

Connected Health: Transforming Healthcare in Emerging Markets

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Point of View: Connected Health

The case for better healthcare may seem to be self-evident. Yet, however desirable universal access to excellent healthcare may be, the realities of budget and logistics present challenges as populations grow, chronic diseases escalate, and lifestyle realities take their toll.

The Cisco concept of Connected Health delivers a framework for government and healthcare providers, and enables citizens to be more informed about their own health through the development of advanced ICT infrastructures that support next-generation healthcare provision.

In the developing world, Cisco Connected Health provides the opportunity to accelerate the effective provision of healthcare even to remote areas. Improved collaboration among health workers, greater facility for self-treatment, and patient involvement in primary care all serve to optimize performance of the healthcare service as a whole. A healthier nation is an economically stronger nation.

In Emerging Markets, Cisco IBSG works with leaders of key national and regional government agencies, businesses, communities, multilateral institutions, and NGOs to turn their technology investments into strategic national assets. Serving as trusted advisers in varied assignments spanning broadband connectivity, digital inclusion, smart communities, and business productivity, IBSG aligns ICT to support socioeconomic development in these countries. Connected Health is IBSG's approach to harnessing the power of ICT to serve the country's national healthcare and transformation agenda.

Executive Summary

In every country, health is a major concern for government, citizens, businesses, and providers of information and communications technology (ICT) services. Each country faces key healthcare issues, with developing countries carrying the greatest burden of disease and the fewest resources to deal with the problem. Despite the temptation to develop acute care at the expense of the primary care sector, there now is a growing realization that this approach is flawed and a more holistic solution is needed. Cisco's fundamental proposition is that patients, clinicians, managers, or providers of services need to be part of a connected health community in order to make better decisions that transform healthcare.

The Cisco® Connected Health program embodies a framework and methodology for the application of advanced healthcare info-structures¹ that adapt closely to specific challenges and priorities in each country, while drawing on proven technologies and vast experience of applications worldwide. Connected Health allows greater collaboration among professionals, faster delivery of patient care, easier and less demanding administration, and development of patient-centric healthcare services that enrich the quality of life and economic strength of the nation it serves.

This paper develops the Connected Health model so that it can be applied in developing countries that can afford only a simple infrastructure. It argues that when health is regarded as part of a holistic program of development, the aggregation of demand will make the connectivity needed to transform health (and other services) more affordable.

1. An info-structure is an integrated network of systems and information and communications technology that allows citizens, government, and businesses to connect on a common platform. In healthcare, such an info-structure allows citizens and people throughout the healthcare system to communicate with each other to make informed decisions regarding their own health, the health of others, and the healthcare system.

Introduction

For any government, ensuring all citizens have access to healthcare is a fundamental responsibility. It is an essential economic function; a healthy nation is a productive and competitive one. Healthcare must be accessible, affordable, and responsive, both to the specific, constantly changing medical and clinical needs of patients, and to the broader demographic, social, and cultural shifts that typify the modern world. The Millennium Development Goals² for reducing child mortality, improving maternal health, and combating HIV/AIDS, malaria, and other diseases are proving difficult to meet. They rely on progress elsewhere, not least in global partnerships for development, such as making available new technologies like ICT.



Health is a fundamental right for all citizens. Article 25 of the Universal Declaration of Human Rights states that “...everyone has the right to a standard of living adequate for the health and well-being of himself and of his family.” Translating this right into knowledge of how best to maintain good health and manage ill health, however, remains a major challenge, as does enabling access to appropriate and affordable healthcare.

From the perspective of businesses, whether a large multinational or a single-person start-up, ill health is a major threat to productivity and income generation. Conversely, a healthy workforce contributes significantly to providing resources that enable standards of living that support good health. In many countries, health services are the largest employer and a business that can consume up to 10 percent or more of gross domestic product (GDP). Investment in an ICT infrastructure enables health services to deliver better value for the money.

For specialist providers of ICT services, significant challenges and opportunities exist. New technology is crucial to successful delivery of modern healthcare services. ICT has proven a major influence on growth, efficiency, and innovation worldwide. ICT integration, in which once disparate areas of infrastructure are unified and consolidated, is a critical concern, particularly in the distributed environment that typifies a healthcare infrastructure. It is now possible to deliver connectivity within and between health facilities, as well as to mobile health workers (and citizens) to enable fast, secure access to relevant and current knowledge.

