

# **eHealth Best Practices - Optimizing Efficiency and Quality of Care: Global Case Studies in Asia/Pacific, Europe and Americas**

## **WHITE PAPER**

Sponsored by: GE Healthcare

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## **HEALTH INDUSTRY INSIGHTS OPINION**

The single most important reason for adopting eHealth is to transform healthcare into an evidence-based practice of medicine, whose main objectives are improving care quality, reducing cost and errors, and increasing access to quality care. The practice of medicine needs to catch up to the new “connected” society to reap the benefits made available to practitioners (accurate diagnosis, timely delivery of care) and to optimize information and communication technologies (ICT) as an enabler of progress at the forefront of patient care. Creating an electronic health record (EHR) and a unified system to be accessed by all major stakeholders in healthcare – care providers, patients, payers and policy makers – becomes a critical foundation for the practice of evidence-based medicine. The healthcare industry is one of the most data-intensive sectors, and it requires up-to-date information and communications technologies to manage the ever increasing amount and complexity of medical information. The current drivers of eHealth globally include:

- Increasing expectations for the best care available and for equality in access to quality care;
- Increasingly mobile patients and healthcare professionals;
- An increasing need for a patient-centric healthcare that enables patients to participate in managing their care;
- An increasing need to respond effectively to emerging diseases;
- A rising demand for home care and service due to aging populations and chronic diseases; and
- The need to gain efficiency and manage escalating costs in delivering care, such as reducing duplicate tests and exams, and minimizing errors.

eHealth can be defined as the sum total of capabilities that enhance healthcare delivery by connecting providers, patients and others in the healthcare ecosystem. An eHealth-enabled system adds value to connectivity through advanced methods of improving quality, increasing access, and lowering the cost of healthcare for the individual and society. For example, eHealth includes solutions for disease management, physician-to-physician and physician-to-patient communication, as well as smart, user-friendly personal health records that empower individuals to optimize their health and that of their family members. eHealth is a vision for a healthcare

ecosystem that ensures the highest quality care for the greatest number of people at a cost that will be sustainable over time.

## **IN THIS WHITE PAPER**

This White Paper is presented by IDC Health Industry Insights and sponsored by GE Healthcare. The objective of this research was to gain insights into:

- The drivers and decision-making process for investment in eHealth solutions
- Barriers and challenges to the implementation and utilization of eHealth solutions
- Benefits derived from the adoption of eHealth solutions

To meet this objective, IDC Health Industry Insights conducted several in-depth interviews with early adopters of eHealth solutions. These healthcare organizations included:

- Hong Kong Hospital Authority (HKHA) in Hong Kong
- The University Hospital Heidelberg in Germany
- The Southwestern Ontario Diagnostic Imaging Network (SWODIN) in Canada
- Memorial Hospital of Rhode Island (MHRI) in USA

