



# Global Health IT Policies— Accelerating Healthcare Transformation

International Roadmap for Addressing Healthcare Challenges through Healthcare Information and Communications Technology

Nations around the globe have shown encouraging progress that demonstrates how the effective use of ICT in healthcare can improve access to and quality of care, reduce costs, and improve satisfaction among both patients and providers.

## INTRODUCTION

Information and communications technology (ICT) has transformed nearly every aspect of modern life, from banking to travel to commerce. The healthcare sector has been slower to take advantage of the benefits of these new technologies. Recently, however, global stimulus funding has accelerated the use of Health IT in many parts of the world. Nations around the globe have shown encouraging progress that demonstrates how the effective use of ICT in healthcare can improve access to and quality of care, reduce costs, and improve satisfaction among both patients and providers. These success stories can help build momentum for the use of integrated data to improve healthcare worldwide.

Healthcare systems, in both developed and developing nations, have begun to embrace the transformative power of ICT, from electronic health records that integrate and organize medical data and enable providers to share it more easily across healthcare settings to mobile technology that enables healthcare professionals to provide remote care in rural areas. Intel technology powers a wide range of healthcare applications aimed at improving global access to high-quality, affordable healthcare. And through our 1Mx2015 initiative and its components such as Intel® skool™ Healthcare Education Platform, Intel solutions enable anytime, anywhere e-Learning to improve the skills of healthcare students and workers in even the most undeveloped nations. Intel has partnered with international agencies – including the United Nations Population Fund (UNFPA) to bring technology skills to at least one million healthcare workers in developing countries by the end of 2015.

The technological tools that improve care delivery continue to advance at a steady rate. But in most countries, the development and implementation of policies to govern the advancement and use of these technologies in healthcare lag behind. It is more often policy barriers, rather than technological barriers, that stand in the way of greater progress in eHealth. As technology advances, policies must keep pace.

The World Health Organization (WHO) recognizes the critical role that policy plays in supporting the advancement of eHealth. The WHO eHealth vision lists “legislation, policy and compliance” among the required foundational components for change, along with leadership, strategy, ICT services, infrastructure, standards, and workforce development.

Some of the most common eHealth policy challenges center around the following issues:

- The uneven adoption of standards (where standards exist), which inhibits interoperability;
- Articulating the value proposition and then aligning payment incentives with coordinated care objectives;
- Health IT training for medical students;
- Assuring privacy and security of online health data; and
- Ensuring adequate broadband infrastructure.

Despite these challenges, many nations and regions are making impressive strides toward greater use of ICT in support of better care.

### Policy Recommendations

To further broaden, connect and sustain successes that will be discussed in this paper, and to support new efforts, Intel makes the following global healthcare policy recommendations:

**Set bold national goals.** ICT is not magic. To be successful, it must be deployed with a clearly articulated purpose. Policymakers have the power to respond to national challenges, such as the aging population in China, with bold and strategic goals and specific objectives. The examples cited in this paper demonstrate the value of national leadership to direct ICT toward critical societal aims.

**Secure high-level commitment from national leaders.** In Denmark, senior Ministry of Health leaders demonstrated their commitment to implementing telehealth using Continua standards as part of the government's goal to decentralize care and reduce hospital bed days. Visible and continuous commitment from leadership is essential to making the changes in care planning and delivery necessary to transform the industry.

**Tie funding to the development and adoption of common standards and profiles.** Interoperability is essential if ICT is to improve care. Current US statistics show why: 20% of preventable medical errors are caused by lack of immediate access to health information; one in seven primary care visits is compromised because of missing medical information; and only 55% of US adults get the care recommended by guidelines. Moreover, about 30% of the dollars we invest every year in healthcare are wasted because of inefficiencies.<sup>1</sup>

Common standards for ICT are critically important to ensuring interoperability. Before committing financial support, potential funders — both private and public — should ensure that new projects meet standards that support interoperability with existing projects. The ability to easily exchange data at the local, regional and national levels is an essential element in any effort to improve health outcomes. Organizations such as mHealth Alliance, HL7, Continua Health Alliance, and others are working to study global ICT standards, identify gaps, and offer solutions to address those gaps. These efforts and others like them should be supported with the goal of developing consensus around ICT standards worldwide.

**Engage stakeholders in sharing best practices across regions and nations.** Only through collaborative learning will technology and supporting policies develop in ways that will best meet the healthcare needs of today's citizens and tomorrow's. Organizations, regions and nations must seek and support ways to share with and learn from one another, to foster continuous improvement of standards, policies, technology and training. Recent memoranda of understanding between the European Union and the US and between China and the US to develop standards for sharing electronic health records and best practices are key government initiatives that can drive public/private cooperation.

