Always On, Always Connected

How Technology Will Transform the Future of Chronic Care

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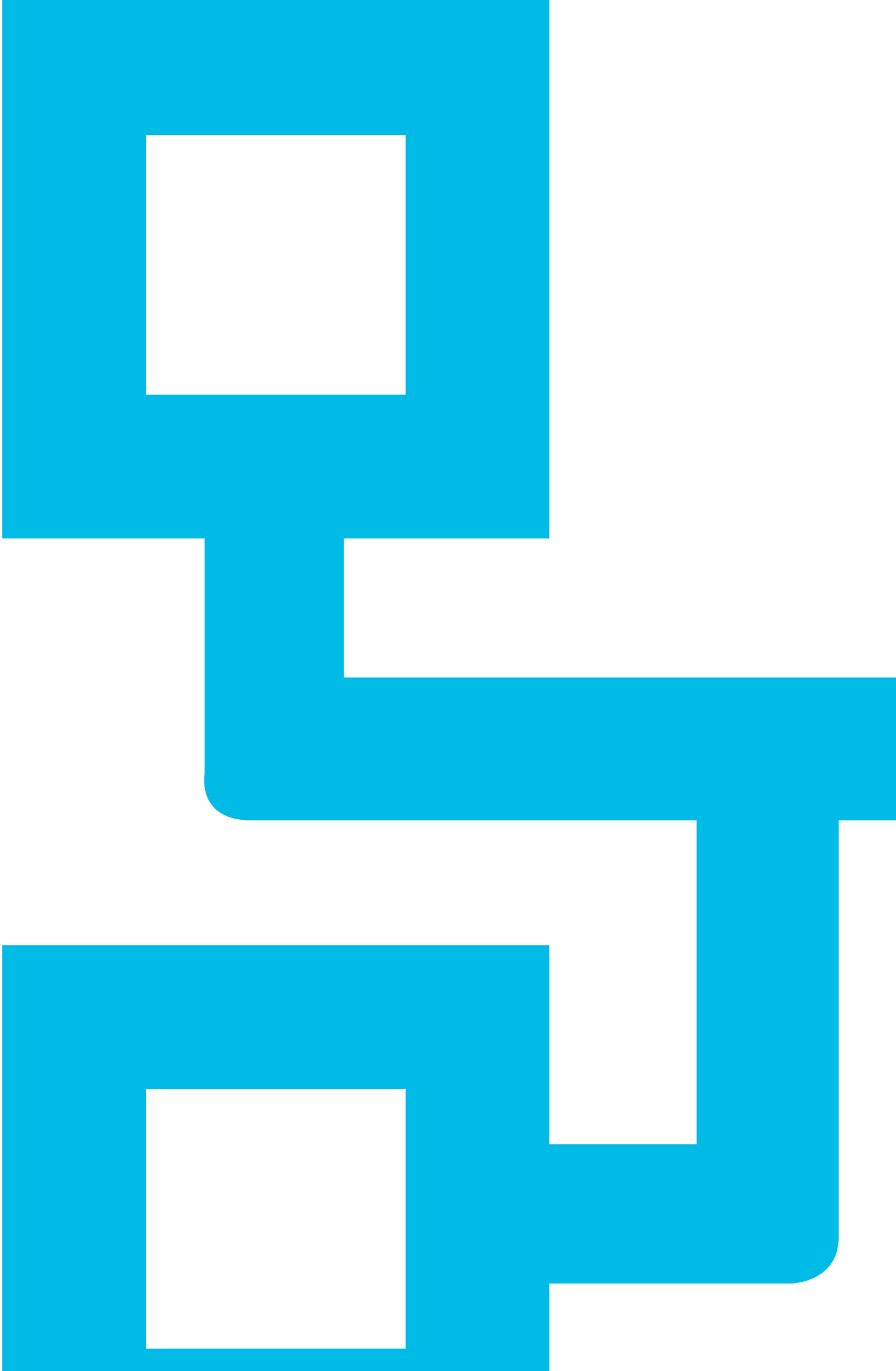
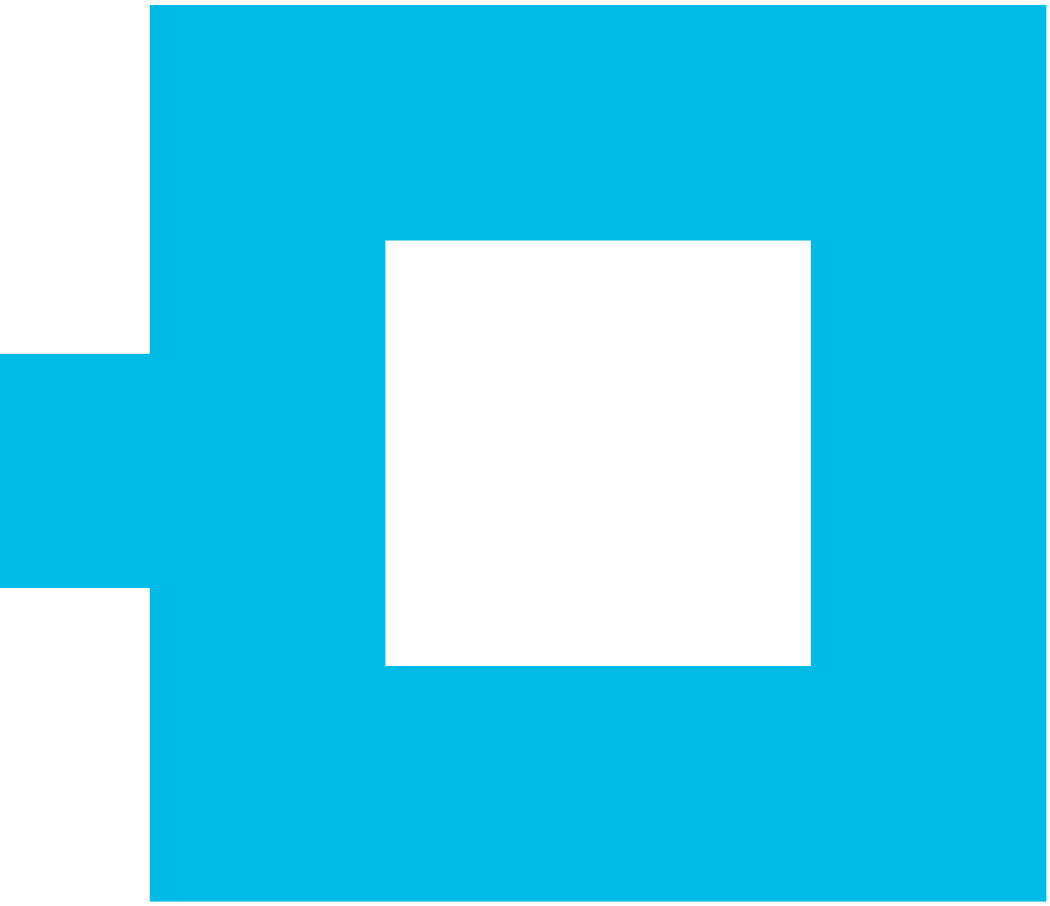




