflect regional needs and policies, as well as the national plan. In addition, the telemedicine program will determine metrics to measure the effectiveness of healthcare IT programs.

Key connected health initiatives

In 1968, the Service d'Aide Medical d'Urgence (SAMU) and the Service Mobile d'Urgence et Reanimation (SAMUR) created the framework that enabled telemedicine in France to advance to where it is today. While these organizations did not regulate telemedicine, by 1970, 15 regional health centers were electronically interconnected.

Video conferencing is the backbone of regional telemedicine initiatives, serving as the primary mode of providing teleconsultations. Picture archiving and communication systems (PACS) have also been introduced in the region. Doctors commonly use PACS, for example, to remotely review X-rays as part of a prison tuberculosis-screening program.

The DMP is a national Web-based personal health record (PHR) system intended to improve care delivery and patient safety. It has been piloted in some regions of the country, and full rollout began this year. In the DMP, health professionals may only view authorized areas of a patient’s record pertaining to care and relevant professional interests.

The Agence Nationale des Systèmes d’Information Partagés de Santé (ASIP Santé) administers the DMP. The National Agency for Shared Health Information Systems (formerly the Groupement de Coopération Sanitaire) administers the DMP. The National Agency for Shared Health Information Systems (formerly the Groupement de Coopération Sanitaire) administers the DMP.

Medim@il is a secure messaging system used regionally. It is a commercial off-the-shelf product and is not integrated into the DMP. The system was implemented three years ago, and has been moderately well adopted, with approximately 1,000 to 1,500 medical professionals using it.

The Vitale-2 smartcard is a patient card that contains a user photograph, insurance information specific to the patient and a secure patient identifier. The card also allows patients’ control over access to their records, as it is required to grant access to the DMP. The Carte de Professionnel de Santé (CPS card) is the electronic ID card for clinicians which authorizes access to various levels of the DMP.

CHU Toulouse (Toulouse University Hospital) has been a cornerstone of telemedicine and e-health, serving France's largest metropolitan region. From here, the European Institute of Telemedicine university institute—along with the GIP RTeS@Midi-Pyrénées, a region-wide public interest network focused on telemedicine and e-health—also oversaw the creation of the Centre e-Santé Foundation.

Groupement de Coopération Sanitaire (GCS) Télésanté Midi-Pyrénées was established in March 2011 to implement the Regional Health Project, as defined by the regional health agency. The project involves development of the telemedicine program, e-health systems and health information exchange (HIE). The operating budget for 2011 (eight months) is €3.5 million, and the investment budget is €1.6 million. Most of the money comes from public funds, but members contribute approximately 7 percent. It replaced GIP RTeS@Midi-Pyrénées, and took over the organization's previous activities. The 133 members represent 72 percent of health organizations in the region, 82 percent of private institutions and 44 percent of medical-social organizations that have the capacity to serve at least 200 people.

Healthcare consumers are expected to be involved in an advisory capacity. A general assembly made up of six groups of high-level healthcare professionals—public health organizations, private health organizations, medical-social organizations, individual health professionals, health networks and others—govern GCS Télésanté.
Electronic medical records (EMRs) have greatly improved clinical practice—the physician interviewed for this case study stated he could not work without them anymore. Secure messaging also saves time and helps store information, although it has not contributed as much as the EMRs.

Impact and benefits
To date, there have been no medical economic studies that compare the costs of adding new networks or expanding capacity with the value added by use of telemedicine. The biggest perceived impact is the improvement in medical practice—including better decision-making, faster diagnostics, better training of physicians and reduced patient transfers—but these benefits are difficult to quantify.

Electronic medical records (EMRs) have greatly improved clinical practice—the physician interviewed for this case study stated he could not work without them anymore. Secure messaging also saves time and helps store information, although it has not contributed as much as the EMRs.

Challenges
Healthcare delivery in France is based on a very individualistic culture. Public and private physicians have differing payment models and reimbursements, and are generally not accustomed to working with one another. There are strong cultural barriers to integrated models of healthcare delivery as well. Recently, there has been movement toward seeing patient care from the perspective of "le malade de tous" ("everyone's patient") rather than "mon malade" ("my patient"), but much more cultural change is still necessary to foster collaborative care through healthcare IT initiatives.

There is also a widespread belief that "health" and "business" don't mix, resulting in a mistrust of organizations, such as healthcare IT vendors, that are trying to make money in the health sector. The lack of a clear financial reimbursement structure for healthcare IT implementation and use in care delivery further complicates the ability of legitimate businesses to break into the health sector. In any case, technology companies have little incentive to invest in the development of healthcare IT tools because there is still no clear business model for physicians to purchase—and be reimbursed for—their products.

"In France, at a cultural level, there is a taboo about health and business. When someone says 'I'm going to make money in healthcare,' it arouses a bit of distrust."
–Julien Venne, Director, Centre E-Santé

Physician acceptance of healthcare IT initiatives depends on the interoperability of new systems with their existing technology. Several interviewees stated that the healthcare IT tools currently available are not well-integrated into their medical practices, or do not always fit their needs. Over the last few decades, many physicians have invested in their healthcare IT independently, thereby creating large variation in healthcare IT systems and the extent of their use. Efforts to implement regional tools are limited by this lack of interoperability.

"It's out of the question for physicians to change their [EMR] software. Asking physicians to change their software would be a big mistake. If [the government] wants [the DMP] to work, they will make it easier to use."
–Dr. Jean-Louis Bensoussan

Furthermore, advancements in technology often require investments in upgraded software and hardware, which can be a costly and frequent expense. With telemedicine, providers that are least able to keep up with advancing technology—often those in remote areas—are also the providers who would benefit most from its use.

Finally, although French law established telemedicine as a medical act in 2004, the legislation did not address payment models. Therefore, payment for each individual act of telemedicine must be negotiated between the participants.

"We have an information systems architecture that is becoming clear for everyone and rules of the game that are also clear with the established standards. What's missing today is the economic model ... the financing architecture."
–Julien Venne, Director, Centre E-Santé
The future
There are plans to expand telemedicine in the Midi-Pyrénées region by making further use of healthcare IT. These plans include developing dedicated, secure networks for sending medical information on portable devices such as smartphones and tablet PCs.

The overall aim is to bring care to the patient’s home. Centre E-Santé is working with technology vendors to develop telemonitoring hardware and software that will be used at a patient’s home to collect medical data. This technology would allow the monitoring of healthcare equipment (weight scales and blood pressure cuffs, for example), the gathering of data through sensors (telemetry), and the compilation of measurements in a system capable of analyzing them and presenting them so they can be interpreted remotely. These capabilities are particularly important where pathology profiles and data history are concerned. Telemonitoring differs from teleassistance or telealarm services in that it is not restricted to visual and telephone-based resources.

GCS Télésanté is developing a variety of services, including a secure messaging service, an electronic directory, a Web-conferencing tool and a shared system of management and archiving for medical images, all of which seek to increase communication between clinicians.

The Centre E-Santé is developing certification standards for healthcare IT. In particular, it is working with insurers to guarantee reimbursement for use of certified healthcare IT products.