**Identify investments that offer the best clinical and economic returns at the local, regional and national levels.** Liberal and open sharing of best practices will help public and private leaders and funders identify ICT practices that are associated with improved and efficient care, better health outcomes, and reduced or contained costs. Investments of human and financial capital should be steered toward those initiatives that have a proven track record of return on investment.

**Recommend policies (including breach notification) that will secure patient health information.** Intel recommends a holistic approach to implementing privacy and security, including administrative, physical and technical security safeguards, with careful attention to comprehensive training for healthcare workers. Security must mitigate risk in a way that preserves an optimum user experience; otherwise, workers may seek alternatives that can circumvent or disable security. Intel recommends security safeguards that deliver strong security while ensuring that controls do not stand in the way of delivering high-quality care.

Emerging trends, such as mobile health and cloud computing, and sophisticated malware outbreaks call for the ability to secure sensitive data directly, wherever that data is at rest or in transit. However, with increased use of evidence-based decision making, immediate access to the data for urgent patient care is also critical. Delayed or unreliable access to patient records can compromise the quality of patient care.

**Assess and develop policies that support development of broadband capacity and programs that maximize the value of intermittent connectivity.** Robust broadband infrastructure is key to the effective use of ICT in healthcare. Documenting the value of health ICT and aligning payments appropriately will help to foster the creation and spread of broadband access. This should be a priority for all regions and nations. At the same time, areas with intermittent connectivity should take advantage of technology that effectively supports offline learning, data entry and decision support.



The recommendations listed on the previous page emerged from studies of how various nations and regions are using ICT to improve both access to and quality of healthcare. Following are some of the richest examples.

### China: Age-Friendly Cities

China's destiny is in its demographics. The 2010 census shows that China's slowing population growth — its fertility rate of 1.4 children per couple is among the lowest in the world — is resulting in fewer young people and more old people than predicted. In 2010, nearly 14% of Chinese citizens were over 60, and nearly one in 10 were over 65.<sup>2</sup> With an increasing life expectancy, the impact on China's future is clear: in less than 30 years, about 25% of Chinese citizens will be over 65.

Geographically, about half of China's 1.3 billion citizens live in rural settings. While advanced medical care is available in major cities, many rural areas offer only local clinics that are often understaffed and ill equipped to provide even basic healthcare services.

Chinese leaders are paying attention to these data, and are responding with comprehensive plans that leverage the power of ICT.

To address the impending demographics, China's 12th five-year plan sets a policy goal to ensure that 90% of seniors would live in their homes, 7% in community-based care and 3% in institutions. Now leaders are creating initiatives to implement these policies. In 2012, China launched the Age-Friendly Cities initiative, designed to use new technologies and policies to promote healthy and independent living for older people. Intel has worked closely with key government stakeholders, academics and companies to help lay out a plan to achieve this vision. The idea is to build a sustainable healthcare "grid" and "careforce" that will allow a city to deliver care into the homes and community locations of its citizens, instead of through expensive, unsustainable hospitals, nursing homes and other institutions.

The "grid" will weave together intelligent communications, computing and health IT technologies designed to support remote patient monitoring, care coordination, personalized coaching, social networking, caregiver support, and accessibility and engagement by seniors in the flow of daily life in their city. Key to the success of this endeavor will be ensuring that the healthcare, transportation, energy, and communications grids and other city infrastructures are designed to be interoperable and to promote and support independence whenever possible.

### China's RHIN

For rural dwellers, China is developing a nationwide healthcare information network that will decentralize its healthcare system. The network, called the Regional Healthcare Information Network (RHIN), will initially be deployed at local community clinics in rural areas. Accessible to healthcare providers, Ministry of Health officials, and local healthcare authorities, this information exchange and sharing platform will serve as the nation's first step toward creating a nationwide Electronic Medical Record (EMR) platform, serving as the storage and delivery system for each patient's basic personal health record.

RHIN will create a framework that connects private and public healthcare agencies within the region, increasing medical, social, and healthcare workers' efficiency, reducing costs, and promoting standardization of care. RHIN will provide a nationwide healthcare infrastructure that will focus on developing community clinics that provide healthcare in rural and otherwise underserved areas, expanding equitable access to essential services.