2. The Millennium Development Goals are eight aggressive goals that make up the Millennium Declaration that was signed at the 2000 UN Millennium Summit to end global extreme poverty by the year 2015. The eight goals are: 1: End Hunger and Extreme Poverty, 2: Achieve Universal Primary Education, 3: Promote Gender Equality and Empower Women, 4: Reduce Child Mortality, 5: Improve Maternal Health, 6: Combat HIV/AIDS, Malaria, and Other Disease, 7: Ensure Environmental Sustainability, 8: Develop a Global Partnership for Development.

For many developing countries, however, the costs of connectivity are prohibitively high and need to be reduced if health and economic development are to be improved.

Cisco believes that the delivery of an ICT infrastructure to support Connected Health offers developing countries the opportunity to provide advanced healthcare services where they can be afforded, while at the same time offering coverage and knowledge access to all citizens and health workers. A range of issues and challenges to overcome can be presented in a general framework, but still need to be addressed in the specific context of each country.

Issues and Challenges

Health services worldwide are facing new and evolving challenges. The population of many countries, particularly in Africa and Asia, will increase greatly in the coming decades. In contrast, owing to below-replacement fertility levels, some developed countries are expected to experience a significant population decline. Developing countries account for 80 percent of the global population and 90 percent of the global disease burden, but only 12 percent of global health spending.

Chronic diseases, such as heart disease, stroke, cancer, chronic respiratory diseases, and diabetes, are by far the leading cause of mortality in the world, representing 60 percent of all deaths. Eighty percent of chronic disease deaths occur in low- and middle-income countries. Chronic disease risks become widespread much earlier in a country's economic development than usually is realized. For example, levels of body mass and total cholesterol increase rapidly as poor countries become richer and national income rises. For the poor, however, any form of ill health, such as poor nutrition, prevents them from working. They cannot earn the money needed to provide for themselves or others, so, although high mortality is the most significant population concern for developing countries, disability needs to be considered as well. The World Health Organization's (WHO) work on the Global Burden of Disease³ shows that in low-income countries, the three leading causes of disability-adjusted life years lost to ill health are HIV/AIDS, perinatal conditions, and unipolar depressive disorders.

3. A WHO response to the need for comprehensive, consistent, and comparable information on diseases and injuries at global, regional, and national levels.

Safety and quality of care are high priorities, especially with rising demand. The increasing mobility of populations creates new pressure points as users expect consistent standards of service, even in more remote locations. In this demand-driven environment, costs are escalating and the price/performance trade-off for ICT is coming sharply into focus. Despite rapid growth in some sectors of their economies, many developing countries still are without a modern ICT infrastructure. Elevated levels of poverty in many communities mean levels of ill health also are high, while the costs of accessing care (travel and out-of-pocket expenses, or insurance premiums) often suppress demand.

WHO estimates that there is a global shortage of 4.3 million health workers. Countries with the lowest relative need have the highest numbers of health workers, while those with the greatest burden of disease must make do with a much smaller health workforce. Areas with teaching hospitals and a population that can afford to pay for health services invariably attract more health workers than regions without such facilities or financial support. As a result, health-worker density generally is highest in urban centers where teaching hospitals and high incomes are most common. Although the extent of urbanization increases across countries with rising incomes, in countries of all income levels, the proportion of health professionals living in urban areas exceeds the proportion of the general population found there. The training of health workers is costly, and many migrate overseas once they have qualified.

In addition, health systems traditionally tend to focus on acute care. In developed countries, where the costs of acute care have been rising rapidly, the impact of increasing levels of chronic ill health is evident. The need to develop primary care is becoming clearer, as is the importance of fostering changes in social behavior patterns (such as the social trend against smoking in some countries) to mitigate demand for health services. When primary care fails, the demand on the ambulatory system, such as outpatient care, increases. This can cause failures in the outpatient system, resulting in more hospital admissions where care is much more costly. While better health education widely is recognized as a key element of any effective health strategy, the cost of making improved knowledge more broadly available is a critical barrier for some nations. In addition, there are biases in funding for different types of disease. For example, while 90 percent of the world is at risk from infectious diseases, only 10 percent of the world's research and pharmaceutical resources are spent on them.



