

# Creating Sustainable 21st Century Health Systems: eHealth and Health Information Technology



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## Executive Summary

The aging of the world's population combined with the growth of chronic medical conditions is bringing relentless pressure to bear on health systems globally, even as consumer expectations are increasing. As nations around the world seek to address this challenge, they are exploring the ways in which information technology can help them drive healthcare improvements and innovation.

Our frame of reference is more than 30 years of global health information technology experience, with systems installed in approximately 100 countries. While there is wide variance in political and economic environments, countries face remarkably similar challenges around the world.

A well-designed eHealth strategy is a critical element of the effort to design sustainable healthcare models for the future. Such a strategy must include a shift from hospital-centric healthcare for individuals to coordinated, distributed health and social care for populations.

Viable population-focused eHealth models rely on robust information technology, including:

- Shared virtual care records to facilitate planning and communication between health and social care providers.
- Modern, assistive patient care systems to promote safe, effective care.
- Coordinated care plans that promote patient engagement and ensure that the right care is delivered across all care settings.
- Comprehensive analytics to document effectiveness and support clinical research.

While every community's history, needs, and goals are unique, a thoughtful, continuous approach to eHealth is an essential element of all health system transformations. A practical path forward includes five components:

- Documented benchmarks and goals.
- Adoption of a proven, community-wide connected health record solution.

- Investment in patient and provider engagement.
- Enhanced information utilization at the point of care.
- Continuous measurement and improvement.

Leading care providers worldwide have demonstrated the practicality and benefits of population-focused eHealth. A coordinated, distributed care model — in which patients are full partners, and social care is integrated into the model to enhance quality of life — is the promise for 21st century health systems.

## The Price of Progress: Unsustainable Healthcare

The triumph of 20th century medicine was its dramatic progress in the diagnosis, treatment, and prevention of infectious diseases. Hospital-centric provider organizations, clinical technology, and funding mechanisms all built upon and reinforced that progress. Thus, tuberculosis is no longer a death sentence in much of the world, smallpox has been eradicated, and medical knowledge is growing by thousands of publications per day<sup>1</sup>.

As far back as Hippocrates, health information has played a fundamental role in patient care. Clinical advances have been entwined with the exponential growth of information management, communication, and analytics technology. Healthcare organizations have deployed information technology widely to facilitate clinical, and business operations and now have an extensive IT base in place.

Paradoxically, this success has created challenges for the future:

- People are living longer, creating a growing population of frail elderly in need of a wide range of health and social services.
- Those who would have died from acute illnesses are now living with multiple complex long-term conditions.
- The same technology that powers healthcare innovations encourages sedentary lifestyles, resulting in behavior-related healthcare conditions.

<sup>1</sup> *Best Care at Lower Cost: The Path to Continuously Learning Health Care in America*. Mark Smith, Robert Saunders, Leigh Stuckhardt, and J. Michael McGinnis, eds. National Academies Press, 2013, p151.

- Almost ubiquitous access to information has created an expectation of transparency, choice, and shared decision-making by healthcare “consumers.”
- Most important, costs have become unsustainable<sup>2</sup>, putting at risk highly valued national health and social care priorities.

