

# TELEMEDICINE: AN ESSENTIAL TECHNOLOGY FOR REFORMED HEALTHCARE



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## MANAGEMENT SUMMARY

Healthcare reform in dozens of countries, including France, the United Kingdom, Australia, Chile, Canada, Taiwan, China and the United States, is generating dramatically new approaches to care delivery. Although the details and the level of maturity of the efforts differ across countries, the overall trends are universal: they reflect the need to contain costs while improving access and care quality, to overcome a shortage of providers, and to take care of a growing sicker and aging population. They are all built on a foundation that puts the citizens at the center and focuses on keeping them healthy, partly by encouraging them to become more active participants in their own health management.

The critical alignment of care practices with incentives for patients, providers, and payers/governments that each country is seeking to achieve positions telemedicine to be a key enabler of many healthcare reform goals — and for good reasons:

- Telemedicine is hardly new. Over the last few decades, a succession of telemedicine pilots has yielded documented care, cost and resource benefits in developed and developing countries.
- Telemedicine has demonstrated adaptability to a wide range of health situations, ranging from early disease identification and chronic condition management to expanding access and extending health resources.
- Core and ancillary technologies for telemedicine have matured and today's telemedicine solutions are dependable, easy to adopt and easy to use by patients and providers. For many solutions, the end-user device is already in the pockets and homes of many citizens and providers.
- The infrastructure to support Internet access is becoming more widespread and reliable. In some areas, there are multiple connectivity options.
- At the local and regional levels, the general easing of regulatory constraints and equalization of reimbursement makes telemedicine a viable option, even while health reform is still evolving.<sup>1</sup>

Because of these reasons, the immediate question for health systems and payers/government is where to start and how to make longer-range plans for integrating telemedicine into routine healthcare.

Our recommendations include:

- Start with a program that addresses an immediate problem in an area with as few barriers as possible. Pilot only to work through technology and workflow issues, with agreed-upon plans to full-scale rollout. If possible, focus in the areas of chronic disease, as these will deliver substantial early benefits to the health system.
- Understand current challenges and investigate local and regional efforts that are continuing to chip away at these barriers. For example in the United States, new regulations have recently been announced that enable the credentialing of physicians who use telemedicine for remote-care visits across state lines.<sup>2</sup> In Australia, the Connecting Care program coordinated by New South Wales Health will be drawing on a number of products and services to support self-monitoring and support solutions for patients with chronic conditions. The state-wide initiative will connect doctors, hospitals and community health services.<sup>3</sup> In the United Kingdom, the Whole System Demonstrator Programme has run controlled trials since 2007 and the full evaluation results are to be released shortly.
- Commence early with policy reform to ensure healthcare delivery is not constrained by legacy jurisdictional boundaries. Telemedicine requires policy and technology innovation.
- Develop a telemedicine strategy with representatives of health plans (where applicable), patients and clinicians to define sponsors, programs, processes and responsibilities.
- Prepare an implementation roadmap, using the knowledge gained in the aforementioned efforts to shape priorities and programs.

## INTRODUCTION

The challenges that have hindered the spread of telemedicine in the past are dissolving as the forces governing care delivery are brought into better alignment. Fueled by advances in technology infrastructure and a growing number of solutions that fit specific care needs and patient preferences, telemedicine has quietly made its way into segments of care delivery where it has accomplished dramatic turnarounds.

Widespread adoption of telemedicine, however, is not yet a reality. Globally, the tipping point will be the care model realignment under healthcare reform, where payment is value-driven, not volume-driven. Care providers (hospitals, physicians, and ancillary caregivers — all part of the overall care team) are paid for results, and whether the venue is the office or a virtual visit at home will no longer matter. Quality is measured and payments made for meeting targets. Finally, there are incentives for preventive care — for keeping citizens healthy so there is a decrease in the number of physician's office visits and hospital admissions.<sup>4</sup>

**“The ACO shall define processes to promote evidence-based medicine and patient engagement, report on quality and cost measures, and coordinate care, such as through the use of telehealth, remote patient monitoring and other such enabling technologies.”**

*(Federal Register, Vol. 76, No. 67, p. 19531, 4/7/11)*

In this report, we identify healthcare practices and reform programs from different countries that are surprisingly similar. The fact that they are in different stages of maturity offers the reader the opportunity to learn from early leaders; about both the challenges and successes. Telemedicine solutions described in the report are also in various levels of maturity and use, reflecting the specific care needs and available technologies in different countries.