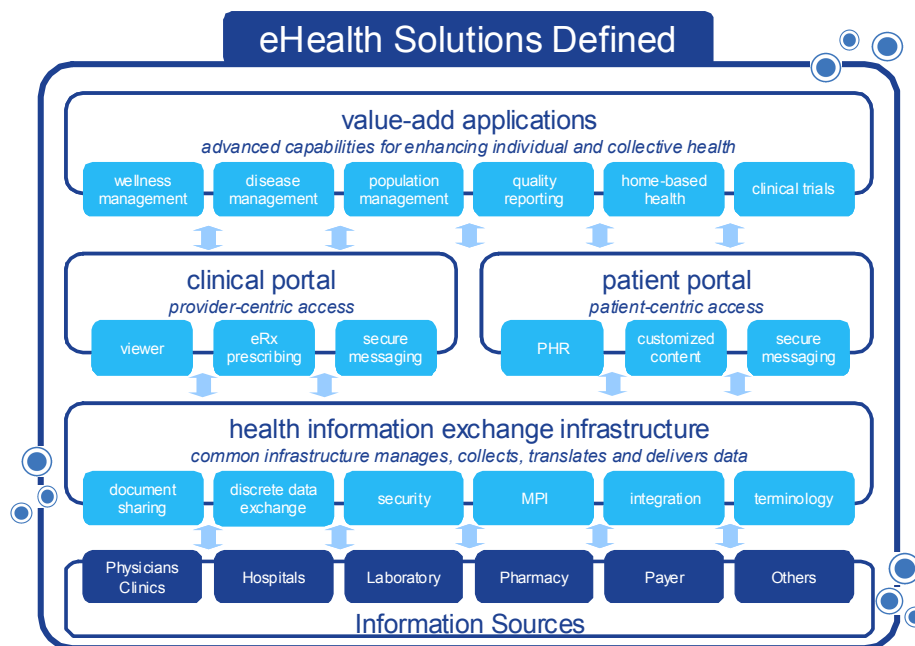
## **SITUATION OVERVIEW**

Most industrialized countries are focused on implementing EHR solutions to improve the quality and safety of patient care and system efficiency. Some of the countries currently focused on EHR implementations include Canada, United Kingdom, Australia, New Zealand, Denmark, Sweden, Hong Kong, Singapore and Korea. At the national level, the goal for EHR is to have a “one patient, one record” that allows for a true longitudinal view of the patient data. Recent developments in eHealth are moving in several key fronts toward an evidence-based practice of medicine in a connected environment: digitization of health information for interoperable EHRs; Web-based communications solutions for a seamless transfer of patient information from one institution in one region to another in a different region; integration of existing systems for a cost-effective way of implementing eHealth; consumer participation in healthcare; and remote diagnosis, consultation and monitoring of patients through telehealth programs.

## What is eHealth and Why Invest in it?

eHealth means the deployment of ICT in the healthcare industry to enable more effective and efficient care. eHealth covers communication of information between patients and doctors, transmission of data between institutions, and peer-to-peer communication between patients and/or healthcare providers. eHealth comprises EHRs, health information networks, telemedicine, hi-tech clinical equipments, mobile communication devices, health portals, and many other ICT-based tools assisting disease prevention, diagnosis, treatment, health monitoring and lifestyle management. Figure 1 summarizes the various elements of eHealth.

**FIGURE 1**



Source: GE Healthcare, 2009

eHealth improves the quality of healthcare first by better informing both healthcare professional and patients. With the patient's consent, his or her patient-specific information can be easily accessible and sharable so that diagnosis and treatment can take place in a timely fashion with accuracy and at any point of care. The ease of access and transfer of actionable information can also enable constant monitoring of patients at their homes. And through patient portals on the Web, patients can stay informed, form online support groups, and participate in the management of their care. With a long-term outlook, the future of eHealth can provide better organization of information using EHRs so that all activities related to providing healthcare can be connected, enhancing productivity and efficiency.

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## **BENEFITS OF EHEALTH**

Debates about the healthcare reform around the globe center on the need for cost-effectiveness of healthcare. But the overall value of eHealth for improvement of healthcare should be beyond doubt, and the global community interested in reducing the cost of healthcare, increasing access to healthcare, and improving the overall quality of healthcare should be moving toward a comprehensive, universal implementation of eHealth. The benefits of eHealth are manifold:

- It improves the cost efficiencies of care delivery by maximizing the effectiveness of all healthcare professionals;
- It ensures the quality and safety of treatments by minimizing errors and faulty diagnoses (e.g., decreases adverse drug events);
- It eliminates redundant tests and treatments, thereby reducing costs;
- It allows patients to become informed and educated consumers of care;
- It increases patient participation in managing their health;
- It improves care delivery to remote or rural regions;
- It increases the capability for managing public health; and
- It increases speed and accuracy in detecting infectious disease outbreaks

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## **CHALLENGES**

Many challenges still lie ahead for eHealth. First of all, eHealth requires more commitment and leadership from both policy makers and healthcare providers, and significant investment must follow their commitment to eHealth. Secondly, eHealth systems must be interoperable, secure and user-friendly. In order to achieve ubiquitous healthcare, eHealth systems must manage increasingly large amounts of data that need to be made available securely and timely at any point of care. Another significant hurdle is the slow cultural change in the provider community: many practicing physicians began their careers long before the digital age and are not accustomed to creating and using electronic care records.

Another critical challenge is the partial and fragmented implementation of eHealth initiatives. Cost and lack of standards and semantic interoperability have created the problem of ad hoc developments that may ultimately raise the cost of eHealth implementation.