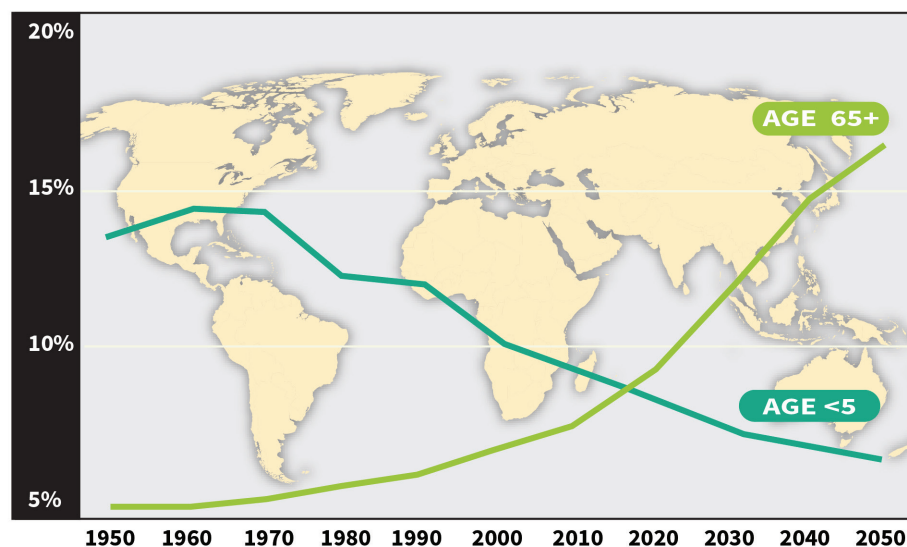
The imperative now is to develop and deploy models of information management to address these new realities cost-effectively while fostering healthier communities and individuals.

## Imagining a Sustainable Model of Health and Care

The starting point for a 21st century healthcare model is the growth of an aging population, chronic disease, and uncoordinated care. Consider the following:

- By some estimates, 17% of the population alive today in the U.K. will become centenarians<sup>3</sup>, consistent with trends around the world. There are a number of challenges associated with an aging population. For example, based on current rates, 33% of people will die with dementia<sup>4</sup>.
- Frail elderly citizens may need help performing activities of daily living and managing multiple long-term conditions. In Canada, 75% of people over age 65 have at least one chronic condition, and of those, one-third have three or more conditions and take an average of six prescription medications<sup>5</sup>.
- The World Economic Forum estimated the cumulative output lost over a 20 year period from the top five chronic conditions at \$47 trillion<sup>6</sup>.
- Health and social care for citizens with chronic diseases accounts for almost 80% of the money spent on healthcare in England<sup>7</sup>.

### YOUNG CHILDREN AND OLDER PEOPLE AS A PERCENTAGE OF GLOBAL POPULATION



Source: United Nations Department of Economic and Social Affairs, Population Division. *World Population Prospects. The 2004 Revision*. New York: United Nations, 2005.

<sup>2</sup> *Sustainable Health Systems, Vision, Strategies, Critical Uncertainties and Scenarios*. World Economic Forum, January 2013.

<sup>3</sup> “Nearly One in Five UK Citizens ‘To Survive Beyond 100’.” BBC News, Dec. 30, 2010.

<sup>4</sup> “2015 Alzheimer’s Disease Facts and Figures.” Alzheimer’s Association.

<sup>5</sup> *The Global Economic Burden of Non-communicable Diseases*. World Economic Forum and Harvard School of Public Health, September 2011, p15.

<sup>6</sup> *The Global Economic Burden of Non-communicable Diseases*. p6.

<sup>7</sup> *The Potential Cost Savings of Greater Use of Home- and Hospice-based End of Life Care in England*. Evi Hatziaandreu, Fragiskos Archontakis, and Andrew Daly, RAND Corporation, 2008, p1.



To ensure sufficient healthcare resources for the future, we need to create a more sustainable model — one that shifts the focus from healthcare to health, and from treating infectious disease to effectively managing chronic disease through a tightly coordinated, distributed care team that includes and engages the patient. A sustainable model encourages healthy behaviors and preventive care across the population to reduce the incidence of disease. And it harnesses information technology to promote safe, high-quality evidenced-based care in the most appropriate settings across the continuum.

The requisite information technology for this new care model has as its foundation a comprehensive virtual care record shared across the community. It leverages and connects legacy IT where appropriate while continuously enhancing and expanding care management capabilities. It engages patients and providers and guides them along evidence-based care paths. It presents timely, actionable information to all members of the care team in formats appropriate to their needs. And it harnesses the aggregate care experience of patient populations to create a learning health system.