Starting with a brief history of telemedicine, the paper highlights a few of the staggering health-related statistics that are key drivers of the fundamental healthcare changes in progress. Matching the challenges that are driving healthcare reform with the capabilities of different telemedicine solutions, we will make our case that this group of technologies is indeed a key set of enablers of healthcare reform.



## WHAT IS TELEMEDICINE?

There are a number of definitions for telemedicine. Public interest groups, including the World Health Organization (WHO) and country-based industry trade groups such as the American Telemedicine Association (ATA), the Commission of the European Community and the National ICT Australia (NICTA) all require three common critical elements for a technology to be classified as telemedicine:

- 1) Provision of healthcare services
- 2) Delivery via Information and Communications Technology (ICT) and
- 3) Supporting a goal of overcoming geographical separation of patient and/or provider(s)

Included in the definition of telemedicine (and a critical success factor for its adoption) is mobile health (mHealth), which is the ability to access healthcare applications using wireless, Internet-accessible devices such as smartphones, tablets and laptops.

Specific telemedicine applications that fit this definition fall into three categories. Some implementations focus on just one of these services, but others, such as many homecare programs, incorporate remote visit, remote consult and remote patient monitoring services all in the same service.

- **TELE-VISIT:** Use of ICT to conduct provider visits with patients (aka e-visits) from remote sites. Options include remote hospital rounding, remote intensive care unit (tele-ICU), and remote outpatient care visits. Ideally tele-visit programs also interface telemedicine and electronic health record (EHR) systems, enabling providers to view and record findings in the patient's medical record.
- **TELE-CONSULTS:** Use of ICT by two or more providers to consult about a patient (with or without the patient present). Tele-consults increasingly include shared access to patient EHR data, including photographs, x-rays and other images, to facilitate discussion and recommendations.
- **TELE-MONITORING:** Use of ICT for the patient to collect and transmit vital clinical statistics (such as weight, blood pressure, blood sugar levels and activity) from home or other locations to be viewed as needed by care providers. Data entry can be done directly by the patient, via bluetooth-enabled technology or directly connected medical devices. Advanced applications include clinical decision support logic to alert and remind the patient and the care team when out-of-range findings are reported. Tele-monitoring, also known as patient self-monitoring, has been very successful using mobile technology for active patients with chronic conditions such as diabetes.



## HEALTHCARE CHALLENGES AND HOW TELEMEDICINE ADDRESSES THEM

### HEALTHCARE CHALLENGES THAT ARE BREAKING THE SYSTEM

Current healthcare challenges in part stem from past successes. People are living longer due to advances in medical treatment, new diagnostic tools are able to identify health issues sooner, and vaccines today prevent diseases such as typhoid and rubella. Today more than 50 countries have a life expectancy of 78 years or more. Worldwide, life expectancy is 68. However with lifestyles more sedentary, and diets loaded with fats and highly processed foods, people are increasingly overweight or obese. The combination of living longer and failing to adopt healthy lifestyles is yielding a population with more chronic conditions and getting serious illnesses like cancer later in life. This leads to higher use of healthcare resources and higher costs.<sup>5</sup> We have identified the following five challenges as important contributors to the healthcare crisis and believe that telemedicine is an enabler for overcoming each one.

**COMBATING THE RISING COST OF CARE:** Healthcare spending has risen across all of Europe, often at a faster rate than economic growth. In 2008, EU countries spent 8.3 percent of their GDP on health, up a full percentage point from 7.3 percent in 1998.<sup>6</sup> The United States spends an even larger proportion of its GDP on healthcare: 16 percent in 2008.<sup>7</sup> In dollar terms, U.S. healthcare costs rose from \$2.3 trillion in 2008 to \$2.5 trillion in 2009, and are expected to reach \$4.5 trillion by 2019.<sup>8</sup> The Australian Institute for Health and Welfare estimated that total health and residential care expenses for the aged will increase from \$85 billion in 2003 to \$246 billion in 2033 (a 189 percent rise).<sup>9</sup>