The problems created by uneven, uncoordinated adoption include the following:

- Partial implementation that have not reached full maturity will incur further costs of updating or replacing existing systems;

- Uncoordinated development undermines the very benefits of eHealth such as elimination of redundancies and reduction of errors through exchange of accurate information; and
- It hampers latest innovations in healthcare such as telemedicine.

For countries taking on the EHR challenge and already on the eHealth journey, other challenges exist:

- Equal access for both public and private providers, including general practitioners (GPs);
- Privacy and security framework;
- Performance at the technical level that needs to include non-text data such as digitized radiology images and x-rays; and
- Performance at the clinical level that needs to include clinical workflows (e.g., case management, basic disease management, eReferrals, clinical quality monitoring, and adverse drug reaction surveillance) Leadership, governance and change management.

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## **GLOBAL INITIATIVES IN EHEALTH – EXPERIENCES OF LEADING-EDGE ADOPTERS**

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### **Europe – Key Trends**

A significant effort currently underway in Europe is epSOS ([www.epsos.eu](http://www.epsos.eu)), the first pan-European project that seeks to demonstrate cross-border interoperability of EHRs between European countries. Additionally, key European countries such as Denmark, England, Wales and Sweden are carrying out pilot eHealth infrastructure projects at the national level to implement interoperability standards and architecture that are compatible with, if not based on, Health Level 7 (HL7) version 3 for message transferring and Integrating the Healthcare Enterprise (IHE, [www.ihe.net](http://www.ihe.net)) for a standardized approach to sharing of clinical documents. So far, Denmark has successfully achieved the goal by developing a common infrastructure based on MedCom, their own standard for messaging, but it is currently discussing mapping MedCom onto HL7 v.3. Sweden plans to carry out a “national information structure” project and has studied national projects in Denmark, England, Canada and New Zealand. One recommendation that stands out in Sweden’s study is to decentralize IT development by giving responsibility to local organizations for implementing their own solutions that are compatible with the national architecture and standards. An attempt to coordinate these and future national initiatives was made by the European Commission which in 2004 adopted the “European e-Health Action Plan.” The action plan articulates the EU’s vision of eHealth as an integral part of the member nations’ healthcare policies.

Among the challenges the action plan enumerated were a lack of standards and regulation and the fragmentation of the eHealth solutions market in Europe. Custom solutions built by many small and midsize companies and solutions developed internally by the healthcare organizations contributed to a fragmented market, and the cost of implementing these custom solutions kept on rising.

A potential challenge on the horizon for European eHealth, according to the plan, is the mobility of patients who sometimes prefer or need to seek care and treatment in a different country. Cooperation among member nations on eHealth policies and interoperable EHRs is needed to ensure the patient's right to seek care anywhere in the EU region. For instance, to treat patients with rare diseases, EU has created the European Reference Network consisting of Centers of Expertise so that patients can be treated at these centers even if they are not located in the patients' own countries.

Even though nationalizing eHealth is still very much in its infant stages, EU has begun to hold annual high-level eHealth conferences since 2003, and the themes that are consistently emphasized are cross-border interoperability of EHR systems and the deployment of telemedicine. A step in the right direction is the European Commission's publication in 2007 of the draft guidelines on eHealth interoperability. Large pilot projects have been launched to demonstrate that interoperability is achievable and to stimulate the eHealth solutions market.

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### **European Case Study - Heidelberg (Germany)**

The University Hospital Heidelberg in Germany consists of 2,000 beds and treats over 300,000 patients per year, and in such large hospitals, it is common for patients to be transferred to other hospitals and medical facilities within the geographic region. In such a complex care environment, seamless exchange of patient information and medical reports across institutions is critical to ensure continuity of care for the patient after being transferred to a different institution.

The University Hospital Heidelberg and the hospitals of the Rhine-Neckar Health Centers sought a solution that would create a cross-facility or cross-institutional patient record for the hospital's Intersectoral Information System (ISIS) and at the same time include a personal health record (PHR). They chose ICW's networking solution, Professional Exchange Server (PXS) and LifeSensor which uses existing systems as well as global standards such as HL7 or IHE profiles. PXS has been successfully tested for conformity with IHE PIX and other profiles at the European Connect-a-thon in 2007.