IT that facilitates coordinated, evidence-based care that reflects patients' wishes has the potential to more than pay for itself through cost savings. The 2009 Institute of Medicine report "Best Care at Lower Cost" identified \$750 billion per year in excess costs in the U.S. Excluding costs tied directly to the uniquely American funding model, almost \$400 billion of that excess was related to inefficient delivery; inappropriate, duplicative, or unnecessary services; and missed prevention opportunities<sup>8</sup>. Experience around the world demonstrates opportunities to address those excesses.

- In Israel, Ofir Ben-Assuli and colleagues showed significant reductions in hospital admissions and avoidable readmissions when electronic medical records (EMRs)<sup>9</sup> and health information exchange (HIE) records were reviewed during emergency care<sup>10</sup>.
- In Rhode Island, all-cause 30-day hospital readmission rates decreased as much as 18%, for a potential cost savings of \$1.4 million when primary care providers received notifications based on a statewide shared virtual patient record<sup>11</sup>.

- A RAND study on the cost of end-of-life care in England found that while a majority of cancer patients prefer to die at home, a high percentage instead die in hospitals. Preventing a single unwanted admission for 10% of those patients could save over £100 million (\$151 million) annually to fund home- and community-based services<sup>12</sup>.

When care is right-sized and delivered in more appropriate settings in accordance with patient wishes, resources can be invested back into the health system to improve care for all.

## A Viable eHealth Model

Populations comprise individuals, and each individual is not only a member of multiple populations, but also moves between populations as circumstances change. We need both close-up and wide-angle views to see and manage populations clearly. Moreover, each community is different. Although there is no one-size-fits-all solution, there are core elements that should be part of any regional or national eHealth model.

### There are four critical elements to an eHealth program:

#### First, the right foundation: the shared virtual care record

In an ideal world, all health and social care providers would work within a unified information system with real-time access to all of the information needed to make sound patient care decisions. In reality, we have a healthcare landscape littered with information silos and disconnected health records. Yet coordinated care requires an inclusive and comprehensive person-centric record spanning the entire distributed care team, including community healthcare centers, specialists, hospitals, home help, and social care. Similarly, it should reflect the breadth of data types, such as images, medications, notes, test results, and wearable device data.

While many individual healthcare organizations are moving toward a unified EMR, spurred on by patient safety and efficiency drivers, this kind of monolithic

<sup>8</sup> *Best Care at Lower Cost*, p13.

<sup>9</sup> For the purposes of this white paper, we have used "Electronic Medical Record (EMR)" but acknowledge that other regions use "Electronic Health Record (EHR)" or "Electronic Patient Record (EPR)".

<sup>10</sup> "The Impact of EHR and HIE on Reducing Avoidable Admissions: Controlling Main Differential Diagnoses." Ofir Ben-Assuli, Itamar Shabtai, and Moshe Leshno, *BMC Medical Informatics and Decision Making*, April 17, 2013, p13-49.

<sup>11</sup> "Rhode Island: A Look at How a Neonatal Intensive Care Unit Team Is Using ADT." Larry T. Jessup, Kristina Celentano, and Joyce Coutu, *Health IT Buzz*, Nov. 3, 2014.

<sup>12</sup> *The Potential Cost Savings of Greater Use of Home- and Hospice-based End of Life Care in England*, p46

environment is not possible across a care continuum involving a growing array of disparate organizations. The community-wide model has different stakeholders, regulatory context, processes, IT systems, and often funding. Consider, for example, the need to incorporate social services such as child protection into a community care process; these providers do not and will not use an EMR, yet they need to be able to connect all the dots for a given patient.

***The proper foundation for population-focused eHealth is not the EMR, but the shared virtual care record.***

A comprehensive virtual care record aggregates information from all sources and participants, including the patient; normalizes that record; and makes it available in a relevant format to each member of the care team in the appropriate workflow. For the patient or patient representative, this may be a unified patient portal that presents the record in a format familiar to users of social media. For the physician in an emergency care setting, it may be a web-based clinical viewer. For the specialist, it may be pushed directly into the EMR.



Retrospectively, the virtual care record is the foundation for observational clinical research, performance metrics, and archival data storage to ease the migration path from one EMR to another.