RHIN is expected to reduce costs by providing ready access to a patient's healthcare record, thereby avoiding duplicative tests. It is also expected to improve quality of care and promote evidence-based medicine by providing healthcare workers with decision support tools. The cumulative data from RHIN will also enable healthcare planners to track population-wide information to spot significant trends that can drive decisions about resource allocation, identify new challenges, and provide consistency of care in a shifting population.

China is using purposeful design of technology, policies, and workforce training to create a sustainable healthcare system designed to meet the present and future needs of its citizens.



**Nigeria: Mobile Technology Dramatically Expands Capacity for Care**

In Nigeria, a public-private partnership between Intel and local leadership allows mobile healthcare teams to successfully employ ICT to reach rural populations with limited resources. The results have been remarkable: a 270% increase in patients seen, and a 900% increase in disease reporting (Figure 1). After the initial pilot phase, the program was scaled to reach more than 400 communities and 113 Local Government Areas.

Getting adequate care and resources to remote locations is a significant public health challenge, particularly in developing nations. For example, in Nigeria’s Federal Capital Territory, a 7,300 square-km area in the nation’s central region, residents in more than 800 villages had little or no access to primary care. In regions such as these, 80% of deaths are due to chronic diseases, many of which are manageable with appropriate care. Regional officials estimated that adequately serving the population would require 434 Primary Health Centers (PHCs), but only 179 exist. Such a large expansion of PHCs would be cost prohibitive.

So in 2009, the Nigerian Federal Capital Territory Millennium Development Goals Unit (FCTMDGU), health officials, and Intel Corporation began discussing ways that ICT could be used to improve health and healthcare delivery in rural areas.

Together, the FCTMDGU and Intel formed the Mailafiya Health Program (*mailafiya* means “giver of health”) and began to develop a delivery system for mobile primary healthcare services that would be integrated into the existing public health structure. The Program initially consisted of six mobile medical teams, each including a doctor, nurse, community health worker, and a driver. In addition to off-road trucks, basic healthcare tools, and drug kits, each team was equipped with cost-effective Intel-powered netbook PCs and software that enabled data collection into an Electronic Health Record, including patient IDs and patient pictures captured using

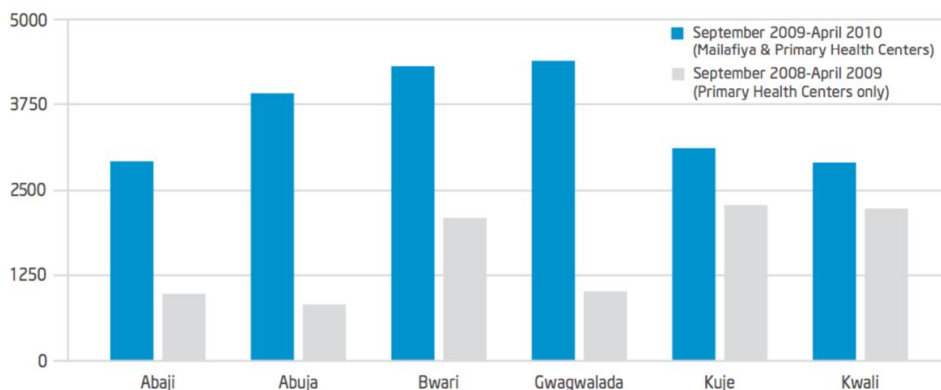


Figure 1: Increases in Patients Served

the PC’s camera. The teams also carried an automated lab system for on-site diagnosis and treatment planning. After the initial pilot phase, six additional mobile teams were added.

The central software component for the project is the District Health Information System (DHIS), an open source platform already adopted in 18 countries. For the Mailafiya Health Program, DHIS was modified to fit the FCT’s specific needs, providing data entry covering more than 140 different data elements and fully customized forms for patient records, test results, diseases and medical conditions.

These ICT tools help teams improve drug dispensing, treatment follow-up, and referrals. The improved data flow enables the right healthcare interventions at the right time and has revolutionized the way healthcare is delivered to underserved rural and urban areas. Not only are individuals getting better, more appropriate care and follow-up, but the ability to capture population data is helping health officials understand health trends and opportunities for improvements. For example, data collected by Mailafiya teams helped to identify an increased incidence of schistosomiasis (a parasitic disease) in several communities





along the banks of rivers in the Lower Usman Dam area. Using this data, a program was developed for mass treatment and the provision of portable water sources—thus containing a potentially extensive outbreak of the disease.