Prof. Dr. Bjorn Bergh (Prof. for Medical Information System, CIO and Head of Medical Engineering) at Heidelberg University Hospital states, "When choosing a vendor, make sure that you choose a global vendor that supports international standards that can be expanded upon, since interoperability is one key challenge in eHealth."

The centerpiece of PXS is the Master Patient Index (MPI) that can uniquely identify a patient from patient information stored in different systems used by different institutions. It assigns patient data kept in various institutions' systems to individual patients. The MPI can handle 100 million data sets consistently under one second. This solution is not only suited for clinical associations in a small region but also for national-level connectivity projects.

The University Hospital's ISIS allows authorized medical personnel to view Web-based medical documents of patients after allowance by the patient. The patient is at the core and steers all access processes. The PXS makes patient information centrally available to physicians and nurses who can have a consolidated view of the patients' electronic medical records. These records are secure and can only be

viewed by nurses and physicians when the patients grant access and they are involved in treating the patient.

Prof. Dr. Bjorn Bergh states, "Combination of personal health record (PHR) and EHR is essential since all EHRs alone violate the citizen's and patient's privacy rights. Proper privacy can only be ensured when the patient controls all accesses."

The lesson to be learned from this case study is that the combination of PHR and EHR is essential; a solution can be implemented without getting rid of the existing systems, thereby not wasting the investment already made. It is important to build a solution based on common standards of information exchange, such as HL7, and that solutions can be expanded to cover large geographic regions to allow patients greater mobility. ICW has shown that interoperability can be achieved by working within existing software and system environments. Furthermore, this inter-facility solution within a small geographic region can serve as a model for larger geographic regions.

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## **North America – Key Trends**

Canada has a successful national eHealth program that concentrates on common architectures and standards for interoperability, while allowing individual organizations and local regions to implement their IT systems. Though the United States lacks a national eHealth program, there is significant investment in standards for data sharing, and the work of the Healthcare IT Standards Panel (HITSP) has adopted many of the profiles generated by the global organization Integrating the Healthcare Enterprise (IHE, [www.ihe.net](http://www.ihe.net)), such as the XDS series of profiles. One notable trend is the growth of regional health information organizations (RHIOs) and health information exchanges (HIEs). IDC Health Industry Insights estimates that around 200 RHIOs and HIEs are in various stages of maturity in the United States. About 20% of Americans live outside metropolitan areas, and they tend to be older, poorer and sicker than Americans living in cities. Rural healthcare in North America are faced with higher numbers of uninsured residents, shortages of physicians, smaller hospitals and clinics with a wide variety of IT infrastructures and limited access to IT professionals. These challenges have fueled the growth of information exchange networks to integrate care organizations within large geographic regions in order to improve patient safety and quality of care in rural areas. The US federal government recently allocated nearly \$600 million to be awarded to individual states for the establishment of HIEs to support interoperability of electronic medical records (EMRs). The regulatory guidelines that will govern the HIE interoperability standards are now being finalized and are expected to borrow heavily from the work of HITSP and include most of the previously recognized interoperability standards based on IHE profiles (such as XDS and XDR).

IDC Health Industry Insights defines RHIOs as entities that formalize HIE efforts by establishing a governance structure, developing and managing a set of contractual terms, arranging for electronic data exchange, and developing and maintaining HIE standards for healthcare organizations collaborating within a geographically defined region or community.

The familiar drivers of eHealth also motivate the development of RHIOs, but one critical need in rural areas is to connect primary care physicians in the local healthcare network where the patient lives, with specialists in major hospitals hundreds of miles away where the patient might have received care or consultation. With an HIE system, EHRs with patient histories, lab results, images, and so on, can

be shared between physicians and specialists in order to make consultation and treatment less time consuming, less costly, and more effective.

RHIOs with easy access to information can also help overcome the challenge of geographic distance by augmenting the clinicians' ability to treat their patients remotely. One particular advantage RHIOs offer is in identifying and monitoring patients with chronic diseases such as diabetes, hypertension, obesity or congestive heart failure using disease registries.

With economic affluence and increased life expectancy, the demand for constant care for patients with chronic diseases will see a dramatic increase. A related development to highlight in North America is remote patient monitoring, a subset of telemedicine. Other countries in both Asia and Europe have also begun telemedicine programs since the 1990s. But in the United States, the need for remote patient monitoring is particularly acute.