Future efforts will support further implementation of the personal health record (DMP) and the dossier communicant en cancérologie (DCC)—a health record containing information about all aspects of a cancer patient’s treatment.

What can we learn from Midi-Pyrénées?
The Midi-Pyrénées region has provided the capacity for physicians to perform consultations via video-conferencing technology, greatly reducing the need to transport patients to receive healthcare, particularly specialty referrals. Other places that seek to overcome difficulties providing specialty care in remote areas can learn much from their efforts.

“[Telemedicine] makes medicine multidisciplinary, without moving the patient or the doctor.”

Healthcare IT must be developed with input from the end users. Several interviewees stated that the healthcare IT tools currently available do not fit their needs or match the systems they already use. Rather than relying on the ability of individuals to incorporate something completely new into their current practices, the regional agencies (such as GCS Télésanté) now recognize that future efforts must focus on incorporating end user input during the development stages. The Centre E-Santé is actively working to address the interoperability issues.

Successful execution of healthcare IT implementation requires bottom-up and top-down coordination. The Midi-Pyrénées region has had many different initiatives over the last several decades, but regional and national coordination has traditionally been lacking, so it has been difficult to achieve widespread implementation. Healthcare IT initiatives are often small (limited to a locality or a specific pathology) and supervised with a degree of autonomy that takes into account specific local factors. While the local healthcare IT initiatives have been innovative and successful, translating them into regional programs can be difficult, largely because the needs of many individual stakeholders must be accommodated and coordinated. It is clear that larger programs need oversight, dedicated to healthcare IT, at a higher level. While “top-down” coordination is a necessity, without consultation from the “bottom-up,” it tends to fail. To provide some of this top-down coordination at the regional level, GCS Télésanté was established in early 2011.

Stakeholders must all be closely involved in the development and execution of healthcare IT strategies. Each stakeholder (including healthcare professionals, patients, insurance providers, oversight agencies, technology vendors and researchers) must express their needs and take part in the search for sustainable economic models. Addressing these needs is a key factor for success.

Often, the facilities that most need healthcare IT are the least able to invest in or sustain it. Teleradiology, for instance, is continually advancing through upgraded PACS applications and, because wider transmission bandwidth is becoming the norm, allowing an increase in the number and detail of images that can be transmitted. While these are welcome advances, they are counter-productive if remote or rural providers do not have the technology to receive the larger data files.

Establishing a clear financial/payment structure is critical to success. Ideally, payment structures would be established within legislation that addresses telemedicine or healthcare IT. France established telemedicine as a medical act in 2004, but did not address payment models, which has held back healthcare IT adoption. Furthermore, without a clear business model for purchasing healthcare IT tools, technology companies have little incentive to invest in their development.
Local and National Commitment to Convergence

Scotland

<table>
<thead>
<tr>
<th>Description</th>
<th>National public health system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population served</td>
<td>5 million</td>
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<tr>
<td>Public Hospitals/Clinicians</td>
<td>14 vertically integrated regional Health Boards; 230 hospitals and more than 5,000 GPs.</td>
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<td>Connected health vision</td>
<td>Deliver accessible, integrated, safe, world-class healthcare by enhancing availability of information and maximizing efficiency.</td>
</tr>
<tr>
<td>Key focus of initiative</td>
<td>Delivery of patient management systems and clinical portals to enable improved information access within and between regional health boards.</td>
</tr>
<tr>
<td>Architecture</td>
<td>Federated structure, with centrally designed architecture implemented and hosted locally with some national enablers (such as network and UPI).</td>
</tr>
<tr>
<td>Funding</td>
<td>Public funding: about £86 million allocated annually and devolved to boards by eHealth team; about £172 million spent locally from general allocations. Spend on IT equates to about 2.3 percent of overall National Health Service of Scotland (NHSScotland) budget.</td>
</tr>
</tbody>
</table>

NHSScotland provides end-to-end patient care for 5 million people, free at the point of need and paid for from general taxation. In 2004, a decision to integrate services saw healthcare devolved to 14 regional health boards, each managing primary, secondary and tertiary care for their region, and eight specialist health boards to support the delivery of healthcare nationally.

This vertical integration has brought care providers within each region into unified organizations and has resulted in a natural rationalization of IT infrastructure and applications. Information sharing within boards is a fundamental enabler of connected healthcare, supporting clinical communication and smooth patient pathways between primary, acute and tertiary providers. Integration across health boards is a major eHealth goal.
The government’s pragmatic eHealth strategy focuses on addressing specific challenges while incrementally building a nationally designed and locally implemented infrastructure and a landscape of continually evolving national, regional and local projects. A commitment to convergence of technologies, a governance model that flows down the ownership of solutions and budgets and a shared vision focused on outputs have all been instrumental in pushing progress forward.

“Experience has shown Scotland that having a grand design doesn’t result in faster progress. The grander the design, the more difficult and time-consuming it is to get up and running and realizing benefits. Scotland designed a strategic engagement model that was incremental, pragmatic, highly consensual and collaborative.”

—Paul Rhodes, eHealth Programme Director

Up until 2011, the Scottish Department of Health ran a program of capital investment in national systems. This involved the purchase and implementation of new primary and secondary care systems and other enhancements such as national picture archiving and communications systems (PACS). The strategic emphasis is now to ensure that Scotland realizes the value of these investments in support of improved healthcare. The eHealth Programme has become a revenue-based and quality-led IT improvement initiative.

Most central eHealth funding is distributed to boards annually to deliver change programs, applications and service and infrastructure enablers. Devolving budgets is expected to drive greater value for money and contribute to a sense of transparency, co-evolution and local ownership.

“Since April 2011 ... the eHealth development money is devolved down to boards, which is a really positive development. Not because it gives us direction to spend money in an ad hoc way: we had to prove ourselves as a group [first], and we have demonstrated a set of behaviors that is very collective and collaborative. But this has offered us a really good opportunity to make the best of scarce resources. We’re not being forced into being collaborative; we already collaborate, and the devolution of budget just strengthens that.”

—Robin Wright, Director of IT, NHS Lanarkshire

Scotland’s approach to connected health

Within the Scottish government, the eHealth Strategy Board sets the national IT strategy for NHSScotland. Its vision puts the citizen at the center of IT solutions and sets an agenda focused on benefits and quality outcomes, with convergence of technologies and engagement of people as critical elements. The eHealth Programme Board monitors implementation and manages a centrally allocated budget. Its scope includes all IT systems, information and records management, process change and skills development required for healthcare delivery, including supporting infrastructure and business systems.

Scotland’s approach to connected health includes a number of core components.

A national design for health IT infrastructure: SCI Store

SCI Store is a nationally designed information repository implemented locally. It provides more than 17,000 clinicians each month with secure access to patient information at the point of care and allows information to be shared within and between health boards. While the SCI Store technology is nearing the end of its life, the capability it has brought to Scotland’s clinicians is significant. With interfaces to other local systems, SCI Store helps clinicians share patient demographics, laboratory investigation reports, radiology reports, treatment logs, clinical documents and admission, discharge and transfer documentation.