After 12 months, leaders of the Mailafiya Health Program said the following key steps contributed to the initiative's success:

- Establishing common goals with a broad set of stakeholders
- Establishing clear success metrics and using them
- Training professionals on ICT usage
- Leveraging the entire existing connectivity infrastructure
- Maximizing data sharing
- Planning for scalability

Today, nearly 300 PHCs are capturing patient data through the Mailafiya Project. In October 2012, Nigeria's National Primary Health Care Development Agency asked Intel to advise them on the best way to integrate Mailafiya into their databank project at the national level. National coordination for eHealth has been challenging since each state owns its own investments and makes its own decisions. Now the President, the Minister for Health, and major national decision-making agencies, such as the Ministry of Health, the Ministry of Finance, and the Ministry of Information and Communication Technologies, are working together on a national program called "Saving One Million Lives" (S1ML).

Through this program, the nation intends to standardize on DHIS as a crucial element of the national Health Information System for all primary, secondary, and tertiary healthcare facilities. Increased synchronization of patient data between PHCs and secondary facilities is currently being implemented, which should enable public and private providers to share common patient data from the central database for the first time.

### Denmark: Achieving Better Care With Fewer Hospitals And More Telemedicine

Already boasting one of the highest levels of Health IT penetration in the world, Denmark has recently launched a national telemedicine action plan to further speed up the dissemination of telemedicine solutions, seen as a key component of health services of the future. A Danish national strategic plan, funded by the Danish government, calls for the construction of 16 new hospitals with advanced IT capabilities in the next 15 years. At the same time, many other hospitals will close and the total number of hospitals will shrink from 40 to 20. The plan calls for fewer, larger and more specialized units, with a goal of reducing the number of beds by 20%, and the average number of bed days from five to three, while increasing outpatient treatment by 50%.

The nation expects to achieve these goals through the use of more connected care, including telemedicine, to help offset the net reduction of available hospital beds. Approximately 20% of the total investment of about \$5 billion for the construction of these hospitals is allocated for medical technology including ICT. With fewer hospitals making in-person hospital care potentially less accessible for some patients, and with objectives to achieve efficiency gains of 6% to 8%, Denmark must invest in connected health technologies to keep and improve the levels of access and quality of care.

As one of the first countries to recommend a standards-based approach to telehealth and personal connected care, Denmark has created a national Action Plan for Telemedicine that seeks to ensure the seamless and secure collection, communication and storage of personal health data from patients' homes to healthcare providers across the country. The plan also addresses sharing medical documents and images, the management of health records, medical appointments and other related information. The plan will establish reference architectures and

national standards for health IT in Denmark, built on design guidelines created by Continua Health Alliance, the international industry organization dedicated to advancing personal connected health by promoting end-to-end, plug-and-play connectivity of personal health devices and establishing industry standards for interoperability.

Once the elements of the plan are in place, patients throughout Denmark, using any Continua-ready device or platform, will have secure, simple and convenient access to health data and support from healthcare providers.

### Prague: Electronic Emergency Data Improves Care, Saves Money

Prague Emergency Medical Services (EMS) provides accident and emergency services to about 1.2 million citizens in the city and surrounding area. Only two of the area's 15 hospitals have emergency departments. Most emergencies are handled *in situ* by a Rapid Response Unit (RRU), a physician and paramedic (driver) in four-wheel drive vehicles. RRU's typically arrive very quickly to an emergency scene and treat and stabilize the patient, often before an ambulance even arrives to transport the patient to a hospital. The RRU physician compiles handwritten notes detailing the diagnosis, treatment, and recommendations, and these notes are transported along with the patient to the hospital.

Prague EMS turned to Intel to help determine the impact on quality and cost of providing RRUs with technology that would enable them to compile and share notes electronically. The assessment team initiated a pilot project, and used the Intel mobile point of care (MPoC) value model to quantify the benefits and the financial impact, as well as any intangible gains. The pilot showed positive results in terms of workflow, quality of care, staff satisfaction, and cost of care.

During the pilot, two RRUs were equipped with Panasonic Toughbook CF-19 rugged



laptops, which were set up to communicate with a central server in the Emergency Service Centre. The RRU physicians used the laptop to create an Electronic Mission Record (EMiR) for each patient, and printed a section of the EMiR to give to the ambulance personnel or directly to the hospital physician if the RRU physician accompanied the patient to the hospital. Mandatory fields ensured that that portion of the record, called the Electronic Patient Record (EPR), contained appropriate information on which hospital physicians could base their treatment decisions.