Deployment of advanced communications technologies will be critical to timely intervention and management of patients in order to reduce costly chronic disease-related complications. ICT solutions must focus not only on patient monitoring but also on patient-provider communication; ICT solutions must also enable and enlist patients as participants in care. Business rules could be established to trigger immediate follow-up actions depending on the level of urgency, from the non-urgent scheduling of tests and consultations to an instant message to the first available specialist.

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### **North American Case Study – The Southwestern Ontario Diagnostic Imaging Network (SWODIN)**

SWODIN comprises four Local Health Integrated Networks (LHINs) in the Canadian province of Ontario, and it connects radiologists, referring physicians and specialists across Southwestern Ontario and allows them to instantly access, exchange and store diagnostic images and reports. According to Canadian Healthcare Technology, SWODIN is “a revolutionary technology and infrastructure network that allows medical professionals to instantly access, exchange and store patient images.” It is the first network of its kind in North America to provide access to a comprehensive record of patient images acquired at multiple facilities from multiple vendor platforms.

Prior to the implementation of SWODIN, medical organizations in Southwestern Ontario faced numerous challenges. Patients had to travel great distances to seek consultation and treatment at different hospitals; physicians in rural hospitals faced a lack of access to specialists and radiologists; patients had to go to different hospitals for x-rays, CT exams, ultrasounds, mammograms, MRIs, and so on, because local facilities did not house all imaging equipment; children had to be re-radiated for duplicate images; a mix of different RIS and PACS vendors created a challenge for interoperability. These adverse conditions created a need to share health information, including images and reports.

In order to overcome these challenges and increase speed of diagnosis and treatment, SWODIN engaged GE to create a central image and report repository, or Diagnostic Image repository (DI-r), that is vendor neutral and that provides a longitudinal patient view for the entire Southwestern region.

GE's DI-r solution leveraged all existing RIS and PACS systems in creating a common archive that provides immediate access to all clinical imaging information. It consisted of multiple components:

- The Patient Normalization Solution (PNS) accepts HL7 feeds from all participating care facilities within DI-r and matches patient information to create a "single patient folder";
- Centricity OneView creates and maintains longitudinal patient records and functions as a user-interface for the DI-r;
- Centricity Enterprise Archive (EA) store images and updates Centricity OneView, and is configured to maintain organizational identity (each hospital with its own archive); and
- Centricity Web, integrated with EA, is used to view images on the DI-r.

Results and benefits include millions of images sharable to date, 25%-30% efficiency improvement for radiologists and other technicians; improved diagnostic turnaround time; and reduced patient transfers. Also, GE's solution successfully established a building block for regional- and national-level HIEs.

According to Babette MacRae, SWODIN Director, after the implementation was successfully completed, "The benefits started with PACS with focus on the radiology department, but we realized that the DI-r implementation impacts the larger clinical community more, and is especially beneficial for specialty hospitals such as the Cancer Centre and Women's and Children's hospital. In the rural communities, patients often have to travel to different hospitals, depending on the type of Radiology exam required. The local hospital may have general x-ray, but not CT, MR or Mammography. The patient may then have to go to multiple locations to obtain all the relevant history information before going to their referred specialty. Now we can have more effective consultation by sharing the images."

Ms. MacRae continues, "This also cuts down on the need to duplicate exams. If we have the complete history, we can avoid repeating procedures. This is especially important in pediatrics where there may also be a great deal of fear and anxiety. As a large teaching facility, we have also found that it facilitates teaching and reduces the need to travel when the training can be facilitated remotely thus reducing time away from taking care of patients and the need to backfill."

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### **North American Case Study – Memorial Hospital of Rhode Island (MHRI), USA**

Memorial Hospital of Rhode Island is a community hospital equipped with 294 beds and is a teaching affiliate of The Warren Alpert Medical Schools of Brown University. It is also home to the Center for Primary Care and Prevention, which proposed a joint venture with the hospital to build a patient-centered medical home model of care to save on costs and to deliver improved care. In this prototype of care management, the patients have a better communication access to providers and can also track and store their own health and wellness information.