Streamlined administrative process through digitization: electronic referrals and prescribing

SCI Gateway is a national system that integrates primary and secondary care systems providing a digital information sharing solution for outpatient bookings, referrals and discharges, pre-populating information from other systems, providing multi-user workflow functionality to support primary care working practices and enabling referral of clinical and demographic information, clinical guidance, key messages and links to relevant online resources. The complementary implementation of a medication record referred to as the “ePharmacy” aims to improve patient access to healthcare and support delivery of care closer to home. In 2011, doctors sent more than 81.4 percent of referrals and 90 percent of prescriptions electronically.

Access to information sharing at the point of care: Emergency Care Summary (ECS)

Launched in 2006, the emergency care summary (ECS) provides clinicians with out-of-hours access to a core clinical summary. In 2011, it was used 200,000 times a month and was expanded to include an electronic palliative care summary (ePCS), detailed information on diagnoses, patient wishes and anticipatory care plans. It also includes an Electronic Key Information Summary (KIS), which will augment the ECS and ePCS to provide support to patients with long-term conditions and mental health issues across a broader range of clinical situations. It has been recently agreed that access to ECS will be available in the scheduled care situation—outpatients and in-patient admissions—for the purposes of reconciling the patient’s medication.
Integration of care records for long-term conditions: diabetes (SCI DC)

SCI DC is a Web-based clinical information system, supporting the care of diabetes patients. First established in NHS Tayside as a clinically led local project to support multidisciplinary clinical networks in the management of diabetes, it was rolled out nationally, and it now monitors 239,000 patients.

Integrating disparate data: patient management systems and clinical portals

The rollout of patient management systems (PMS) and clinical portals nationally is in progress, with some health boards reaching more than 24,000 clinical portal users in 2011, demonstrating movement toward a “single patient view” across multiple care settings. Collaborative procurements for PMS and clinical portals aim to drive convergence and value for money.

Delivering standardized and integrated GP systems: EMIS and VISION

The GPIT Contract, established in 2010 to replace a previously centrally hosted general practice administration system, offers boards a choice of two alternative systems, EMIS and INPS’ VISION. In 2010, the two providers formed a joint venture, Healthcare Gateway, to create a standard interface between the two systems using international standards, with the potential to enable real-time interoperability between all GP practices in Scotland.

Enabling secondary usage of data: Scottish Health Informatics Programme (SHIP)

Scotland is a leader in global healthcare research and has an active clinical research community. At the center of this is the Scottish Health Informatics Programme (SHIP), a national research platform involving a network of projects for collating, managing, disseminating and analyzing clinical data to carry out studies and analyze population outcomes.

"About 15 years ago when I came to Tayside, I saw a great opportunity to use information to actually drive up the quality of care. The key facets of that were firstly, the unique patient identifier—the CHI number—used in Tayside since 1976 and implemented in the rest of Scotland for the past five to ten years; secondly, a combination of clinical leadership and IT leadership working hand in glove; and thirdly, collaboration based upon primary, secondary and tertiary care agreeing on standards of care, data sharing, quality standards and guidelines."

–Andrew Morris, Consultant, Director of Biomedical Research Institute

Establishing local leadership for nationally driven projects empowers individuals and drives innovation, engaging health boards in the direction of the strategy and sharing responsibility for the outcomes of decisions that have an impact on their own organizations, as well as those of their peers.

"There are many examples of the shift of focus away from local siloed implementations and towards recognition of shared benefits. One that illustrates this well is the current development of an incremental approach to Identity and Access Management (IAM)…. We have commissioned selected boards to take the lead on designing and introducing individual IAM components and exploring how these could be brought together and exploited as a solution for all boards. This has culminated in work now being led by NHS Fife which starts to integrate the components as part of a shared vision, but from the bottom up."

–Eddie Turnbull, Architecture Lead, eHealth Programme Eddie Turnbull, Architecture Lead, eHealth Programme

Since 2006, a key priority has been to move care closer to home. Supporting this with the effective use of IT is an ongoing challenge and a critical area of focus for the next stage of the eHealth strategy.
“One thing Lanarkshire is way ahead of the game on is the interface with social care. For the last five years we’ve been exchanging single shared assessments for the elderly and vulnerable between health and social care.... We’ve also got universal child protection messaging ... which delivers very good information sharing about vulnerable children. It’s beginning to be acknowledged as something that could be replicated as a federated model.”

– Robin Wright, Director of IT, NHS Lanarkshire

Scotland’s progression in connected health has, in part, been attributed to its governance structure, outlined in Figure 1. The “Board Collective Governance” bridges the gap between clinical and IT teams “on the ground” and national policymaking.

A common theme across Scotland’s connected healthcare IT is a commitment to implementing IT that addresses specific business or clinical challenges and brings clear improvements in care. The integrated care record for diabetes, SCI DC, succeeded largely because it was developed by a member of the clinical community and sought to address information-sharing challenges affecting clinicians and their patients.

For local implementations of clinical portals and PMS, national guidance and standards ensure a consistent approach to information governance and data security. Information governance presents challenges for data consolidation on a national scale. However, the rules of engagement for Scotland’s health information economy are developing, building on existing legislation and executed through focus groups, decision analyses, discrete choice experiments and opt-in/out models. According to Scottish law, patients do not need to be told if their data is going to be used for direct clinical purposes or audit, although it is recommended good practice to make patients aware as to how their data may be used. Where patient identifiable information is to be used then the patient’s express permission needs to be sought, at which point a clinician who has a relationship with the patient communicates to them that the researchers want to get in touch.

Patient consent for health information exchange has been largely effective. The success of the ECS may be attributed to a combination of strong public engagement, a nationalist sense of being “in it together” and its design as a snapshot of data.

Figure 1: Scotland’s governance structure for delivering connected healthcare IT
Impact and benefits
The eHealth Programme is delivering clear benefits for clinicians and patients across a variety of areas.

In Lanarkshire, feedback from consultants following the introduction of their PMS highlighted speed of use and visibility of the status of appointments and treatments as immediate benefits.

In Glasgow, the introduction of the clinical portal has enabled clinicians to see case notes across all Glasgow hospitals. Test ordering—a major source of expenditure—is thought to have decreased as a consequence of previous results now visible through the portal.

GPs in Tayside have found that e-prescribing has significantly reduced errors. And programs such as the Chemotherapy Electronic Prescribing and Administration System are preventing errors in dosage calculations and drug reconstitution, monitoring dose modifications, enabling clinical audit, providing 24/7 availability of patient prescriptions, automatic scheduling and remote prescribing.

Nationally, the ECS is benefiting unscheduled care, receiving millions of hits each year that help ensure clinicians have as much information as possible to deliver safe care within emergency settings.

Point of care decision support is helping in the treatment of some long-term conditions, including cardiovascular disease and diabetes, providing treatment recommendations at the point of care. It is also helping GPs identify patients most at risk of hospitalization.

The national eReferral program has increased the speed of patient referrals—at one health board, average referral times have been reduced to less than six days.

In another health board, digital dictation has reduced the number of letters, which take more than 14 days to be posted after dictation from 1,300 to 31 in just five months, streamlining patients’ journeys.