**PROVIDING HIGH-QUALITY CARE:** High-quality care is a mandate for many healthcare reform initiatives. In some countries, quality metrics for hospitals have advanced from voluntary reporting to paid-for-reporting to paid-for-performance. The latest Accountable Care Organization requirements in the United States include 65 new quality measures for in-patient and out-patient care, which are requirements for receiving the savings incentives.<sup>10</sup> In England, the routine collection of Patient Reported Outcome Measures (PROMs) for elective procedures has been a requirement from the Department of Health (DoH)

since April 1, 2009 and contained in the standard NHS contract for acute services. Also in the United States, as of October 2012, Medicare will recover payments for unnecessary readmissions within 30 days for heart attack, pneumonia and heart failure patients.<sup>11</sup> The United Kingdom has similar plans set out by the Secretary of Health to penalize acute hospitals every time a patient is re-admitted within 30 days of discharge.<sup>12</sup>

**MEETING CARE DEMANDS:** Between 2000 and 2050, the number of people on the planet over 60 years old (who historically need and demand more care) will more than triple from 600 million to 2 billion.<sup>13</sup> In addition, the prevalence of chronic conditions among patients of all ages (including children) is increasing. For example, by 2015 approximately 2.3 billion adults are predicted to be overweight and more than 700 million obese,<sup>14</sup> between 2000 and 2030 diabetes among all age groups is expected to increase from 2.8 to 4.4 percent,<sup>15</sup> and by 2030 chronic diseases (not infectious diseases) will be the leading cause of death in the world.<sup>16</sup>

**OVERCOMING PROVIDER SHORTAGES:** In simple economic terms, healthcare is a world of supply and demand. On the demand side, there is an ever-increasing need for providers, due largely to the growing aging population and the increasing prevalence of chronic conditions described above. The resource side of healthcare cannot meet the demand. Our current medical and nursing education system cannot expand at a rate to meet the demand gap. According to one study, the United States is expected to face a shortage of 260,000 nurses and at least 124,000 physicians by 2025.<sup>17</sup>

**ACHIEVING PATIENT SATISFACTION:** Hospitals and health delivery organizations are paying more attention to how patients feel about quality, cost and access to care because patients have choices where to seek care. Hospitals will compete in part on patient satisfaction. Payers and regulators are also increasingly viewing the patient perspective as a performance indicator. Routinely, surveys are used to gather important information about what is working, and what needs to be changed. In the United States patients can compare hospitals online based on a series of categories including patient experience ratings, process of care measures and outcome measures.<sup>18</sup> Patient satisfaction measures are also included in value-based purchasing reform efforts for hospitals and Accountable Care Organization (ACO) metrics for ambulatory care. In the United Kingdom, patient satisfaction could impact up to 10 percent of a hospital's income.<sup>19</sup>



































## TELEMEDICINE AS AN ENABLING SOLUTION FOR EMERGING CARE MODELS

Even though telemedicine pilots did not develop into large-scale initiatives, they have provided evidence that these solutions can be implemented and help to address the broad array of healthcare challenges. Telemedicine has been successful in many aspects of care delivery and health management, ranging from the most intensive care setting in the hospital to health and wellness monitoring at home.

Formal cost/benefit and return-on-investment analyses of telemedicine solutions are difficult to find since most programs have been grant-funded and short-lived. Despite this, numerous reports documenting the benefits of telemedicine are making strong cases for the value of adopting these technologies.

The following table summarizes the areas in which telemedicine has been deployed and highlights specific challenges it addresses.

Table 1. Telemedicine Solutions and Challenges Addressed

ACUITY LEVEL	TYPES OF CARE/ (TELEMEDICINE SOLUTION)	CHALLENGES ADDRESSED				
		COST OF CARE	CARE QUALITY	INCREASING CARE DEMAND	PROVIDER SHORTAGE	PATIENT SATISFACTION
HIGH	1) Intensivist coverage (Tele-ICU)					
	2) In-patient rounding coverage (Rounding robot)					
	3) Emergency care services (Mobile tele-consults)					
MODERATE	4) Post-acute care monitoring (tele-monitoring with tele-visits)					
	5) Provider collaborations that may include the patient (Tele-consult that can include data and image sharing)					
	6) Non-office visits (Tele-visits, tele-consults)					 (for rural areas)
LOWER	7) Patient self-monitoring and support (especially for chronic conditions) (tele-monitoring with mHealth options, tele-visits, tele-consults)					
	8) Aged care monitoring and support (Tele-monitoring with intelligent home monitoring options, tele-visits)					