Focused on a growing aging population well-versed in technology, "connected health"—continuous, remote monitoring of chronic conditions, as well as online and mobile care—will improve quality, contain costs and provide a new level of convenience for health consumers.

Most disease management services today rely on a "high-touch" approach by having specially trained nurses call individual patients on a periodic basis, providing them necessary counseling, coaching and education.

The global health care industry faces a crisis in chronic care, which will be further exacerbated as the baby boomer generation begins to retire. According to the US Census Bureau, the world's population of people age 65 and older is projected to triple by midcentury, from 516 million in 2009 to 1.53 billion in 2050.[1] This growing trend places a tremendous economic burden on governments, private employers and individual consumers alike. It also puts strain on the capacity of skilled care professionals and nursing homes. Meanwhile, technologies like miniaturized health sensors, broadband networks and mobile devices, are enabling new health care capabilities such as remote monitoring and online care. Together with the increasing adoption of electronic health records among provider organizations, Accenture believes that these technologies can help deliver high performance to the health care industry by improving quality, containing cost and enhancing access.

At first, the Internet helped open the flood gate of information on diseases and treatments. According to Pew Research, between 75 and 80 percent of Internet users have looked online for health information.[2] However, an informed consumer is just a beginning. To be effective, health information needs to flow both to consumers and from consumers to health care institutions. The latter is especially true for the chronically ill and the elderly, who spend most of their time at their own homes or places away from professional care facilities. In such cases, the lack of timely biometric and self-reported data about the ongoing health status of the consumer and potential interventions often leads to costly emergency room visits, unnecessary hospitalizations and even death.