Clinical quality benefits realized through the implementation and effective use of SCI DC highlight the significant impact of information sharing with respect to long-term conditions.

"Today we have 239,000 people with diabetes in Scotland being monitored prospectively. Because you can systematically apply quality to make sure that patients don’t fall through the gaps, they get all their biochemistry done—their cholesterol, their blood pressure, their foot screening, their eye screening. We have published locally that our amputation rate has fallen by 40 percent in 6 years and our blindness rate by 43 percent."

—Andrew Morris, Consultant, Director of Biomedical Research Institute

Scotland is seeing developments aimed at improving patients’ access to information. National programs such as ePharmacy are reducing patients’ dependence on GPs by providing pharmacists with the clinical information to advise patients and administer treatments. Electronic referrals are speeding up the process of GP referrals into acute care. And patient portals are being piloted with the aim of encouraging self-management of long-term conditions.

NHS Scotland collaborates with academic institutions to research health outcomes. SHIP connects existing local, regional and national databases, allowing data to be linked, made anonymous and analyzed. Scotland has one of the best-quality primary care datasets in the world. By improving the ability to analyze this data, SHIP is ensuring Scotland is at the forefront of healthcare research globally.

"Partly, it’s about finding new ways to accelerate the so-called translational lifecycle of medical research. Although randomized controlled trials are important, they can take several years and be very costly, and yet they can only ever hope to capture a subset of the relevant population. As access to and linkage between large population-based datasets improves, it will become increasingly possible to make similar deductions from observational data, and for theories to be continuously tested against the evidence as more observations are accumulated within the datasets."

—Professor Claudia Pagliari, Lecturer in Health Informatics, University of Edinburgh

Challenges and the future
In Scotland, the challenges being faced by health economies globally are compounded by inequalities and geographic diversity. With an aging population and stretched resources, boards are under pressure to demonstrate cost reduction off the back of IT projects. Doing so will require close management and flexible workforces.

Stakeholder engagement can be challenging when implementing enterprise-wide solutions. Indeed, some boards believe that a lack of business-led (as opposed to IT-led) executive-level governance has been a limiting factor in the speed of progress.

The rollout of clinical portals and PMS is largely focused on acute environments, requiring stakeholder engagement across clinical silos and large numbers of users. Allocating clinical resources to drive this engagement is difficult as boards’ resources are already stretched.
"It is very difficult for eHealth clinical leads to have the time to find out the needs of all of the clinicians—this role is often undertaken in addition to everything else they do clinically. A board can have thousands of clinical users, but a single part-time clinical lead is expected to fulfill the job of engaging with all clinical communities in their organization.... While there is a small, but enthusiastic, band of eHealth clinical leads involved at a national level, the actual level of engagement with clinical groups at board level is very variable."

–Cathy Kelly, Clinical eHealth until August 2011, eHealth Programme

The eHealth strategy for 2011 to 2017 is set in the context of the Quality Strategy for NHSScotland. It establishes a vision focused on benefits and quality outcomes through supporting people to communicate with NHSScotland, contributing to care integration, improving medicine safety, enhancing the availability of information for staff and maximizing efficient working practices.

Health boards will be expected to support the eHealth strategy’s core themes and to incorporate these into local delivery plans, leveraging previous investments in assets. Health information exchange—between care providers within each board and between health boards—is essential to the long-term vision. Achieving convergence of technologies, therefore, remains a priority and potentially a challenge when boards are offered flexibility over choice of applications.

Clinical portals are demonstrating benefits for health boards, and NHS Lanarkshire are considering how this could be rolled out across long-term conditions. Pilots are also exploring public and clinical opinion on extension of portals to include patients as users.

What can we learn from Scotland’s experience?

What can we learn from Scotland’s experience?

Vertical integration of care within regions has brought providers together into unified organizations. This has driven local consolidation of IT, while responsibility for central budget is devolved, localizing control and driving value for money from contracts.

A focus on delivering outcomes through central guidance—rather than mandated solutions—is vital. Regions also share a commitment to convergence to enable the health information exchange essential to achieving those outcomes.

An incremental and pragmatic approach to development focused on solving specific challenges. Scotland’s eHealth program is focused on implementing IT that addresses specific business or clinical challenges and brings clear improvements in care.

An effective governance structure that flows ownership down to local levels. Scotland designed a strategic engagement model that is highly consensual and collaborative. Scotland’s approach to connected health is to encourage engagement between national policymakers and local clinical and IT communities. The principles of collaboration and co-evolution empower individuals and encourage innovation, ensuring that national policy remains aligned with local implementation.

The clinicians’ role is key in driving change. In acute care, temporarily assigning clinicians onto IT teams helps deliver solutions to support their needs. Meanwhile, assigning nurses to drive change onward is critical to affecting change across the organization.

Improved information governance practices. A pragmatic approach to information governance legislation and alignment between policy and implementation support secondary usage of data and enable the analysis of population health outcomes, while Scotland’s longstanding use of a unique patient identifier has aided progress as data linkage is easier than in other geographies.

Smarter use of data. Scotland’s new Information Assurance Strategy emphasizes that usage of data should be driven specifically by the purpose for which data is being held in the first place. So the emphasis is on those who need the information having access to it, knowing it will be available when they need it and confidence that it is accurate and up-to-date.

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Singapore's National Electronic Health Record

<table>
<thead>
<tr>
<th>Description</th>
<th>Dual public/private health systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population served</td>
<td>5 million</td>
</tr>
<tr>
<td>Public Hospitals/Clinicians</td>
<td>Eight acute hospitals, 18 polyclinics, six community hospitals, 2,000 private sector general practitioner clinics</td>
</tr>
<tr>
<td>Connected health vision</td>
<td>&quot;One Singaporean, one health record&quot;</td>
</tr>
<tr>
<td>Key focus of initiative</td>
<td>A longitudinal summary of healthcare profiles and a consolidated view of a patient’s current problems, medications and investigations</td>
</tr>
<tr>
<td>Architecture</td>
<td>Centralized national electronic health record (EHR), with structured data from electronic medical records (EMRs)</td>
</tr>
<tr>
<td>Funding</td>
<td>Public funding—S$176 million to launch Phase 1 of the National Electronic Health Record (NEHR), which launched in April 2011</td>
</tr>
</tbody>
</table>

Singapore's health system serves a population of approximately 5 million people through a combination of public and private insurance-funded provision. Its medical facilities are among the finest in the world. Despite a relatively low level of spending on healthcare, Singapore currently has the lowest infant mortality rate in the world and among the highest life expectancies from birth, according to the World Health Organization. Two contributing factors are worth noting: Singapore's steeply rising economy means more people are able to pay toward their healthcare; and Singapore's relatively youthful population—only about 8 percent of people are aged over 65—needs less expensive healthcare than those in many other countries.

However, by 2050, this picture will have changed. Singapore will be among the world's demographically oldest countries with a median age of 54 years, pushing up healthcare costs and reducing insurance contributions. The government is determined to tackle this challenge through a focus on connected health.