**LEGEND:**



Positively addresses challenges



Significantly addresses challenges

**1. INTENSIVIST COVERAGE:** Many community and rural hospitals cannot provide intensivist coverage 24 hours a day for their ICUs. They solve the problem by using tele-ICU solutions so critically ill patients can be managed safely and do not have to be transferred and travel long distances for care. Tele-ICU systems employ numerous types of remote-monitoring devices at the patient bed and transmit findings to command centers, where staff can review dashboard reports and drill down on specific findings to keep track of each patient's history and progress. Tele-ICUs also include cameras, displays and microphones that enable command center physicians to visually monitor patient status, as well as interact with patients and on-site caregivers. These systems are designed to allow small teams of critical care physicians and nurses to effectively keep tabs on large numbers of patients at multiple hospital ICUs. A single eICU staffed by one critical care physician and two nurses can effectively monitor up to 120 patients.<sup>20</sup>

Reported tele-ICU impacts and benefits are dramatic:

- The UMass Memorial Medical Center (Worcester, Massachusetts, United States) reported a 20 percent decline in patient deaths at the medical center during its trial period of tele-ICU, and a 36 percent decrease in the severity-adjusted mortality rate at a community hospital also participating in the trial.<sup>22</sup> They reported full return on investment during the first year of operation.<sup>23</sup>

**20%  
DECREASE IN  
ICU MORTALITY**

Debra Woods, RN,  
"Medical Connectivity:  
Tele-ICU Saves Money as  
well as Lives," *Telemedicine  
and e-Health*, March 2011,  
p 64.

- At Loyola University Medical Center in Maywood, Illinois, United States, the team compared telemedicine costs to alternatives and determined that telemedicine capital equipment costs were one-thirteenth (1/13) those for alternatives. Kathleen Webster, Director for Pediatric Critical Care at Loyola University Medical Center said, "We went an entire year with no deaths in that group — and that's as low as I can go with the numbers."<sup>24</sup>
- Meta-analysis of 13 studies conducted between 2004 and 2010 in the United States indicated that telemedicine reduced ICU mortality by 20 percent and shortened length of stay (LOS) by 1.26 days.<sup>25</sup>
- An Australian trial that included video conferencing and live telemetrics equipped for trauma and critical care has been extended beyond the initial pilot and will be implemented in all 16 regional hospitals in Victoria. Using the telemedicine solution, specialists at the Melbourne sites provide advice to primary treating doctors for critical-care patients. The solution provides a more positive way to assist patients in critical situations by allowing specialists to have access to information they didn't have before (via phone) — images, vital signs and video footage of the patient.<sup>26</sup>

A dramatic case of tele-ICU success involved a patient who was admitted to a U.S. (Florida) community hospital in 2008 suffering from a heart attack ("cardiac death") and head injuries that were so severe that they required inducing therapeutic hypothermia to minimize brain damage — a procedure no one in the hospital was skilled to perform. However, using a tele-ICU system, a critical care physician from a remote command center was able to guide staff there through successful administration of the procedure and monitored progress throughout the critical 10-day recuperation. The solution allowed the remote team to use a remote camera and high-resolution display screen to zoom in on and look for changes in the capillaries of the patient's pupils, this while also automatically and continuously reviewing and issuing appropriate alerts to changes in heart rate, oxygen levels and other vital signs.<sup>21</sup>

**2. IN-PATIENT ROUNDING COVERAGE:** Instead of leaving their offices to conduct daily in-patient rounds, physicians are using mobile telemedicine solutions, often called remote-care robots. The robot solutions are equipped with interactive audio/video and a wide range of attached devices: stethoscopes, otoscopes, ultrasounds and a stationary workstation that allows the physician to manipulate the robot and devices. The solution effectively removes the barriers of time and distance to extend the physician's reach (from home or office) to deliver patient care. The robots are used in emergency departments (ED), patient units, as well as operating and procedure rooms. The physician workstation can be located in the physician's office or home. A similar technology uses a mobile cart and wireless technology to provide the audio, video and medical device interactions with the patients.

Multiple studies have been conducted showing improved physician response times to patients, improved quality of care provided, increased physician and patient satisfaction and decreased LOS and costs.