The rise of disease management services in recent years is a direct response to these deficiencies in the current health care system in addressing the needs of chronic patients. Many of these programs today rely on a "high-touch" approach of having specially trained nurses call individual patients on a periodic basis, providing them appropriate counseling, coaching and education. While this approach has led to noticeable improvements in compliance and a reduction in hospitalization, it has not lived up to its full potentials in part due to the lack of detailed visibility to the patient's ongoing situations as well as inconsistent data sharing with the physician whose engagement is also critical to successful outcomes.

Until recently, the cost of supporting a continuous flow of data from consumers to care providers and other institutions was quite high. With the wide availability of inexpensive connectivity, both wired and wireless, and a broad range of consumer health electronics at home, a two-way, direct-to-consumer infrastructure is already in place for many households. The combination of ubiquitous networks and smart devices makes it possible to continuously monitor patients' physiological signs and behaviors in their own places. It also enables convenient interactions between patients and their caregivers, regardless of their physical location. This new reality, dubbed "connected health," encompasses a broad range of applications that are always on, always active and always aware. Accenture believes that the emergence of these new capabilities presents exciting opportunities and challenges for health care enterprises as they seek to become high-performance organizations.

New kinds of devices are coming to the market at a rapid rate.

Three key enabling technologies

In addition to today's inexpensive computing and ubiquitous connectivity, three other technological advancements are of particular importance to the future of chronic care. First, the emergence of consumer health electronics will allow the seamless capture and sharing of patient information in real-world settings: from home, at the workplace or on the road. Devices like blood pressure cuffs and weight scales have been around in homes for years. What is new is that, thanks to recent advances in microprocessors, these devices are becoming smaller, cheaper and smarter. They can interface wirelessly with home computers, mobile phones or even remote Internet applications.

Traditional medical devices are also moving out of laboratories into consumer homes. For example, a portable ECG device, which measures only 4" x 3" and weighs 3.5 oz., allows an individual to record electrical heart signals in the comfort of his or her own home. New kinds of devices are coming to the market at a rapid rate. A smart shirt with embedded sensors continuously monitors more than 30 physiological signs, including respiration, posture and cardiac function. An armband gathers detailed data about body movements, heat flux, skin temperature and galvanic skin response, from which inferences are made about important lifestyle patterns. And finally, the availability of cheap and smart environmental sensors (for example, motion/activity sensors, temperature sensors, webcams) has begun to transform many homes into intelligent environments where the health status of the inhabitants, including safety and patterns of everyday living, can be closely monitored and calibrated over time.

The second technology category offers better ways to combine and interpret data about an individual's health and wellness so that appropriate interventions can be made before an acute situation occurs. For example, with cameras at home, an elderly person's activities can be monitored and, using analytics that interpret the raw visual input from cameras and other sensory sources, events such as a fall can be anticipated. Some predictive modeling techniques using sensory data (for example, similarity-based modeling) have already been developed and successfully applied in detecting anomalies and predicting potential failures in complex systems like aircraft engines and nuclear power reactors. In such cases, they demonstrate significant savings in maintenance costs while reducing downtime for airlines and power companies.

As more detailed physiological, behavioral, and clinical data about individual health consumers becomes readily available, a similar analytical approach could be applied to detect anomalies and predict the trajectories of human health, minimizing or avoiding costly acute episodes among people with chronic conditions.

The third promising new technology category covers a broad range of tools, including user modeling, advanced visualization, decision support and collaboration. Collectively, these technologies enable clinicians and health consumers alike to better use the information available for more effective decision making and actions. For example, new communication tools such as multimedia messaging allow better information sharing (for example, a picture of one's meals) and richer interactions between caregivers and patients. There are technologies that help clinicians better manage their attention so that they can stay focused on what is truly important. They also provide necessary intelligence that determines the real-time routing of information to ensure that the right caregivers get the right information at the right level of detail.