Singapore has embraced technology at the highest level. "An Intelligent Nation 2015 (iN2015), A Global City, Powered by Infocomm" is the government's master plan to transform key economic sectors through the sophisticated use of healthcare IT. The government also aims to ensure every home and organization in Singapore has a broadband connection by mid-2012.
Singapore's approach to connected health

The Ministry of Health (MOH) Singapore, manages the public healthcare system. With its vision of "Championing a healthy nation with our people—to live well, live long and with peace of mind," MOH promotes individual responsibility for the costs of services, while encouraging people to adopt a healthy lifestyle and take responsibility for their own health.

Traditionally, Singapore’s public health sector has welcomed IT and has invested in it. Most acute and specialist organizations are using advanced IT, such as computerized physician order entry (CPOE) and clinical documentation, while some institutions have become paperless. However, historically, the healthcare clusters had developed their own tailored electronic medical record (EMR) systems, sharing information only within their own cluster. Furthermore, there has been a low rate of IT uptake in primary care resulting in only 15 to 20 percent of GPs having an EMR. Some practices use clinical management systems (CMS) for administrative and financial purposes, but the majority of clinical information is held in paper-based records.

"I think we actually stand out pretty well internationally, but we still have a journey ahead of us to bring aboard our private sector."

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"Is Sustainability of Healthcare Possible without eHealth? The Singapore Experience." Presentation by Dr Sarah Muttitt, Chief Information Officer, Information Systems Division MOH Holdings, Singapore. eHealthConference 2010
Key connected health initiatives

The challenge in Singapore today is to integrate and share person-centric health records among the public and private sector parts of the health system. An initial solution—the EMR Exchange (EMRX)—was introduced in 2004. This enabled unstructured documents, such as investigation reports and discharge summaries, to be shared across public healthcare clusters, community hospitals and the Ministry of Defence (MINDEF). Although a success, EMRX does not support sharing of discrete data or images such as X-rays and does not include the primary care sector.

The EMRX has acted as a platform for a more comprehensive solution—the National Electronic Health Record (NEHR), which is being introduced as part of the government’s National Health Informatics Strategy. This strategy—its part of the wider IN2015 plan—was launched in 2008, and sets out to implement a robust infrastructure to support the sharing of the NEHR across all healthcare organizations.

The NEHR is defined as “a longitudinal summary of healthcare profiles and a consolidated view of a patient’s current problems, medications and investigations.” Unlike the existing EMRX, the NEHR extracts structured information from local EMRs into a single record, accessible by all authorized providers. Structured data is essential for wider uses such as clinical decision support, and research and disease surveillance.

The MOH and MOH Holdings (the holding company of Singapore’s public healthcare assets) are strongly committed to their vision of “one Singaporean, one health record.” They have said, “With the NEHR, patients will benefit from proper, right-sited disease management and cost savings as we eliminate duplicate or unnecessary tests and reduce medication errors and adverse drug events that could result in unnecessary healthcare expenses.”

“...We have absolute government support, with an ‘it will be done’ attitude. They brought in the right people, created a risk-tolerant environment and presented no big obstacles.”

– Sari McKinnon, Director of Solutions and Architecture, MOH Holdings

Clinicians (including doctors, nurses, pharmacists and allied health professionals) have played a fundamental role here. MOH Holdings’ Clinical Transformation Service and Business Analysis Team has worked with more than 200 clinicians to develop the clinical requirements and business case for the NEHR.

Singapore’s approach has been to introduce the NEHR in phases, enabling the country to take into account experience and learning from each phase and quickly exploit advances in technologies. Full implementation may take many years, and future phases have yet to be defined in detail. MOH Holdings is responsible for managing the system and setting standards for interoperability, and has been commissioning external vendors to implement each phase. The MOH is clear that each phase of new incremental investment will have to be justified on cost-benefit grounds.

Phase 1 was deployed in April 2011, after the government’s 2009 announcement that $176 million would be set aside to launch it. This phase will see the exchange of key medical information (demographics, allergies, X-ray reports and more) initially between a subset of public sector providers, including acute hospitals, polyclinics and community hospitals. Private GP systems are currently not included.

In primary care, however, the MOH is also committed to extending the use of EMRs. Project CLEO (Clinic Electronic Medical Record and Operation System) is an extension of the government’s GP IT Enablement Programme launched in 2009, which aims to encourage GPs to adopt EMRs.

“I do share the belief that the connected health model can lead to improved health outcomes, so I look forward to the NEHR living up to the ‘N’ letter … in the acronym. That is, it must go beyond the public sector into the private sector, into the primary care market.”

– Dr Colin Quek, Vice President Operations, The Farrer Park Company

The initial phase of Project CLEO started in 2011 and will run until 2013 in 50 GP clinics. Community feedback will be gathered to improve the system’s design and fine-tune clinic processes. The focus will be on better quality and safer patient care, alongside streamlining clinic operations to improve services to patients.

In a parallel development, Singapore wants to encourage individuals to manage the condition of their own health. The Personal Health Management (PHM) program has initiated a prototype in its development efforts, and its future scope will include linkage to the NEHR.

While an earlier attempt to set up a patient portal was not widely used, Singaporeans now, with their greater access to IT skills—and a stronger sense of responsibility for their own health and wellbeing—are likely to find it more useful.

"As a consumer, I would like to access all my healthcare histories. I would like to be able to not have to rely on small little cards from every healthcare provider I go to, I would like to be able to access it altogether online, I would like to be able to recall what tests have been done, what the results were…. That is what I would appreciate as a consumer.”
Impact and benefits
Because all these initiatives are in their early stages and concentrating on a relatively small set of public sector providers, it is still difficult to assess their contribution to connected health. Nevertheless, there are some clear messages emerging.

Physicians who are using EMRX gain immediate access to more complete and accurate (if limited) data, providing a better picture of a patient’s medical history, investigation reports, discharge summaries, laboratory results, X-rays, medications and drug allergies. The benefits are widespread and numerous. They include improved patient safety and quality of care as well as access to vital information to support accurate diagnoses and treatment. Patients who are referred across healthcare clusters receive better coordinated care. It has eliminated costs of unnecessary duplicate tests and X-rays. And these benefits have been hugely instrumental in selling the concept of an NEHR to physicians in public sector hospitals—and more widely.

The NEHR architecture, with its structured data capability, offers the opportunity for sophisticated analysis of secondary data through, for example, financial analytics, operational analytics, healthcare knowledge, public health research, performance analytics, clinical quality analytics (and the cost of these), surveillance, epidemiological studies and clinical trial data.

"Our health performance group at the Ministry of Health collects data from all of the hospitals, and it is gradually getting more and more information from the private sector, so we [are able to view] the entire health sector for planning, management, quality improvement and so on."

Each of the six regional healthcare clusters has made substantial progress toward developing its hospital EMRs and supporting connectivity within its public hospital system.