Analysis of the two-month pilot showed the following positive outcomes:

- **Workflow optimization:** Physicians were more efficient creating electronic vs. handwritten records in the field, and were able to complete the work during the episode of care. In the paper-based system, EMS physicians stayed after their shifts, on average, one hour every third shift, to input patient notes. The more accurate recording of patient identities also eliminated the return of inaccurate invoices from insurance companies, saving an average of 15 minutes of administrative time per inaccurate invoice. And finally, the quality and legibility of the EPR printout reduced the need for hospital physicians to completely reexamine the patient, reducing admission time by five minutes per patient, on average.
- **Patient safety:** The legibility of the printed EPR enabled the hospital to deliver the right treatment to the

patient more quickly, and reduced the risk of transcription errors when the hospital created its own electronic record for the patient. Swifter intervention and improved clinical decisions may reduce length of stay.

- **Staff satisfaction:** The more legible, detailed EPR increased the credibility of the RRU physicians; illegible or incomplete paper notes had previously undermined their reputation as professionals. In addition, unlike paper records, the electronic EPR forces the physician to consider a wider range of parameters and take a more complete range of measurements. As a result, the RRU physician's intervention is more comprehensive, enabling the physician to better adhere to medical standards.
- **ROI:** Saving an average of five minutes per admission resulted in a productivity benefit equal to saving more than US \$17,000 per year. Saving 15 minutes of administrative time for every inaccurate invoice equals a savings of nearly US \$800 per year. Over three years, the combined total saving is approximately US \$54,000. The total IT cost was about US \$16,000, which included the two rugged laptops, printers and software. The net present value over three years was calculated at \$28,000. This represents a return on investment of 149% over three years and a break-even of just less than 13 months.

It is important to note that the main quantifiable benefit of the evaluated technology accrued to the hospitals rather than the ambulance service.

This points to the value of holistic technology implementation, which, when well designed and thoughtfully implemented, benefits the entire healthcare system.

Policy steps that supported the adoption of this integrated emergency response system included:

1. Creating standards, such as mandatory fields, that ensure that all Electronic Patient Records contain appropriate information on which hospital physicians can base their treatment decisions
2. Supporting training for both EMS and hospital personnel
3. Funding data analysis to assess its impact
4. Focusing on outcomes rather than profit centers

### Bangladesh: Mobile Technology Improves Prenatal Care

In Bangladesh, Grameen-Intel – a joint venture founded to address specific, major social problems through ICT solutions – created a maternal health solution. Currently deployed in rural clinics, this initiative delivers improved prenatal care to mothers using a turn-key solution based on mobile phones and computers. Local healthcare providers use a phone-based prenatal survey to identify high-risk pregnancies, enabling faster treatment by clinics and follow up by mobile health workers. This solution not only delivers better healthcare, but also creates entrepreneurship opportunities for local women.



### United States: Remote Monitoring Reduces Readmissions and Associated Costs

In the U.S., nearly 20% of hospitalized patients are readmitted to the hospital within 30 days of discharge. The cost to Medicare of unplanned re-hospitalizations is \$17.4 billion per year and expected to grow.<sup>3</sup> Finding ways to decrease unnecessary readmissions is critically important to our nation's fiscal and actual health.

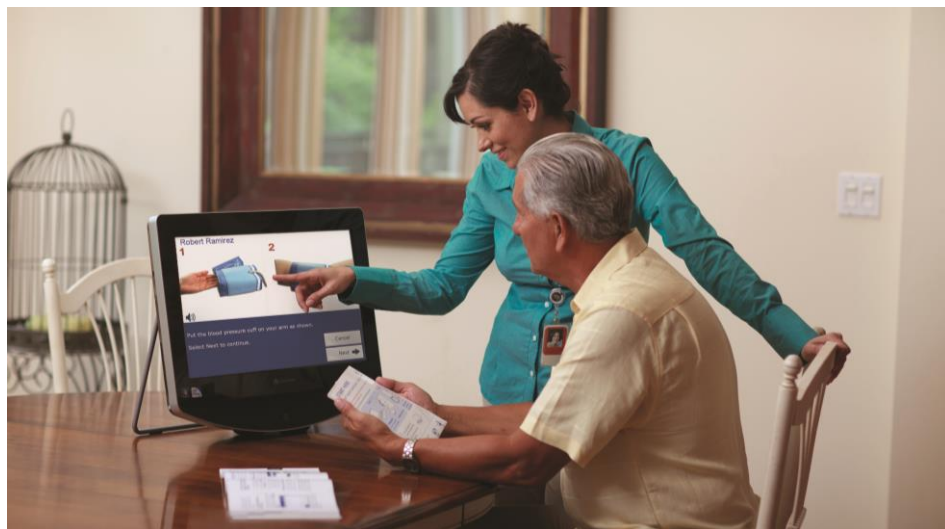
St. Vincent Health\* is a major hospital system in Indiana with 22 hospitals serving 47 counties. It is a member of Ascension Health\*, the nation's largest not-for-profit Catholic Healthcare System.