The shared virtual care record complements the EMR and point-of-service IT systems for everyone involved in the care process and makes coordinated care possible.

## **Second, the right tool for the job: agility at the point of service**

Optimal population health management requires safe, high-quality care for every individual, so every member of the virtual care team needs the best technology for his or her role. For healthcare professionals, this is a comprehensive EMR. For social care providers, it may be a registry or case management system. But it must provide everyone with access to the shared virtual care record.

***Every part of the virtual team needs the best possible information system to support its portion of the care process.***

Most physician practices and hospitals have EMRs that have been interfaced to various legacy systems. While that may have worked in siloed care models, much of it is not up to the challenge of a distributed, highly coordinated model of care. Effective eHealth requires modern, unified EMR technology that reflects the shift in emphasis from entering observational data to making effective use of much richer pools of data from both inside and outside of the organization. Indeed, it's important to recognize that we can easily slip from too little data to too much and that the ability of an EMR to deliver the right data – clearly and succinctly – to the right clinician at the right time is of paramount importance.

Assuming the foundational, shared virtual record is in place, clinical providers can choose an acquisition approach most suited to local priorities, relationships, and funding. For example:

- An entire region may work together to implement a single community-wide EMR system that spans care settings. The shared virtual record then connects the EMR to social care services or other “out of network” providers to complete the picture.
- A region may choose to maintain multiple EMR systems. The shared virtual record becomes the unifier across these EMRs and connects care team members.

Regardless of the approach, all clinical team members must ultimately have the information they need to deliver care efficiently, adopt best practices, and communicate effectively.

### **Third, do the right thing: the shared care plan**

We all want to do the right thing for the health of our communities. The Institute for Healthcare Improvement (IHI) describes this as the “Triple Aim” — excellent quality, optimal costs, and improved population health<sup>13</sup>. But given the distributed nature of the care team, the need for close communication, and the rapid introduction of new diagnostics and therapies, it is nearly impossible to keep everyone adequately informed without technological assistance. All too often, responsibility for this coordination is unclear and technology to enable it is sorely lacking.

***Evidence-based shared care plans and timely notifications are the most effective way to keep care coordinated.***

Within the hospital walls, integrated treatment pathways drive order sets within an EMR for a physical care team. Complementing these, clinical decision support and alerting functionality reduce medication errors, assist with selecting optimal therapies, and warn of possible gaps in care. This process is greatly facilitated by a shared, unified EMR system.

Out in the community, the distributed care team needs a shared care plan, built on the shared virtual care record that:

- Reflects patient values and choices.
- Engages the patient in care management.
- Includes all participants, including social services.
- Is supported by timely notifications when interventions are needed.

For example, a diabetic patient sees a number of different care providers, each of whom is responsible for one aspect of care. The sum total of that care, brought together in the shared virtual record, should trigger reminders to the patient and alerts to the care coordinator or primary care provider about gaps in care or unfavorable trends in overall status.

### **Fourth, the right focus: actionable analytics**

The accounting truism that “what gets measured gets managed” applies to healthcare and is the reason why quality and performance measures have become widespread in healthcare systems around the world. The term “analytics” is used to describe a diverse mix of approaches, ranging from simple management reports to complex predictors of the risk of death from a specific condition. As with the rest of the eHealth model, there is no single analytics solution that meets all needs.

***Outcomes cannot be measured in silos. Performance measurement requires a community-wide record.***

The shared virtual record should include embedded analytics capabilities that support reporting, metrics, and dashboards at a minimum. These capabilities can be employed to measure baseline performance, identify opportunities for improvement, and monitor and document improvements in both outcomes and utilization. It may also support risk stratification and predictive models, or be used as a near real-time data source for specialized analytics applications.

## **Continuous Value**

The eHealth vision is compelling, yet it may also appear daunting. Thus it is important to define a practical, progressive approach to realizing value. New York’s Northwell Health (formerly North Shore-LIJ Health System), one of the world’s preeminent integrated health systems, typifies this approach.