Challenges
Many experts now see interoperability as a minor concern compared to issues of physician adoption—and there are certainly some challenges there. Not all GPs are enthusiastic about using IT systems: they will not normally have received healthcare IT training and, because IT systems are expensive, there is little incentive for GP practices to invest in them. Furthermore, many practices are set up as “one-stop-shops” and do not see any benefit in sharing information with hospitals. GPs may also fear the loss of patient loyalty, feeling that sharing electronic records will make it easier for patients to change their GP.

Experts suggest the government should use a financial incentive scheme to encourage GPs to adopt healthcare IT. And, more important, they see the need to demonstrate the benefits of IT systems to GPs, including return on investment.

In all healthcare sectors, there are further issues to address. Implementing IT requires considerable effort and changes to working practices. Entering clinical data into a computer, for instance, is a major change which many physicians resist. But while older, established physicians may have been reluctant to adopt new IT systems, as a younger, more IT literate generation takes their place, this issue will subside.

The NEHR will enable physicians to access a wealth of information that had not previously been available to them. While this is seen as valuable, some physicians also fear information overload and potential liability issues arising from their inability to assimilate it all. Experts see the establishment of clear legal guidelines as a priority for the government.

As part of addressing such issues, the MOH Holdings has, from the start, actively engaged physicians through clinical advisory and task groups. Physicians have had a lead role in specifying the requirements of the NEHR. This, alongside continual efforts to demonstrate benefits and adapt to physicians’ values and frontline needs, has ensured a design clinically relevant for routine practice.

MOH Holdings’ business analysis team has worked with physicians to develop the business case for the NEHR, and this important factor clearly differentiates Singapore’s approach from that of some other countries. Furthermore, the government is clear that each phase of new incremental investment will have to be justified on cost-benefit grounds. This emphasis has focused work on areas where the potential return on investment is greatest.

Officials hope that project CLEO will have similar successes in primary care. A key lesson for MOH Holdings is to engage GPs early on and to drive change through strong evidence for improved patient outcomes and return on investment, underpinned by funding for IT systems and financial incentives to use them. Experts also highlight the need to involve users in local implementation projects.

"The fundamental question that needs to be answered is, ‘What’s in it for me?’ from the perspective of the different stakeholders. ‘Am I going to get some financial benefits? Is it really going to really improve my business?’"

– Dr Colin Quek, Vice President Operations, The Farrer Park Company

Establishing security standards and protecting private information are essential elements of all these healthcare IT efforts. An enterprise architecture is in place to support the deployment of the NEHR, based on international standards—adapted where necessary to meet local requirements—to enable secure data exchange and data sharing among local and enterprise clinical systems. Consent from patients to share data via the NEHR is assumed, although patients can choose to opt out, and their data will not be shared.
Next steps for connected health in Singapore

Experts predict that, over the next five years, Singapore will move from the current hybrid system of paper and electronic patient records toward a fully electronic system. The routine use of the NEHR in clinical practice will enable physicians to access timely, accurate and comprehensive information about a patient. Sophisticated analytics will support research using disease registers, for example. Experts also highlight the potential for the NEHR to support genomic analysis, leading to more personalized treatment and care.

Also aiding progress toward connected health are two important trends in Singapore: the growth in portable computing, such as use of mobile phones and tablets, and people becoming more proactive in managing their own health. Experts foresee a future in which people use new technologies to inform personal decisions—such as deciding what to eat in a restaurant—based on access to their NEHR.

"I think we’re going to see a huge explosion of applications. All of the work that we’re doing right now on the national EHR would be accessible on your iPad, on your mobile phone, and so on, by an authorized provider, and obviously delivered securely."

Source: Presentation by Dr Sarah Muttitt, Chief Information Officer, Information Systems Division MOH Holdings, Singapore. January 2011
What can we learn from Singapore?

Strong government vision and leadership drives progress. Through the MOH and MOH Holdings, the Singapore government is providing the clear vision and strong leadership essential for connected health. This has ensured progress is highly focused and rapid.

Phased approach to implementation. MOH Holdings’ decision to advance health information and communications technology forward in phases, learning from successes and failures, adapting plans accordingly and exploiting fast-moving advances in technologies, is proving its worth.

Leverage existing systems. The focus for connected health has been to leverage rather than replace existing systems where possible.

“Risk-tolerant” environment of the Singapore government. The government encourages MOH Holdings to be experimental, innovative and “brave in its decision-making.” The organization has set clear target dates, but at the same time it has the trust of government to produce the systems in a well thought out, diligent way. The pressure was minimized as it was accepted that not all solutions will work and be beneficial.

Close involvement of physicians ensures clinically relevant systems. Physicians have had a lead role in specifying the requirements of the NEHR. This has resulted in a design that is seen as clinically relevant for routine practice. Project CLEO hopes to have the same success in primary care by involving GPs in the design and development process.

Building a business case will help ensure return on investment. MOH Holdings’ business analysis team had worked with physicians to develop the business case for the NEHR. The Ministry of Health is clear that each phase of new incremental investment will have to be justified on cost-benefit grounds. This has helped to focus work on areas of where the potential return on investment is greatest.

Rollout the system by finding clinicians who see the benefits of incorporating IT systems into clinical practices. While some clinicians will find a reason not to implement healthcare IT systems, others acknowledge the benefits of healthcare IT. As one interviewee put it, “It’s like a steam train—you can either get on it or get out of the way.” Once the system is up and running, it will be easier to convince clinicians of the benefits as “success breeds success.” It is just at the initial stage that need the “steam train mentality” is important.

Realigning service delivery supports integrated care. Singapore’s health system was reorganized from two into six healthcare clusters, each anchored by a regional hospital working with a variety of primary, intermediate and long-term care sector and support services to deliver patient-centric care. This has helped to make services more accessible for patients and assisted the bottom-up development of connected health in local EMRs. The Agency for Integrated Care also acts as a national care coordinator, supporting the movement of patients across the various healthcare settings.

Singapore may require special measures to engage the private sector. Private sector GPs, who deliver the majority of primary care services in Singapore, have lagged behind public sector hospitals in adopting IT. A key lesson for the government was to engage these physicians early, showing them how they and their patients could benefit and supporting them with financial incentives.
8-Country Physician Survey
Connected Health Physician Survey: Questionnaire

Demographic information

1. In which area of health care do you work?  
   If you work across more than one specialty, please tick the one in which you spend the majority of your time.

- Primary Care/ General Practice / Family Doctor
- Secondary Care / Specialist

2. Which of the following best describes your main area of clinical focus?  
   If you work across multiple specialties, e.g. Onco-haematology, please select the one you feel describes your primary specialty best.

- Addiction Medicine
- Allergy & Immunology
- Anaesthesiology
- Cardiology
- Clinical Oncology
- Dermatology
- Diabetology and Endocrinology
- Emergency Medicine
- Gastroenterology
- General Practice - Family Medicine
- Genito-urinary medicine
- Geriatric Medicine
- Gynaecology
- Haematology
- Hepatology
- Infectious Disease
- Internal Medicine - Internist
- Neonatal
- Nephrology
- Neurology
- Obstetricians
- Oncology
- Ophthalmology
- Orthopaedics
- Otolaryngology - Ear, Nose and Throat
- Pain Management
- Palliative Medicine
- Pathology
- Paediatrics
- Physical Med - Rehab
- Podiatry
- Psychiatry
- Pulmonology/Pneumology/Respiratory Medicine
- Radiology
- Rheumatology
- Surgery
- Urology
- Other (please specify)
3. What is the approximate number of full time employed clinicians working in your organization? Throughout this survey “organization” refers to the medical practice or hospital which is your main place of work. If your organization is located on several sites, please estimate the total number of people altogether.