With funding from a federal Beacon Community grant\*, St. Vincent Health worked with Intel-GE Care Innovations™ to test a remote care management program designed to reduce readmissions. Findings of the study, which concluded in 2012, show a 64% reduction in hospital readmissions compared to the study control group.

The St. Vincent / Care Innovations™ team targeted patients with congestive heart failure (CHF) and chronic obstructive pulmonary disease (COPD), working to develop clinical protocols and educational materials designed to help them stay away from the emergency room and out of the hospital post-discharge.

Using a remote care management program, patients with CHF and COPD were supported at home by a nurse via the Intel-GE Care Innovations™ Guide solution. Educational videos helped guide patients' everyday decisions regarding their health. Through daily telemonitoring of patients' biometrics — blood pressure, body weight, and oxygen saturation — as well as daily interactive questionnaires, and periodic videoconferencing, patients and their nurses were able to recognize any "red flags" and help address health problems before they became serious enough to require re-hospitalization.

The Care Innovations™ Guide strengthens the connection between healthcare



professionals and patients. This personal connection helps make disease management easier and helps patients actively participate in their own treatment. Positive reinforcement increases patient confidence and reinforces behavior changes.

Initial results showed a 30-day readmission rate of 4% compared to 11% in the control group. The national average for 30-day readmissions is 21%.

Policies that enabled and supported this improvement and others like this include:

1. Focus by the federal government on reducing hospital readmissions, which helped to create motivation for testing new models;
2. Federal funding provided through Beacon grants that enabled pilots to test remote monitoring of patients with chronic diseases;
3. Sharing data through Beacon Communities that promoted best practices; and
4. Data analysis that provided the benchmarks and achievements for patient care.

### Making the Most of Intermittent Connectivity

Where reliable and continuous access to broadband connectivity is not available, information and communication technology can still be used effectively to support the delivery of healthcare.

For example, Intel's skool™ Healthcare Education platform uses a "hub and spoke" model of connectivity to train healthcare workers in areas where connectivity is limited. Rich educational content, customized by language and content, is downloaded onto portable devices to train workers in the field. Learners can access training modules and take tests and other assessments in the field, then bring or send their devices or a thumb-drive to a broadband center, such as a hospital, where their work can be downloaded.

The same principle works for collecting patient data in the field. Health workers can gather data and download it to patients' EHRs when they have access to broadband service.

Intel is providing skool™ technology free of charge to governments and healthcare workers. As one example, the government of Sri Lanka is deploying skool™ technology with language support, including English, Sinhalese, and Tamil, across local education and training content.

### Observations

The examples cited above, as well as others around the globe, demonstrate that:

- a collaborative approach to policymaking and technological advancement, with a focus on interoperability, is an important element in meeting current and future needs (China);
- effective public-private partnerships can dramatically expand the availability of care (Nigeria);
- a standards-based approach to telehealth can increase access (Denmark);
- a well-designed intervention with appropriate technology can improve care and yield a return on investment (Prague);

- mobile health technology can identify needs and improve follow-up care (Bangladesh); and
- appropriate use of remote care management enabled by broadband can improve health and prevent unnecessary utilization and costs (U.S.).

There are many other successful and promising examples around the world of how ICT is supporting better health and healthcare. Nevertheless, those successes are still isolated and largely unconnected. Currently, fewer than half of the world's nations include eHealth efforts in their national health policy.<sup>5</sup> Much more must be done to leverage the power of ICT to support and sustain a healthy life course for the world's citizens.

### Conclusion

Information and communications technology is transforming the way healthcare is delivered in a wide range of settings around the world. It supports the delivery of high-quality, reliable, evidence-based care to citizens in busy urban settings and in remote rural villages.

Interoperability that supports data exchange is essential if ICT is to fulfill its promise to improve healthcare worldwide. Leaders in the public and private sectors must work together to ensure that shared learning and collaborative thinking lead to greater use of communications technology that improves both care and health.

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