<sup>13</sup> The Triple Aim was introduced by IHI in 2007 and has been widely adopted and adapted worldwide.

***“This is one of the most strategic IT investments Northwell Health has ever undertaken. [InterSystems] HealthShare’s modern architectural design will give us the agility we need as we continue to grow. This platform will position us strongly for the future, providing the scalability, reliability, and performance we need, without requiring anyone in our care community to replace their technology investments or disrupt familiar processes and workflows.”***

*John Bosco, CIO, Northwell Health  
(formerly North Shore-LIJ Health System)*

The organization has a growing network of hundreds of physician offices and nursing facilities, 21 hospitals, and numerous strategic alliances, including an affiliation with the Karolinska Institute in Stockholm. Serving more than 8 million people — comparable in size to many nations’ populations — Northwell Health is a global leader in population-focused healthcare.

The health system has made a strategic decision to leverage existing EMR technology rather than “ripping and replacing” as it adds new providers to its network. Its shared virtual record enables it to operate as a single coordinated care entity across five different physician office and hospital electronic patient record systems and multiple imaging systems.

Connecting the entire organization has enabled Northwell Health to pursue continuous incremental enhancements to care coordination. For example, the shared virtual record is at the heart of a program for standardizing workflows and managing high-risk obstetric care across the entire health system. It also serves as the foundation for Care Tool, a software application developed by the Northwell Health Care Solutions team to assist with population-focused care coordination and management.

## Creating Your Own Practical Path Forward

If you are ready to design your own eHealth strategy, consider developing a plan that includes these steps:

### Step 1: Document the starting point.

Identify and begin gathering baseline metrics related to the goals of your eHealth initiative. You may have only limited data available at this stage, but this baseline will enable you to measure and accelerate successes and make any necessary course corrections as the program proceeds.

### Step 2: Create the connected health record.

Start by examining the EMR strategy within your organization to identify risks and the gaps in seamless care provision. Select and implement a proven, community-wide virtual care record solution to serve as the foundation for your eHealth program. Prioritize the implementation of providers and data that will yield the highest short-term benefits and cost savings. For example, creating a comprehensive baseline of community-wide patient problems, medications, drug allergies, tests, and radiology orders will deliver immediate opportunities for safety improvements and reduced service duplication in emergency care settings.

### Step 3: Foster patient and provider engagement.

Create outreach programs and peer champions to encourage providers, patients, and families to adopt and embrace the shared virtual record and care plan as an integral part of their own care management processes. Adjust and improve workflow, clinical content, and training to attain critical mass-adoption of patient and clinician portals.

### Step 4: Enhance the EMR.

Whether you adopt a single community-wide EMR or multiple different systems, implementing next-generation EMR technology requires careful planning and change management. The shared virtual record provides the necessary archival repository to ensure continuity, and it insulates caregivers from the impact of that change as older data sources are swapped out and replaced.

## Step 5: Measure-Monitor-Improve-Repeat.

At each step along the path to a mature eHealth program, there will be opportunities to enhance and improve care processes, drive efficiencies, enhance patient satisfaction, and learn from experience. The essence of a learning health system is continuous measurement and improvement.

## Conclusion

Nations everywhere are facing the realities of a new healthcare environment — one in which healthcare is a team activity, patients are equal partners in the care continuum, and new approaches are needed to ensure sustainable funding for increased demands. An eHealth model designed for this new environment spans the entire community, engages patients, reduces costs, and improves outcomes. Experience shows that health systems can do so when they:

- Eliminate information silos.
- Align around a common plan.
- Ensure that everyone has the best tools for their job.
- Continuously learn from and improve the system.

Healthcare providers, national and regional health systems, payers, and software developers are transforming and improving care around the globe using InterSystems' solutions. They are reducing readmissions, realizing the promise of personalized medicine, enhancing safety, eliminating duplicative testing, and fostering collaboration. Innovators are finding better ways to provide care. And patients are taking ownership of their health records and partnering with their providers to create healthier communities.

If you are interested in discussing the challenges outlined above or your own vision for eHealth, please contact us.

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