- 1
- 2–5
- 6–10
- 11–25
- 26–50
- 51–100
- 101–500
- 501–1000
- 1000+
- Don’t Know

4. Which of the following most accurately describes your organization’s status? Please tick one box.

- Public
- Private not for profit/charitable
- Private for profit
- Don’t know

5. What kind of payment scheme best describes how you are remunerated?

- Salaried
- Capitation (based on predetermined funding amount per patient)
- Fee for service/private (based on services provided, e.g., office visit)
- Mixed approach
- Principles
- Other

6. Which of the following age brackets do you fall into?

a) Under 30
e) 60–69
b) 30–39
f) 70+
c) 40–49
d) 50–59

7. What gender are you?

a) Male
b) Female
## Nature and uses of health information technology

1. How frequently do you use/perform the following functions/activities?

<table>
<thead>
<tr>
<th></th>
<th>Use routinely</th>
<th>Use sometimes</th>
<th>Use rarely</th>
<th>Do not use. It is available to me within my organization and I plan to use soon</th>
<th>Do not use. It is available to me within my organization but I am not planning to use</th>
<th>It is not available to me within my organization but I would be interested in using it if it were</th>
<th>It is not available to me within my organization and I would not be interested in using it</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) I electronically enter patient notes either during or after consultations</td>
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<td>b) I have electronic access to clinical data about a patient who has been seen by a different health organization (e.g. hospital, laboratory)</td>
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<td>c) I am electronically notified of my patients’ interactions with other health organizations (e.g. admissions to hospital).</td>
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<td>d) I electronically send prescriptions to pharmacies (e-Prescribing)</td>
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<td>e) I electronically send order requests (e.g. for lab, radiology or diagnostic tests)</td>
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<td>f) I electronically send or receive referrals to/from health professionals in other organizations (e.g. for specialist appointments)</td>
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<td>g) I communicate electronically with patients (e.g. via secure email) to support remote consultation and diagnostics</td>
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<tr>
<td>h) I communicate electronically with clinicians in other organizations (e.g. via secure email)</td>
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</tbody>
</table>
### 2. Who enters the patient data?

a) Myself  
b) Someone else

### 2a. When is this information entered?

a) During the consultation with the patient  
b) At some other time

### 3. Do you access electronic patient information remotely through the use of a mobile device (e.g. smart phone or tablet PC – not a laptop)

a) Routinely  
b) Sometimes  
c) Rarely  
d) Never
4. Please indicate which statement most closely describes how you currently enter the following data in your electronic medical record system.

<table>
<thead>
<tr>
<th>Data Category</th>
<th>This data is entered using free text i.e. unstructured information</th>
<th>This data is entered by inputing structured data typed into ready-made fields i.e. responses to specific prompts</th>
<th>This data is entered by inputing coded data i.e. information abbreviated in a standardised way</th>
<th>The data is scanned into the system</th>
<th>This data is not entered into an EMR system</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Patient demographics</td>
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<tr>
<td>b) Medical history</td>
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<tr>
<td>c) Vital signs</td>
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<td>d) Symptoms/reason for encounter</td>
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<tr>
<td>e) Clinical notes (e.g. diagnoses, patient care summaries, treatment plans)</td>
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<tr>
<td>f) Medications</td>
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<tr>
<td>g) Allergies/contra-indications/problem lists</td>
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<tr>
<td>h) Lab test results</td>
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<tr>
<td>i) Radiological images</td>
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<tr>
<td>j) Treatment outcomes</td>
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<tr>
<td>k) Claims details (e.g. pharmacy, medical or hospital)</td>
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</tbody>
</table>

5. Are you able to electronically generate the following using your organization's health information technology systems?

a) List of medications taken by patients (including those prescribed by other doctors)

b) Lists of patients by specific condition/diagnosis

c) List of patients by lab result

d) Lists of patients who are due for tests (e.g. mammogram) or preventative care (e.g. vaccinations)

e) Data relating to clinical quality of care measures
6. To what extent are the clinical patient data you collect electronically used in the following ways?

<table>
<thead>
<tr>
<th></th>
<th>Not at all</th>
<th>To some extent</th>
<th>To a great extent</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>a)</strong> Patients' clinical data are shared across my organization and used to help improve our clinical care protocols and clinical outcomes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>b)</strong> Patients' clinical data is shared with other organizations, including public health authorities, to improve protocols and patient care at the system-wide level</td>
<td></td>
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</tr>
<tr>
<td><strong>c)</strong> Patients' clinical data are shared with other organizations, including public health authorities, for population health reporting, disease management, surveillance of potential threats, etc</td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
7. Please identify which of the following patient-related technologies are available to your patients (e.g. via personal health record, patient portal, secure messaging or mobile device apps).

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>My organization has the ability to do this but does not currently</th>
<th>Don't know</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Patients can electronically access their medical information</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Patients can electronically book/change/cancel appointments</td>
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<tr>
<td>c) Patients receive electronic reminders when it is time for preventative or follow up care</td>
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<td>d) Patients can see health-related information during the consultation</td>
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<tr>
<td>e) Patients can electronically request prescription refills</td>
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<tr>
<td>f) Patients can communicate with me electronically, for example through secure email or video conferencing</td>
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<tr>
<td>g) Patients can use telemonitoring devices in order to monitor and record their own health indicators and remotely inform me of their conditions</td>
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<tr>
<td>h) Patients can electronically access health information/education to help them manage their own conditions</td>
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</tbody>
</table>
Benefits of EMR and HIE

8. To what extent is the use of electronic medical records and health information exchange enabling the following benefits?

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Impacts very positively</th>
<th>Impacts somewhat positively</th>
<th>No Impact</th>
<th>Impacts somewhat negatively</th>
<th>Impacts very negatively</th>
<th>Don't know</th>
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</thead>
<tbody>
<tr>
<td>a) Improved diagnostic decisions</td>
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<tr>
<td>b) Improved quality of treatment decisions</td>
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<tr>
<td>c) Reduction in medical errors</td>
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<tr>
<td>d) Improved health outcomes for patients</td>
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<td>e) Reduced costs for my own organization/service</td>
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<tr>
<td>f) Improved cross-organizational working processes</td>
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<tr>
<td>g) Increased speed of access to health services for patients</td>
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<tr>
<td>h) Improved patient access to specialist health care services</td>
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<tr>
<td>i) Improved doctor-patient relationships</td>
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<tr>
<td>j) Reduced waiting lists/waiting times</td>
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<tr>
<td>k) Increased numbers of patients that can be seen per day</td>
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<td>l) Reduced numbers of unnecessary interventions/procedures</td>
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<td>m) Improved coordination of care across care settings/service boundaries</td>
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<tr>
<td>n) Reduced risk of litigation</td>
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<tr>
<td>o) Improved work-life balance</td>
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<tr>
<td>p) Better access to quality data for clinical research</td>
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</tbody>
</table>
9. Please select the 5 main barriers to the adoption and use of electronic medical record systems and health information exchange in your organization.