- Three hospitals in the United States using the remote care robots surveyed patients and learned that: 1) 67 percent of patients agreed that they would prefer tele-rounding with their physician than to be treated by a partner, 2) 76 percent of patients felt comfortable with tele-rounding daily, and 3) 86 percent of patients felt they could easily communicate with their doctor during tele-rounding. One physician made rounds a second time, later in the day, and was able to send some patients home earlier — reducing patient stay by 0.17 days (which translates into \$750,000 annually).<sup>27</sup>

- At Shawnee Mission in Kansas, United States, a study of physicians using this technology identified that 1) 71 percent agreed that remote presence sessions accelerated hospital discharge, 2) 95 percent agreed that it saved physician time, 3) 97 percent agreed that they learned more about their patients, 4) 95 percent agreed that it advanced care, and 5) “off-hours” robotic visits were three times more efficient than in-person visits.<sup>28</sup>

- At Tallaght Hospital in Dublin, Ireland remote-care robots perform evening and weekend rounds on an orthopedic postoperative care ward. Patients in the pilot study strongly agreed that their care was better because of the tele-rounding and that it should be a part of regular patient care in the hospital. The nurses agreed that they could easily communicate with the physician using this telemedicine solution.<sup>29</sup>

**95% OF PHYSICIANS INDICATE THEY SAVED TIME**

In Touch case study on Website <http://www.intouchhealth.com/7SMCC-PhysicianSurvey.pdf>, viewed May 17, 2011

**86% FELT COMFORTABLE COMMUNICATING USING THE TECH-NOLOGY**

In Touch case study on Website [http://www.intouchhealth.com/apps\\_Patients.html](http://www.intouchhealth.com/apps_Patients.html), viewed April 27, 2011.



Image Courtesy of InTouch Health

**3. EMERGENCY CARE SERVICES:** Effective emergency care is about quick diagnosis and immediate treatment. In the case of suspected myocardial infarctions, the heart muscle starts to die as soon as a heart attack starts, so every minute counts. TeleECG is a telemedicine program that provides real-time support for emergency medical technicians (EMTs) while they respond to emergency calls in patient homes and/or while transporting patients. In Norway, for example, the teleECG initiative started in 1995 after the initial pilot projects. It is now available in over 100 ambulances and offered throughout the country with plans for roll-out to all districts. Ambulances equipped with the telemedicine solution capture and transmit ECG images to hospitals where they are analyzed by a cardiologist who recommends an immediate course of action.<sup>30</sup> In the United States, a program called STAT-MI uses smartphones to transmit ECGs from the ambulance to the cardiac catheterization laboratory. Patients with confirmed heart attacks are brought directly to the lab where the staff is ready and waiting.<sup>31</sup>

Reported improvements in patient care from these two programs include:

- Outcomes improved by 15 to 20 percent among Norwegian patients. This improvement is likely due to the fact that approximately 50 percent of “cardio patients” now are administered anti-thrombolytic treatment by EMTs before arriving at the emergency room.<sup>32</sup>
- Reduced patient time to treatment of up to 131 minutes in the U.S. program.<sup>33</sup>

**> 2 HOUR  
REDUCTION  
IN TIME TO  
TREATMENT**

Molly Merrill, “Smartphones Speed Heart Attack Treatment,” *Healthcare IT News*, December 22, 2010.

**4. POST-ACUTE CARE MONITORING:** Many newly discharged patients need close monitoring to ensure continued health progress, high-quality outcomes and avoid re-admissions. In the past, healthcare organizations have piloted the use of nurse transition coaches who call patients and make house calls to check vital signs and help them keep up with their therapy, medication or dietary requirements. While results show positive outcomes, this labor-intensive approach is typically not done due to lack of resources. However, telemedicine solutions can help ease the resource burden while maintaining the appropriate level of monitoring. Basic components for post-acute care-monitoring telemedicine solutions include a home-based Internet device and a command center at the hospital or other location, such as a care call center where providers conduct remote visits using broadband connectivity. Command center and home devices are configured with teleconferencing equipment (cameras and high-resolution displays) that enables routine remote visits. Many patient workstations are connected to medical devices for capturing and downloading vital signs data. The technology also reminds the patient to enter daily vital sign and health information, sends the data, analyzes the findings, and alerts transition coaches and care providers when patients need their help. Optimally, these solutions are interfaced or integrated with the delivery organization’s EHR, so care providers can review patient records and document remote care.

There have been numerous pilots for post-acute care for patients with diseases such as chronic obstructive pulmonary disease (COPD), diabetes, heart disease and cancer. Results from pilots indicate that quality and outcomes are as good, or better than the traditional post-discharge in-person and phone call follow-up. Telemedicine pilots have demonstrated a decrease in re-admissions and a decrease in length of stay since patients can be discharged sooner, freeing up beds for other patients. For surgery patients, rehabilitation can be done at home, saving travel time, improving patient comfort and improving recovery outcomes.