The business case

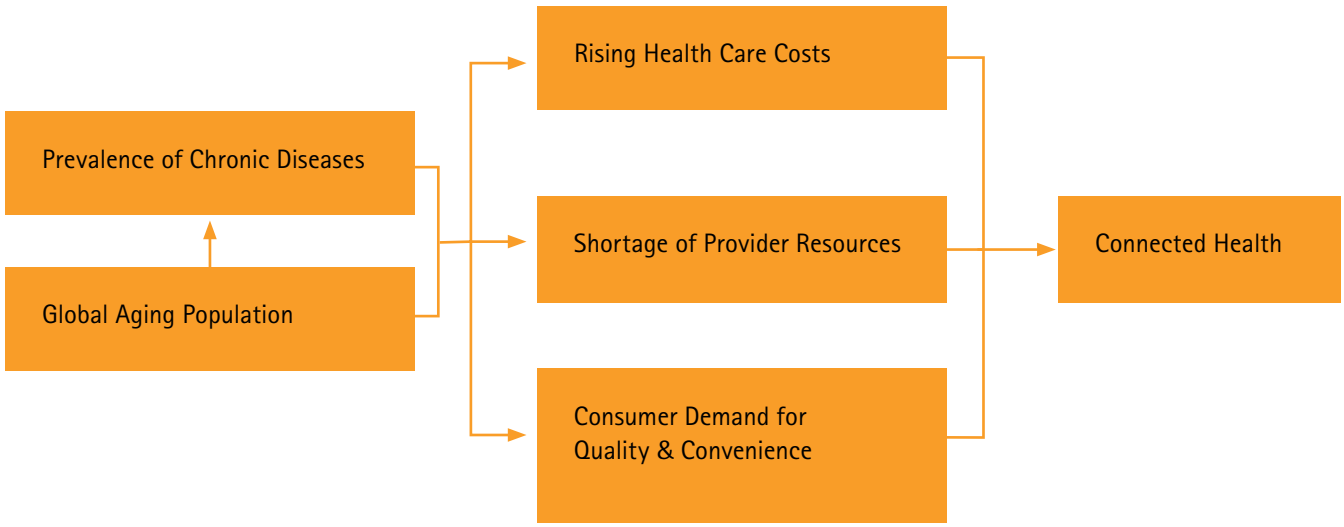
Despite the recent progress, these technologies are unlikely to attain widespread traction without first showing that they can help improve patient outcomes and provide positive return on investment. Available evidence indicates that connected health indeed offers great promises in reducing health care cost and addressing the shortage of provider resources. More importantly, it also enables a new model of care much needed to address the root cause of the current health care crisis, that is, chronic diseases.

In the immediate term, the most important consideration is undoubtedly about containing the skyrocketing health care costs, which affects not just health insurers, but governments at all levels, private employers, and individual consumers. Early evidence shows that connected health can help lower the cost of care by reducing potential emergency room visits and hospitalizations. For example, an analysis by the New England Healthcare Institute found that, compared to standard outpatient care, using remote monitoring for heart failure patients reduced the readmittance rate by 32 percent following a heart failure hospitalization, resulting in net savings of more than $1,861 per patient.[3] Similar savings were also reported by Partners Healthcare and the Veterans Health Administration (VHA).

The second driver is the improvement in productivity among provider organizations by addressing the increasing shortage of health care professionals. The most noticeable one is the worldwide nurse shortage, which is especially acute in long-term care facilities.

According to the Centers for Medicare and Medicaid Services, 90 percent of long-term care organizations lack sufficient nursing staff to provide even the most basic care.[4] Connected health can play a vital role in improving caregiver productivity. Because homebound patients can take their own vital signs before a care professional arrives, each visit can be shortened by 15 to 20 minutes and needless weekly visits can be eliminated, with visits prompted only when a monitoring device detects a problem. Connected health can also reduce the number of caregivers necessary to provide quality care. Using remote monitoring, home care agencies and cardiac clinics could handle significantly more patients with the same or fewer staff.