Rank as 1, 2, 3, 4 and 5 in order of importance, with 1 being most important and 5 being least important.

<table>
<thead>
<tr>
<th>Barriers</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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</thead>
<tbody>
<tr>
<td>a) Lack of easy access to a computer</td>
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<td>b) The system is too difficult to use</td>
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<td>c) Cost to my organization</td>
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<td>d) Lack of technical expertise to manage implementation</td>
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<td>e) Low IT literacy/lack of training among clinicians and staff</td>
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<td>f) Benefits are unclear/unproven</td>
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<tr>
<td>g) Concern about loss of productivity/too time consuming to input data</td>
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<td>h) Decrease in clinician and staff job satisfaction</td>
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<tr>
<td>i) Concerns about privacy and security of patient data</td>
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<td>j) Lack of financial incentives</td>
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<tr>
<td>k) Higher risk of medical liability</td>
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<tr>
<td>l) Lack of viable EMR products</td>
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<td>m) IT systems that can’t ‘talk’ to each other</td>
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<tr>
<td>n) Lack of trust between organizations in sharing data with each other</td>
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<tr>
<td>o) Incomplete or poor quality data entry</td>
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<td>p) Lack of high speed bandwidth</td>
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<td>q) IT systems old/slow</td>
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<tr>
<td>Other, please specify</td>
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</tbody>
</table>
10. Do you receive any financial support or incentives (e.g. bonuses, higher fees, special payments, other kinds of reimbursement) to use health information technology in relation to:

<table>
<thead>
<tr>
<th>Service</th>
<th>Yes</th>
<th>No</th>
<th>Don’t know</th>
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</thead>
<tbody>
<tr>
<td>Non face to face interactions with patients (e.g. via email or telephone)</td>
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<tr>
<td>Achieving specific clinical quality of care targets</td>
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<tr>
<td>Proactively managing patients with chronic conditions (e.g. diabetes, asthma)</td>
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<tr>
<td>Providing enhanced preventative care</td>
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<tr>
<td>Coordinating care with other health provider organizations</td>
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</table>

10a. If ‘NO’ or ‘DK’ to any of the above:
How likely would you be to use health information technology in relation to each of the following if you were to receive any kind of financial support or incentive to do so?

<table>
<thead>
<tr>
<th>Service</th>
<th>Very likely</th>
<th>Fairly likely</th>
<th>Not very likely</th>
<th>Not at all likely</th>
<th>Already doing without any financial support or incentive</th>
<th>Don’t know</th>
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</thead>
<tbody>
<tr>
<td>Non face to face interactions with patients (e.g. via email or telephone)</td>
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<td>Coordinating care with other health provider organizations</td>
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</table>
Data Security and Patient Consent

11. Which of the following do you believe are in place to ensure the confidentiality and security of sensitive data?

a) Password or smartcard access to computers
b) Restricted access computers
c) Separate password protection of sent or received files
d) Encryption of information within your systems
e) Encryption of all sent and received files
f) Digital "signing" of information such as prescriptions, death certificates and post mortems
g) Protocols and policies targeted at data security
h) System(s) for data back-up with a backup regime
i) Other, please specify

12. Which of the following types of information do you provide to patients in relation to their privacy rights (for example, through posting of notices, brochures and pamphlets, and/or discussions in the normal course of exchanges that take place between you and your patient)?

a) What information is being collected about them
b) The purposes for which the information is being collected
c) How that information will be used by the provider/health facility/agency
d) To whom the provider/health facility/agency will disclose the information
e) How the patient can seek access to and corrections to their health record
f) How the patient can exercise their rights with concerns about the organization's personal information practices
g) We don't provide patients with information regarding their privacy rights
h) Don't know
13. What approach does your practice/hospital take to obtaining explicit informed consent from patients for the storing and sharing of their personal health data?

a) We seek advance oral consent from patients to share their health information with other health organizations (patients “opt in”)

b) We seek advance written consent from patients to share their health information with other health organizations (patients “opt in”)

c) We provide patients the right to “opt out” of having their health information shared with other health organizations

d) We include all patients’ health information in our electronic system and share it with other health organizations, giving notice to or educating patients about the process (“notice only”)

e) We take a blended approach, employing different options as appropriate, depending on the particular uses of information and who has access to it

f) We do not take explicit consent from patients

g) We are not required to obtain explicit consent from patients concerning their personal health data

h) Don't know

14. How often do you seek patient consent?

a) Only on the first encounter

b) It is renewed at each clinical encounter

c) It is renewed after a specified amount of time

d) It’s not consistent

e) It depends upon the provider
About Accenture’s methodology
In 2011, Accenture explored the distinguishing characteristics of connected health systems in eight countries: Australia, Canada, England, France, Germany, Singapore, Spain and the United States. It looked at how these countries, with their very different health systems, are progressing in setting up connected health networks and systems and how they are using the components of connected health to support the move to integrated healthcare.

The research entailed a literature review and more than 160 interviews with healthcare experts and health system leaders in the eight countries, including government officials, clinicians and clinical organization leaders, healthcare IT executives, and academics and analysts.

Accenture also conducted an online survey with 3,727 physicians in the eight countries (approximately 500 each in Australia, Canada, England, France, Germany, Spain and the US, and approximately 200 in Singapore), which provided comparative data on physicians’ use of different functionalities of connected health. The survey also captured attitudinal data on the perceived benefits of connected health with respect to several dimensions of quality, access and cost, and explored physicians’ views on the barriers and incentives to encourage adoption and use.

Finally, Accenture conducted further in-depth secondary research and consulted with academic experts and other subject matters experts to compile a list of health systems and organizations that are widely seen to be leading the way in connected health. From that, it developed 10 case studies of connected health systems that represent the benchmark for good practices.

Accenture: Insight Driven Health
Insight driven health is the foundation of more effective, efficient and affordable healthcare. That’s why the world’s leading healthcare providers and health plans choose Accenture for a wide range of insight driven health services that help them use knowledge in new ways—from the back office to the doctor’s office. Our committed professionals combine real-world experience, business and clinical insights and innovative technologies to deliver the power of insight driven health. For more information, visit: www.accenture.com/insightdrivenhealth.

About Accenture
Accenture is a global management consulting, technology services and outsourcing company, with approximately 244,000 people serving clients in more than 120 countries. Combining unparalleled experience, comprehensive capabilities across all industries and business functions, and extensive research on the world’s most successful companies, Accenture collaborates with clients to help them become high-performance businesses and governments. The company generated net revenues of US$25.5 billion for the fiscal year ended Aug. 31, 2011. Its home page is www.accenture.com.

Rick Ratliff
Global Managing Director
Accenture Connected Health Services
+1 703 947 2525
richard.ratliff@accenture.com

www.accenture.com/connectedhealthstudy