The project, named "Project Anchor," involved an implementation of secure messaging and bidirectional communications between patients and providers. This solution aims to allow patients to be actively involved in managing their health

information such as glucose readings, blood pressure, weight, exercise regimen, and other relevant metrics that would aid the physician in providing informed care.

Project Anchor is a two-phase solution that uses GE's Professional Exchange Server (PXS). Completed in 2008, Phase I of the project involved securely transferring key patient data from MHRI's GE Centricity EMR to the Web-based LifeSensor PHR using PXS. Key patient data includes active medications, problem lists and laboratory data. A pilot group of 200 patients were used in the project to demonstrate its viability.

Phase II focuses on patient participation in communication with providers and in managing their health information. The expanded functionality of the interoperable platform can deliver:

- Automatic population of discrete data fields (e.g., medication history, allergy, and cholesterol level) from Centricity EMR to LifeSensor;
- Automatic upload of readings (e.g., blood pressure) from home devices to LifeSensor;
- Secure two-way email from patient to provider and back to patient;
- Secure patient requests for e-visits, consultation and prescription refills; and
- Web 2.0 social networking through LifeSensor to promote peer support.

Dr. Charles Eaton, Director of Center for Primary Care and Prevention, states, "The patients are more engaged in that they can communicate more easily with us; when they need to get drug refills, they can just email us. And we can have things prearranged so that the lab results are sent to their PHR, so the exchange of communication appears relatively seamless to the patient and the communication is more efficient. Also for the patients who have chronic disease such as diabetes, the PHR helps them to better track and manage their conditions since they may have several comorbid conditions. Since we are a family practice, mothers with children can now easily track all the key health records for the family, such as their children's immunization records and physical examinations, through their PHR."

One key lesson that can be learned from this case study is that involving the patients in an active management of their care can give them a sense of empowerment. Also, it can reduce the cost of care by enabling early detection and preventing complications. As the number of older patients with chronic diseases begins to increase, hospitals will need to develop a solution that can make care cost effective and patients more connected to care delivery.

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## **Asia/Pacific – Key Trends**

There has been significant attention given to eHealth in the Asia/Pacific region. In the past few years, Taiwan has successfully implemented its healthcare 'Smart Card' for each of its citizens to get closer to Ubiquitous Health. The Singapore government has announced that by 2010, the island-state will have a national EHR system. In Australia, New South Wales (NSW) started its EMR program in 2007, one of the largest clinical information system implementations outside of the United States and the United Kingdom and involves developing and implementing EMR on a statewide basis, including the Electronic Discharge Referral System. New Zealand enjoys one of the highest rates of EMR adoption by GPs. Since 2006, Hong Kong is investing in

shared health information from public to private health organizations. Currently many other Asia/Pacific countries are adopting health informatics and ICT practices to gain additional traction on eHealth.

Looking back to the 1990s, ICT enabled many countries in the Asia/Pacific region to implement telemedicine programs, an early focus of eHealth, to service both highly mobile populations and remotely located populations by providing expert diagnoses and consultations. To highlight some examples, in 2000, the Malaysian Ministry of Health, working in conjunction with WorldCare, established the world's first comprehensive teleconsultation network, connecting 41 health centers in Malaysia. Malaysia has also introduced a prototype project that uses mobile phones to provide pregnancy support to women in rural areas with information, monitoring, and check-ups through a Web portal. Countries with an aging population such as Taiwan, Japan, and Singapore are developing advanced home monitoring systems.

Even as telemedicine initiatives are receiving much attention, one major obstacle they face is the technical barrier created by a lack of interoperability and standards for eHealth applications. There is clearly a growing need for integration among the Asia/Pacific countries. Cooperative and coordinated development across the region will prove cost effective in the long run. Coordinated development in eHealth can have the following benefits that improve the quality of care and make care cost-effective:

- Standardization of norms, guidelines and policies in healthcare can enable a much more efficient collection and sharing of technology and strategies;
- The ease with which technology, strategies as well as expertise can be shared across the region can allow countries to continue to develop their own strengths that complement each other; and
- eHealth can create a better educated citizenry who can be used as a resource in improving the quality of care that they receive.