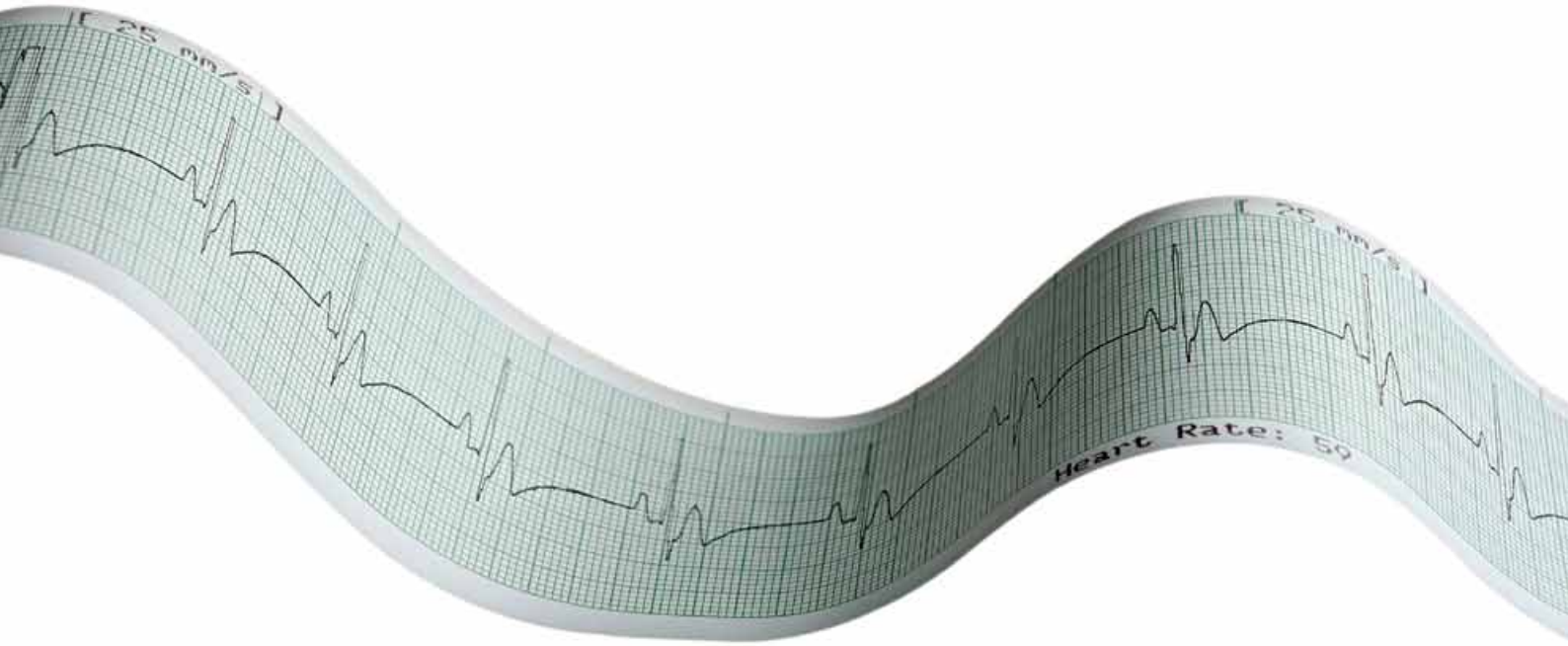
Figure 1. Market Drivers for Connected Health



The third driver relates to patient safety and quality of care. In a landmark report on issues surrounding the quality of care in the United States, the Institute of Medicine (IOM) noted that hospital discharge often signals an abrupt drop in care quality because, when left on their own, patients frequently lack the means, information, discipline, and/or oversight necessary to care for themselves. A UCLA study of patients immediately after hospital discharge reveals that 73 percent failed to use at least one medication according to the physician's instructions and, of all the drugs ordered at discharge, only 32 percent were taken at all.[5] Such noncompliant behaviors can result in delayed recoveries, complications and costly readmission.

In a continuous care environment, real-time remote monitoring devices can promptly detect abnormal physiological developments, trigger appropriate interventions and, ultimately, reduce noncompliance. A VHA study on remote monitoring demonstrated that, aside from cost savings, patients also reported being more educated, secure and better able to manage their own health care needs.[6]

Figure 1 summarizes the major market forces driving connected health. While rising health care costs, provider productivity and care quality are the most visible drivers, a closer examination reveals two deeper forces underlying the current crisis: the prevalence of chronic diseases and a global aging population. Because most chronic patients are also elderly, the latter will also exacerbate the former. To address these root causes, Accenture believes that we need a new, continuous care model in which connected health will play a pivotal role.