Source: eMedlink, CSC

Examples of successful post-acute care monitoring programs include:

- A 2010 Catalan Remote Management Evaluation (CARME) study in Spain compared outcomes of 92 heart failure patients using telemedicine to outcomes from the previous 12 months of care without telemedicine. Researchers found that patient-reported quality of care increased by 62 percent and reported dissatisfaction decreased by 22 percent. The study also reported a 68 percent decrease in hospitalization (including readmissions) for heart conditions.<sup>34</sup>
- Studies of COPD patients have shown a 33 percent reduction of Emergency Room visits and 46 percent reduction in hospitals costs due to reduced in-patient days. In addition, 63 percent of the patients who would otherwise be in nursing homes, now can stay in their homes using telemedicine and home care.<sup>35</sup> A surprising finding from one recent pilot was the reluctance of patients to give up their system once the pilot was done. Numerous explanations were posed, but one key was a 24/7 attention

**68 %  
DECREASE IN  
HOSPITALIZATION**

Kyle Hardy, "Telehealth Tech Helps Provide Better Patient Care," *Healthcare IT News*, June 2, 2010.

**33 %  
DECREASE IN ER VISITS**

Robert Litan, "Vital Signs Via Broadband: Remote Health Monitoring Transmits Savings, Enhances Lives," *Better Health Care Together*, October 24, 2008.

feature ("the button") on the patient workstations that enabled immediate contact with command center caregivers whenever questions or needs arose.

- In an Australian study, knee replacement patients who used an Internet-based postoperative rehabilitation program experienced similar and sometimes better outcomes than those using traditional rehabilitation. Specifically, they achieved better outcomes for reducing joint stiffness, completed an average of 2.2 exercise sessions versus 1.7 for the control group and reported higher levels of satisfaction with the rehabilitation program.<sup>36</sup>
- The Veteran's Health Administration investigated the use of automated home monitoring along with the nurse-run disease management program for CHF patients post-discharge. The study found that the combination solution decreased readmissions by 72 percent, 20 percent more than the traditional nurse disease management program alone.<sup>37</sup>

**5. PROVIDER COLLABORATIONS:** Primary care delivery is typically sequential. A patient with a health problem starts the process by visiting a primary care physician or general practitioner (GP). If the patient requires the expertise of a specialist, the GP authorizes a referral. In other instances, patients can self-refer and go directly to the specialist, skipping the primary care evaluation.<sup>38</sup> Both models are inefficient, but exist because current care practices do not support a care team approach. Fortunately the value of these multidisciplinary teams is well-known as they, frequently called “centers of excellence”, are often the standard of care for high-risk conditions such as cancer.

Fortunately, using telemedicine-enabled care can overcome care practice and complexity barriers to support collaboration among members of the patient’s care team. In a recent survey, healthcare leaders from 16 countries viewed collaboration, rather than costs or access, as the driving force in healthcare delivery. Results indicated that the use of telehealth to develop care teams (doctors collaborating with each other in real time on a patient’s care no matter where they are located) led to reduced waste, lower cost and better clinical outcomes. In addition the technology needs to support electronic sharing or accessing of diagnostic images, video and patient biometric data.<sup>39</sup>

The following examples demonstrate the value of tele-consults for both urgent and non-urgent care:

- A recent case in California involved a 3-year-old who was in need of immediate care due to a head injury, and the trip from Redding to the University of California Davis Medical Center (UC Davis) in Sacramento, California, United States, would have consumed precious hours and possibly exposed the patient to additional medical trauma. Instead, using the latest video telemedicine technology, a pediatric critical care specialist at UC Davis consulted with his remote partners on digital images that revealed a fractured skull. He recommended the drugs to administer and when the Redding doctors should remove the ventilator.<sup>40</sup>
- The U.S. Department of Defense (DoD) Health System is another example of provider-to-provider collaboration using telemedicine. During 2009, pediatric specialists provided 300 remote consults to family medication physicians and physician extenders. In 74 percent of the cases, the diagnosis or treatment plan was modified following the specialist consult. In 60 percent of the cases, physicians were able to resolve patients’ primary problems via the tele-consult. In at least 43 percent of the cases, the consult eliminated the need for patients to transfer to larger facilities. The teleconsultation system reduced spending annually by \$750,000.<sup>41</sup>
- Radiologist coverage and consultation is an established form of tele-consults, especially for after-hours and weekends. Images are sent to the “teleradiologists” who

**60% OF CONSULT CASES RESOLVED PATIENTS’ PRIMARY PROBLEMS.**

“Department of Defense Study Finds Telehealth Cuts Pediatric Costs,” *iHealthBeat*, February 10, 2011.

perform preliminary readings which are made available to the physician via a secure website. If there are questions, the treating physician and remote radiologist can discuss the findings and both view the image using telemedicine. Teleradiology is often used in hospitals where there is unpredictable overnight and weekend shift need (extremely busy or extremely slow) so they save money by not staffing a full-time radiologist.