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### **Asia/Pacific Case Study – Hong Kong Hospital Authority**

Hong Kong Hospital Authority (HKHA) was established in 1990 to manage all public hospitals and clinics in Hong Kong, with 43 hospitals, 29,000 beds and over 50,000 staff. The Hospital Authority serves 7 million Hong Kong residents. These hospitals manage more than 1 million inpatient episodes, over 8 million outpatient visits, 2 million emergency visits, and 5 million general outpatient attendances.

In the past, hospitals in Hong Kong were not effectively sharing medical records, and data were being replicated when patients visit different healthcare facilities. Multiple data captures caused inefficient use of hospital resources and lowers the integrity of the patient record.

HKHA is a firm believer in utilizing IT to improve the effectiveness of healthcare practices. Since 1999, HKHA hospitals have been using a centralized clinical management system (CMS) and electronic patient records (ePRs) across all 43 public hospitals to track a patient's longitudinal medical history. The system allows HKHA to handle nearly 8 million patient records with 30,000 clinical users who make 3.5 million transactions and access patient records 700,000 per day.

“Modern healthcare is an incredibly complicated multidisciplinary activity, and in fact, is probably the most information-intensive industry in the world today,” says Dr. NT Cheung, Chief Medical Information Officer of the HKHA. “We see using a centralized, fully integrated CMS and ePR across all our hospitals, with seamless access of all patient records, as essential to providing safe, high-quality care to the population of Hong Kong.”

Over the years, some of the HKHA hospitals implemented Picture Archiving and Communications Systems (PACS) to manage clinical images like x-rays. However, these systems were implemented in individual hospitals and again, patient images were not shared among the hospitals. Leveraging a similar approach as CMS and ePR, HKHA decided to engage GE to implement a central medical image repository. The project first began by integrating the existing PACS systems of four hospitals to the new image distribution data center. The center can manage 30 TB of centralized storage and over 2 million patient examinations per year. With the central image data center repository developed, HKHA then implemented GE’s Centricity Enterprise Web Solution that linked with HKHA’s legacy ePR software backbone. This image distribution project was initially piloted at four hospitals, then expanded to 10 hospitals, and eventually to all public hospitals in Hong Kong. The result, so far, is that physicians in the Hospital Authority can now access, anytime and anywhere, the entire clinical history of patients including diagnostic images.

Leveraging a centralized ePR and image distribution solution enabled by GE Centricity, the HKHA’s hospitals can improve care processes and outcomes with shorter time for diagnosis. This leaves more time for physicians to tend to their patients. According to Dr. N.T. Cheung, “This access to real-time records and images enable doctors to make better decisions and provide more timely and effective treatments.” Furthermore, all relevant patients’ health information can also be accessed instantly by pharmacies as well as private clinics.

A survey conducted in 2007 of over 300 physicians revealed that over 70% of respondents found the system to be easy to use and needed little training. But more importantly, 80% believed the solution was helpful in patient management.

The lessons learned from this case study include a need for central repositories of medical data that can be distributed to different points of access. Besides compromising patient care quality, too much time, money and storage space are wasted when data needs to be replicated at each point of care. Also, ability to integrate to existing systems and capability for future expansion are vital to maximize the return on investment. To ensure that patients have continuous care no matter which hospital they visit, caregivers must have Web-based access to information stored centrally.

The HKHA case also demonstrated the value of a centralized EHR, which enable the creation of a content-rich patient longitudinal record with highly structured data. As HKHA system continues to evolve and adopt additional capabilities, including clinical terminology, advanced clinical decision support, and so on, they are well prepared to achieve the ultimate goal of eHealth, to transform healthcare into an evidence-based practice of medicine.

While HKHA consists of public hospitals only, pharmacies, private clinics and GPs can, with proper IT infrastructure, access patient information stored in their central repository so that patients can experience continuity of care without the hassle of duplicating their medical data.

"Next stage in Hong Kong's vision for the future is a fully integrated healthcare IT infrastructure that links all the public and private healthcare sectors together, and opens up the linkage to other segments such as the private hospital and the general practitioners (GP). It will be a total government eHealth agenda that will integrate care between primary and secondary levels and improve clinical processes at all different levels of care. Since the government has already approved Phase I of the EHRs for all of Hong Kong, the next focus is Phase II; it will include the patient portal and expand eHealth in Hong Kong beyond clinical management systems (CMS).