Calls for a continuous care model

Over three quarters of US health care spending goes to the care of people with chronic conditions, including heart disease, diabetes and asthma. In 2004, nearly half of Americans were diagnosed with one or more chronic conditions. This number is expected to increase dramatically as the baby boomer generation rapidly approaches their retirement age. The current health care system, however, is poorly equipped to meet the demand of this rapid growth. The current episodic care model, which focuses on treating patients when they develop an acute problem, works well for people in need of open-heart surgery or hip replacement, but is ill-suited for patients with diabetes, hypertension, or Alzheimer's disease. Chronic illnesses require daily management, self-care and coordinated and timely interventions from care providers. Without appropriate guidance, the status of a chronic patient can quickly deteriorate from manageable symptoms into a more serious condition that requires costly emergency interventions.

Chronic conditions such as congestive heart failure and Alzheimer's disease are especially prevalent among the elderly. Congestive heart failure accounts for over a quarter of a million deaths each year. An estimated 4.5 million older Americans currently suffer from Alzheimer's disease—a number expected to rise dramatically in upcoming years. Because patients with these conditions are often frail and unable to care for themselves, they require more support and participation from caregivers than patients with other chronic diseases.

The prevalence of chronic diseases calls for a continuous care model that empowers patients to engage in self-care through ongoing education and proactive interventions from caregivers. The key here is the ability to identify early warning signs of potentially acute problems and to support prompt interventions to avert unnecessary complications and trips to emergency rooms. This is the essence of connected health. With always-on connectivity, remote monitoring and real-time alerts, online consultation and other new care capabilities are now possible. Patients monitored by health devices are automatically reminded about what they need to do when the situations arise. When necessary, caregivers on the

HealthVault at Cleveland Clinic

Microsoft's HealthVault is a Web platform that enables consumers to easily store and share their health information. One important feature of HealthVault is the Connection Center, which integrates many types of health devices like glucometers and blood pressure monitors to support automatic data capture and uploading. Cleveland Clinic has recently launched a pilot that involves 400 chronic patients using HealthVault to manage their conditions (for example, hypertension). The participants are asked to monitor their blood pressures, glucose levels, etc., periodically at home. Through HealthVault, physicians can continuously track these readings and adjust treatment plans as necessary. Early evidence shows that patients enjoy the convenience of remote monitoring as well as the new level of empowerment that makes them active participants in their own care. Physicians appreciate the increasing visibility to their patients while they are away from a clinical facility, which puts them in a much better position in rendering quality care.

remote end are prompted to make sure the patient is on the right track. This continuous care model can effectively manage patients at any location, resulting in more responsive services, less patient suffering, lower costs and better use of scarce professional care resources.

The Veterans Health Administration (VHA) is a pioneer in demonstrating the effectiveness of connected health for the chronically ill. In 2000, VHA funded eight 2-year clinical demonstration projects in Florida to test the concept of "aging-in-place" by providing disease management, care coordination and remote monitoring of veterans in their homes. The published results showed a 40 percent drop in emergency room visits, a 60 percent decrease in hospitalizations, a 64 percent decline in nursing home admissions, an 88 percent reduction in nursing home bed days of care, and over 90 percent patient satisfaction ratings.[6] Similar positive results were reported from an expanded follow-up program in 10 other states and territories.[7] Based on the success of these early pilots, VHA established the Office of Care Coordination in 2003 to oversee a nationwide rollout of these programs, with the eventual goal of making such services available to the population of over 1.2 million veterans.

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The opportunities and challenges

Accenture believes that connected health offers key stakeholders great opportunities to address their shared as well as respective priorities. By increasing patient visibility and enabling early actions, it can improve the quality of care, reduce cost and enhance work efficiency, resulting in a winning proposition for all key stakeholders involved: patients, clinicians, health plans, employers, government, and family members. Consumers will benefit from improved health and quality of life and reduced out-of-pocket cost as a result of less frequent emergency room visits and hospital stays. Better education and support enables the consumer to have an increased ability to understand and manage their overall health and well being. Health care providers will benefit from improved decision making and enhanced work productivity. Equipped with both comprehensive patient history and an up-to-date picture of a patient's condition supported by biometric data, physicians can have more productive office visits with their patients.

Other potential benefits include more manageable patient workloads and better utilization of scarce provider resources, including nurses and hospital beds. By embracing new service channels like online care, health plans could effectively manage cost while ensuring convenient and quality care. Through unobtrusive monitoring and objective documentation, connected health could also help increase compliance and prevent fraudulent claims by providing health insurers with an accurate account of what has actually happened with the health consumer. Employers also win by controlling rising health care costs for current and retired employees and their families.