For example, at Lake Forest Hospital in the United States, teleradiology consults have a 30-minute turnaround in urgent cases, which leads to quicker diagnostic and treatment decision.<sup>42</sup> It also is critical in rural areas where there is a substantial shortage of radiologists. Another provider of telemedicine services is headquartered in Barcelona, Spain, and serves more than 60 European hospitals. This organization offers diagnostic services and radiology readings from providers working across Europe, and provides after-hours reporting from a specially-staffed center in Sydney, Australia.<sup>43</sup>

- In Moray, Scotland, remote consultation by teleconferencing is being piloted for remote diagnosis of thrombolysing stroke patients at Dr Grays Hospital. Since December 2008, the hospital has been involved in a wider national pilot that offers quick and remote consultation in an attempt to lessen the effect of a stroke. Approximately 80 percent of strokes are caused by a blockage to the blood supply to the brain. If diagnosed quickly, the use of clot-busting drugs can restore the blood supply quickly and lessen the damage from the stroke. These drugs have to be administered within three hours of the onset of the stroke which has traditionally presented a problem in more rural areas such as Moray.

Diagnosis of the feasibility of thrombolysis (clot-busting) usually requires a specialist to view the patient’s CT scan and carry out a face-to-face consultation. However, the use of teleconferencing allows the Accident and Emergency Department to hook up with specialists at the other end of the country if need be, in order to get the quick decision required in order to begin thrombolysis procedures, if appropriate. The Telestroke Programme is being run by the Scottish Centre for Telehealth in Aberdeen and has been providing 24/7 telemedicine links from Dr Grays Hospital to the acute stroke unit in Aberdeen Royal Infirmary with very positive results to date.<sup>44</sup>



**6. NON-OFFICE VISITS:** Patients need to interact with their care providers for a wide range of health issues. Many do not require a trip to the physician's office and can be addressed using telemedicine solutions. These online provider-patient consultations, called e-visits, can range from e-mails regarding minor health issues or medical questions to webcam online visits. Using online communications offers physicians a unique way to control their schedule and optimize productivity. They can work from home, work in the evenings or fill in an office visit cancellation with an e-visit. The non-office technology option keeps face-to-face visits open for patients who really need to see the physician in person.<sup>45</sup>

Where non-office visits are particularly critical is in providing access to care providers in rural and other underserved areas where resources are scarce and require patients to travel long distances for an office visit. For example, in the United States the California Telehealth Network (CTN), an organization run by UC Davis has connected 25 medical facilities to a broadband network. The plan is to connect the sites to specialist physicians from the eight UC medical centers, as well as a few private hospitals, such as Stanford University and the University of Southern California, for real-time video conferencing. CTN will eventually link medical specialists to more than 800 rural and underserved healthcare facilities across the state.<sup>46</sup>

An innovative example of providing rural care is a mobile screening program that specialists in Queensland, Australia developed to provide hearing and vision screening to the Aboriginal and Torres Strait communities in remote areas 300 kilometers northwest of Brisbane. The program operates from a van that is customized to operate as a mobile clinic. Equipment onboard includes both self-contained screening devices and wireless communication equipment that supports real-time remote consults with specialists back at Royal Children's Hospital, Brisbane. In addition to doing the screenings and participating in remote consults, mobile clinic staff also arrange for follow-up surgery and other needs for care identified by the screenings.



E-visits increase access and productivity in urban and rural areas:

- Texas A&M University in the United States offers telemedicine mental health services for rural patients, who have significant disparities in their ability to access mental health services because of travel time, expense, lack of insurance and shortage of eligible providers. The program already successfully deployed in seven Brazos Valley counties is expanding into Madisonville.<sup>47</sup>

**350 +  
APPOINTMENTS SAVED  
BY ONE MD**

Amanda Chan, "Doctor will Skype you now: More MDs Use Web for House Call," *Yahoo News*, January 2, 2011.

**35 %  
OF PATIENTS SCREENED  
HAD HEARING  
ABNORMALITIES**

"Telemedicine Clinics and Mobile Health Screening Services for Indigenous Children," The University of Queensland, Australia, <http://www.uq.edu.au/coh/health-e-screen-4-kids>.