Dr. Cheung continues, "Hong Kong is investing approximately 5% of its GDP to provide one of the best levels of healthcare worldwide, and the government attributes a lot of credit to the use of IT.

"Next stages will build upon the benefits already gained," he adds. For this, Dr Cheung emphasizes the importance of clinical information standards, EHR standards, coordinating with all the key stakeholders for eHealth interoperability both internal and externally.

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### **Common Traits Among End Users Interviewed – Understanding the Value of an Interconnected Model**

The end-user organizations consistently express their willingness, as early adopters, to embrace new technology. Successful organizations share two common traits. First, they share a long-term strategic vision of how eHealth solutions can be brought together to create a more efficient and effective care environment. Second, these organizations share a commitment to utilizing technology as a catalyst for that change.

But the most notable common trait among these organizations is the diversity of paths they follow with respect to the technologies they select and their approaches to implementation. This diversity was a product of the organizations' business priorities, budgets, and existing technical environment.

## **FUTURE OUTLOOK**

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### **Challenges/Opportunities**

Over the past decade, the practice of medicine has evolved through the influence of digital technologies of many kinds, but until recently, investment in information technology had been largely limited to automating and digitizing isolated areas of clinical practice – converting medical diagnostic imaging from film-based to digital media, monitoring the vital signs of critically ill patients, analyzing laboratory specimens and distributing results electronically, just to name a few. But the digital future of healthcare, or evidence-based medicine, requires a coordinated effort by healthcare organizations worldwide to link these isolated areas of automation into a coherent, integrated, patient-centered digital record, one that provides caregivers instantaneous access not just to data related to the patient's current medical need, but to their full medical history. The use of digital patient information in the delivery of care will become as ubiquitous as paper is today. Leveraging the value of electronic record-keeping will require that healthcare organizations invest in the technologies that can deliver information quickly and easily to those who must act on it whenever

and wherever. The convergence of communications technologies and integrated solutions, whether the data is image, voice or text, is the catalyst for the best practice of medicine and for accommodating the changing needs of tomorrow's patients.

GE Healthcare can improve upon its integrated delivery of connected care by providing its best practices knowledge of international standards and interoperability to its global clients. GE Healthcare is committed and continues to be involved in many international standards setting organizations such as HL7. Also looking inward within this global organization, GE Healthcare will continue to improve upon how it works across the different regions and share how different regions are able to achieve the high key performance indicators (KPIs).

## **ESSENTIAL GUIDANCE**

Healthcare provider organizations considering an investment in eHealth solutions face a high level of complexity in their selection decisions. Some specific considerations include:

- Plan big but start small.
- Plan ahead and understand integration strategies. Solutions integrated into the clinical workflow are critical; yet end users often defer the development of a comprehensive integration strategy until after the implementation of their clinical systems is completed.
- Check the readiness of the organization.
- Get clinical staff buy-in. Vendor products should be reviewed by a multidisciplinary team who can evaluate options and test new technologies and processes in order to ensure that they can meet the needs of all impacted staff groups before a system is selected.
- Understand your budget. End users should also consider the total cost of ownership, including maintenance and support required.
- Outline your success factors ahead of time. eHealth implementations need to be clearly tied to some metrics of ROI as well as less-quantifiable benefits associated with increased communication and improvements to the quality of care.

## **CONCLUSION**

The journey towards an integrated enterprise-level eHealth is a long one. As nations move towards a national-level EHR connecting EMRs through HIEs and adopting interoperable standards, the maximum level of benefit will be made available to all the participants in the fuller healthcare ecosystem. However, as nations work on a larger agenda, providers of healthcare must work within the current system to make improvements in ICT in the realms that are within their reach. Throughout the continuum of care, eHealth aims to close the gaps that exist in the current healthcare value chain. As various case studies have shown, the benefits of eHealth care are tangible and numerous.

Looking ahead at an example like Hong Kong with its large eHealth investments (e.g., US\$700 million for Phase 1 of the government-approved EHR with future plans for additional investment in Phase II), nations are taking advantage of the benefits that eHealth can deliver and are forging ahead. Similar large investments are planned also for Singapore for its national EHR efforts. These early adopters with the right vision have been able to overcome various challenges to forge ahead in their eHealth journey, and IDC Health Insights foresees other nations adopting a national-level eHealth strategy in the coming years.

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