Furthermore, better health services ultimately translate into higher worker productivity through lower absenteeism. Governments could ease the burden on taxpayers, who ultimately pay for medical entitlement programs, like Medicare and Medicaid in the United States. Finally, family members can enjoy the healthy company of their loved ones longer and have the peace of mind of knowing that they are receiving any necessary medical attention on a continuous basis.

Connected health also provides a tremendous business opportunity for technology companies. The demand for innovative wearable, implanted and home health devices and services will likely continue to grow at a rapid rate. Many leading technology firms, such as Google, Microsoft and Intel, have already been expanding into the health device and solutions market.

Some retailers have opened separate departments or stores to sell these devices. In addition, many startup companies are introducing a wide range of innovative solutions, while traditional medical device manufacturers have also added telemetry capabilities to their new generation of devices. New industry groups such as Continua Health Alliance have emerged to promote standards and interoperability among these rapidly expanding products and solutions.

Despite the vast potential of connected health, a number of major challenges still lie ahead. Perhaps the most daunting one is reimbursement. As long as doctors and hospitals remain unsure about who will pay for these new services, connected health is unlikely to be widely adopted. In the current system, the logical funding sources are health plans and insurers. However, these parties are historically slow in providing coverage for new technologies. Flexible spending and medical savings accounts give consumers increasing control over health care dollars, but recent studies show that many consumers are reluctant to pay for such services out of their own pockets.

In addition to the financing hurdle, connected health faces a cultural challenge as well. Many doctors and other caregivers are fearful that these technologies might disrupt their existing workflow and patient care. In addition, some patients, especially the elderly and frail, may feel uncomfortable with technology, and prefer having doctors and nurses physically present.

There also are a number of technical obstacles, including standards, data security and usability. Because a large number of parties are involved in health care delivery, standards are critical to achieving smooth delivery of care services. There currently is little standardization in many areas, including wireless communications among home and wearable devices, data privacy and data formats governing information sharing among patients, clinicians and health plans.

As a result, health care organizations have to choose among incompatible solutions without knowing which ones may eventually win out. This uncertainty increases adoption risks and slows down the uptake of these technologies. The other major technical barrier is related to usability, which includes software user interfaces, hardware form factors, et al. Usability is especially important in connected health because the typical user is an elderly individual with a chronic illness who may be unable or unwilling to learn new technologies.

American Well pilot in Hawaii

Today, Web conferencing and multimedia messaging are commonly used in the workplace and among families and friends. American Well—a Boston-based startup founded by two physicians—attempts to bring such capabilities to health care. By working with health plans and physician groups, American Well provides a Web-based, online care platform that allows patients to use webcams and Internet browsers to consult physicians remotely from anywhere, anytime. To ensure the continuity of care, it partners with Microsoft using HealthVault to capture and share patient information among different care providers over time.

Earlier this year, Blue Cross Blue Shield of Hawaii launched a statewide pilot of this service to its 700,000 members as well as nonmembers (at a slightly higher rate). While it is still too early to assess the exact impact on cost, quality, and clinician productivity, anecdotal evidence suggests that both physicians and patients enjoy the flexibility and convenience of this new channel of care. To further prove the case, Blue Cross Blue Shield of Minnesota recently started a similar pilot with its 10,000 employees and family members, with a plan to roll it out to its network of 2.8 million members in 2010.

Conclusions

Based on the early positive evidence, Accenture concludes that connected health will eventually take hold in the marketplace. With the continuing commoditization of computing and communications and the rapid maturation of consumer health devices, these technologies will become increasingly versatile and ubiquitous. Recognizing the tremendous untapped potential of these products, high-tech companies are already making huge investments. Governments of all levels and private employers also are finally beginning to take actions to address exploding health care costs. The chronic care improvement programs at the US Veterans Administration and Medicare are just two notable examples. However, the real key for the broad adoption of connected health lies with the aging baby boomers.

More than any previous generation, baby boomers are well-educated, health-conscious, demanding and self-reliant. Because they have been surrounded by electronic devices during most of their working years, they are also technologically savvy. More importantly, their control of the purse strings is expected to expand significantly as private businesses and governments continue to shift a larger share of health care costs to consumers. This combination of self-determination, technology sophistication, growing age-related health needs, and expanding spending power will ultimately help make connected health a way of life.

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