These challenges confront all health services but often are magnified by the particular economic circumstances in developing countries. While developed countries must deal with the challenges of established and often cumbersome health organizations, developing countries can apply lessons learned elsewhere to move immediately to healthcare services ready to meet the challenges of the 21st century.

Point of View: The Connected Health Model in Developed Countries

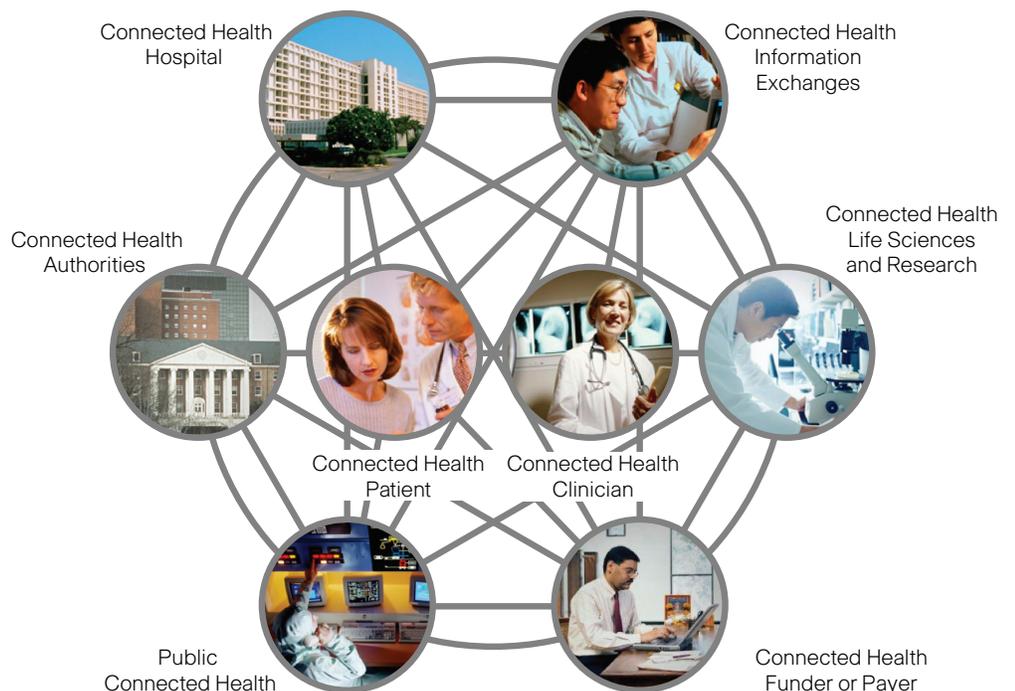
The Cisco Connected Health framework, already used in developed countries, is designed to understand the intricacies of nation-specific challenges and make it practical for healthcare professionals to share vital medical, clinical, and patient information. This, in turn, fosters a culture that perpetuates the idea of an integrated service, with the patient at its heart. This model now needs to be applied to additional issues facing developing countries.

Connected Health creates collaborative relationships among all healthcare stakeholders to facilitate safe, affordable, accessible health services. Cisco enables a Connected Health community through interoperable processes, technology, and people to provide critical health information anywhere, anytime. The Connected Hospital includes hospital management and healthcare services in both public and private hospital settings. Connected Hospitals are patient-centric, with ICT infrastructures dedicated to improving the quality of care and the patient experience. The concept supports technologies such as electronic patient records, patient identification systems, bar coding, picture archiving and communications systems (PACS), and diagnostic and support services. It delivers improvements in connectivity among departments while supporting secure messaging and enabling electronic order entry and results reporting. Connected Hospitals also are plugged into the overall ecosystem of the nation's health system—from remote telecenters to health centers, medical research facilities, and universities—enabling employment of the best talents and specialists locally and internationally.

At the center of the ecosystem is the Connected Patient. This describes patients who are able to access knowledge that helps them understand health issues and services so they can navigate through the healthcare system. Personal health monitoring uses biogenetics, body sensors, and other monitoring devices that enable patients to be screened, and then cared for, at home. Implants and other biosensory devices can monitor patterns of behavior, and biogenetic information can become part of each patient's health record. Electronic personal health records enable people to enter their own information and, if they are unfortunate enough to become patients, they can input records of their care history. This aspect of Connected Health empowers citizens and fosters a greater awareness and understanding of the value of a healthy lifestyle.

Connected Clinicians also are central to the ecosystem. No matter what their skill level, they need current, evidence-based, and localized knowledge to allow informed diagnosis and prompt preventive or remedial action where it is required. Support for continuing professional development blends knowledge from experts, e-learning, peer group learning, and reflective practice. Clinicians then are able to connect their knowledge with the information contained in patients' electronic records.

Figure 1. Today's Connected Health Community





Related Services

Connected Health Information Exchanges focus on interoperability of healthcare information at the local, regional, national, and international levels. **Connected Life Sciences and Research** includes pharmaceutical and biotech industries, medical product and device manufacturers, healthcare distributors and suppliers, and medical research enterprises. **Connected Funder or Payer** comprises public or private organizations that are responsible for financing and arranging healthcare services. **Connected Public Health** includes solutions that support government-sponsored public health, including epidemiology, environmental surveillance, and infectious disease tracking and management. Finally, **Connected Health Authorities** encompass solutions and policy work relating to departments of health, health ministries, regional health authorities, and other governmental or quasi-governmental agencies.

In a Connected Health ecosystem, health facilities are connected via intelligent information networks that are resilient, responsive, protected, and interactive—a concept embodied in the Cisco Medical-Grade Network⁴ infrastructure. Care is integrated across the healthcare community while management of the whole system is improved. In addition, patient records are shared appropriately, appointment bookings and prescriptions are managed electronically, and professional development and teamwork are driven by an optimized support infrastructure. A Connected Health community drives increases in capacity, productivity, and throughput, and gains efficiencies from accurate and fast reimbursement options. Work outside the immediate care infrastructure, such as life science and other research, can be fully integrated into the Connected Health network, enabling exponential benefits throughout the system. Managers can retrieve needed information while public health workers and epidemiologists can have near real-time reporting of health events. And, since cost always is a critical concern, a Connected Health strategy allows for improvements in management information about the cost effectiveness of the health system as a whole.

4. The Cisco Medical-Grade Network provides the industry-specific framework required to meet healthcare's unique clinical application needs for interoperability, security, availability, productivity, and flexibility.

The Connected Health Model in Developing Countries

Although half of those who supposedly have access to the Internet live in developing countries, the reality is that only 25 percent actually are *connected* to the Internet. To bring connectivity within reach of the remaining 75 percent requires new approaches, and Connected Health can play its part. In developing countries, the Connected Health model may be entirely appropriate within those major cities and prosperous regions where a mature ICT infrastructure is affordable. Within cities and regions, however, there often are extensive areas of poverty and poor service provision and, in the poorer rural areas, the cost of devices, connectivity, content, and training can be prohibitive.

Cisco believes that by integrating Connected Health with national strategies for education, government services, business services, connected communities, and other network-based services, costs can be aggregated to make the economics of full-scale broadband deployment manageable. How this is best done will depend on the local context, but the Connected Health framework can help guide the approach to enabling transformation. To gain deeper insight into the concept of Connected Health in developing countries, it is appropriate to consider the two major steps that precede the achievement of a Connected Health community: localized knowledge and telehealth.

Localized Knowledge

The first step is to recognize the importance of paper, word of mouth, radio, and television services in disseminating health knowledge. Entry-level ICT devices also may be used, such as standalone PDAs (to provide knowledge support for health workers) or mobile phones (that can be used to send text-message reminders about taking medication). Cheap standalone laptop computers now are becoming available. The key feature of this stage is that quality health knowledge is localized and useful. Providing knowledge that enables better decisions (for example, how to prevent ill health, where to seek care, how to understand symptoms) is a precursor to making investments in both technology and skills development to gain connectivity and access to richer sources of knowledge.

Telehealth

The second step is to consider how connected devices can be used not just to radically improve speed of knowledge distribution, but also to support healthcare at a distance. The focus here is on a point-to-point relationship, often with asymmetric power/knowledge relationships. Telehealth offers major benefits for many developing countries where the terrain can make it difficult to deploy healthcare services at a local level. Using the Connected Health infrastructure, healthcare advice, guidance, diagnosis, and treatment can be delivered at a distance from the provider. Health workers can access the resources and information they need even when working at a patient's home. Primary healthcare can be delivered online. Even small, secondary care facilities within a community can be supported by fast data, voice, video, and real-time telepresence. Routine communication between patients and caregivers can be exchanged through messaging systems, and patients can partake in Web-based visits to caregivers or specialists working many miles away. With broadband connectivity, people and communities can have multichannel access to a wide range of healthcare services. Helping individual patients with chronic diseases to manage their care at home, for example, can save significant hospital costs as admission rates are reduced substantially.

Connected Health Community

Developing a Connected Health community is more easily undertaken where the necessary ICT infrastructure already is in place or planned. Initially, the focus may be achieving more effective exchange of local health knowledge with communities and health workers in the field. Then, using the networks to connect health facilities, telehealth applications can be exchanged while also addressing the skills and continuing professional development requirements of health workers. But the objective is to establish a healthcare ecosystem that is able to deliver cost-effective care because it is connected. In many developing countries, there is a rich mix of public, private, and non-government organizations (NGO) or faith-based health services. They all can be supported over a Cisco network infrastructure. But where these infrastructures are not yet in place, as usually is the case in most developing countries, then other issues and opportunities must be considered. If the community itself (whether rural, urban, small, or large) can be connected, then modern healthcare services can be delivered. Indeed, the case for delivering Connected Health can form a significant part of the rationale for connecting the community as a whole.

This approach fits within the broader framework for transformation where an effective healthcare strategy links strongly to the Cisco concept of the Connected Community. Here, the technology forges a more integrated and unified community, from a remote village to a major metropolis. By addressing health issues at a local level, in conjunction with education, business development, and skills training, more communities will be able to afford a connected development strategy in which healthcare is a key component. Good health knowledge and behavior can be integrated into the way the community becomes connected and makes better decisions. In developing countries, the concept of moving healthcare into the community can be incorporated into ICT infrastructure plans from the outset.

Global Healthcare

In the global network-based economy, the Connected Health element of a country strategy enables greater integration of world healthcare priorities and resources into the national healthcare system. This global perspective promotes better management of health hazards, nationally and internationally, and greater sharing of global knowledge, which can be adapted to meet specific local needs.

Increased mobility of the global population has enabled the rapid spread of diseases, such as SARS, over long distances. Finding ways to collect and collate environmental health and epidemiological data rapidly will enable healthcare and disease prevention on a true macro scale. This can encompass technologies such as remote sensing via satellite, mobile communication from health workers operating in remote locations, automated sensors detecting changes in air quality, or the presence of chemicals and other phenomena indicative of threats or concerns. An integrated healthcare infrastructure ensures the rapid exchange of essential information, enabling a prompt and informed response. With a global health information infrastructure, benefits arising from biomedical and genomic research can be gained more quickly, and the impact of the global reach of telehealth care can be far greater. Through a national Connected Health strategy, the human issue of health can be addressed as a global concern, for the benefit of all.

Conclusion

Cisco works with global healthcare industry leaders, including application, system, and service providers, device manufacturers, and medical technology vendors, to help revolutionize healthcare delivery. Scalable, interoperable, and fully integrated, Connected Health delivers exceptional benefits with better patient care, improved patient outcomes, reduced operational costs, and major gains in efficiency and productivity.

Cisco's Connected Health initiative enables collaborative relationships among all key healthcare stakeholders to deliver safe, affordable, accessible health services across a country. Connected Health encompasses interconnected and integrated points of delivery and high degrees of access and self-care for patients. Success is defined in terms of the effectiveness of processes and outcomes within and between parts of the health ecosystem.

Cisco is committed to making the Connected Health vision a reality. In developing countries, Connected Health offers the opportunity to take tested processes that work well in developed countries and extend them into new areas. The ability to deliver improvements in healthcare—particularly in primary care—as part of a concerted effort to provide communities with an information infrastructure will enable people to make better decisions. Fewer unnecessary visits and referrals to hospitals will reduce workload pressures and costs, while improvements made to the population's health will enable greater contributions to economic development and poverty reduction.

Notes

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More Information

The Cisco Internet Business Solutions Group (IBSG), the global strategic consulting arm of Cisco, helps Global Fortune 500 companies and public organizations transform the way they do business—first by designing innovative business processes, and then by integrating advanced technologies into visionary roadmaps that improve customer experience and revenue growth.

For further information about IBSG, visit <http://www.cisco.com/go/ibsg>



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