- The University of Minnesota Medical Center, Fairview, Minnesota, United States has 36 physicians who are beta-testing online sessions for patients. Physicians take shifts to provide coverage Monday to Friday from 8:00 a.m. to 8:00 p.m. and weekends from 9:00 a.m. to 5:00 p.m. To date, they have received very positive feedback from patients.<sup>48</sup>
- Dr. Gregory Smith, a physician who lives in Los Angeles, California in the United States but has a clinic in Fresno, uses computer webcam e-visits to see patients in the winter time when the weather makes it impossible to travel. He estimates that the technology saves 350 to 500 appointments a year that would have had to be re-booked.<sup>49</sup>
- In the Brisbane, Australia program, 665 children were screened who in all likelihood would otherwise have gone unscreened for either hearing or visual difficulties. They identified 230 (35 percent of those screened) with hearing abnormalities and 80 (12 percent) with visual abnormalities.<sup>50</sup>
- In the State of Queensland, Australia, instead of attending the Pre-Admission Clinic in Toowoomba, rural patients go to regional health services where nursing staff take required observational data and establish a videoconference link for the specialist consultation. Participants consist of pre-operative patients living in remote areas in the south-west region of Queensland, who would otherwise be required to undertake an additional long-distance return trip to Toowoomba. On average, the telehealth PAC service was found to save patients almost 500 kilometers, or approximately 6.5 hours, of travel. The service benefits Queensland Health by \$57 in reduced costs per consultation, and patients by at least \$289 in reduced travel. Subjective feedback indicates that clinicians and patients report a high level of satisfaction with the service. Experience has shown that PAC consultations represent a suitable and effective application for telehealth.<sup>51</sup>

## 7. REMOTE PATIENT SELF-MONITORING AND SUPPORT:

Patients with chronic conditions such as diabetes, high blood pressure and heart disease need to continually monitor their health by keeping track of key health metrics such as blood pressure, weight, blood sugar and by staying on their individual care plan. Internet-enabled telemedicine solutions are ideal for remote patient self-monitoring, both for at-home and mobile use. At home, the laptop or workstation can be connected to a variety of medical devices that record and send the readings to the home station. The health application has the patient's care plan that is used to store the daily metrics and reminds the patient when to take medications and record vital signs. Data are sent to the care team and physicians are notified when an intervention is needed.

Many people with chronic conditions need a mobile solution. The smartphone can be that personal care assistant — always there providing immediate alerts, reminders, education and care coaching. Again, when the patient's data indicate there is a health issue, the provider or other member of the care team is alerted by this mHealth solution. The key technology for both models is the electronic health record or disease registry in the physician's office to receive patient data and record patient-provider interactions.

There are many examples of how telemedicine has been used for remote health monitoring and support.

A simple example is a controlled clinical study Kaiser Permanente undertook for patients with high blood pressure. For that study, investigators gave patients in



### TELEMEDICINE-ENABLED PATIENT ENGAGEMENT

David Jesse, a long-distance truck driver, had blood pressure readings of 160/110, putting him in jeopardy of losing his commercial driver's license if he didn't get it lowered. As part of a disease management program offered by the Cleveland Clinic, he began using a remote device to regularly measure, store, and forward blood pressure readings to a PHR; and receive real-time medication and lifestyle change recommendations from his PCP — all while David was on the road. He now keeps his readings at 120/80 or lower and is still trucking.<sup>61</sup>

the test group remote blood pressure readers that patients interfaced via the Internet to download readings to cloud-based personal health records (PHR) and a subsequent transmittal to a Kaiser's disease registry. The registry was monitored by clinical pharmacists, who then contacted patients with recommended medication adjustments and online educational materials.<sup>52</sup>

One such solution provides real-time coaching over mobile devices such as cellphones and smartphones. People with diabetes can record information about their blood glucose values, carbohydrate intake and diabetic medications. The software application provides immediate feedback on the person's health status — positive reinforcement or advice for addressing a high or low reading.<sup>53</sup>

Results from patient self-monitoring medicine solutions are dramatic.

- In the Kaiser study, the results indicated a 50 percent increase in the likelihood of blood pressure control.<sup>54</sup>
- A randomized controlled trial in the United States indicated that patients using an mHealth solution reduced their A1C levels by nearly two points. (Every one point reduction in A1C has been shown to reduce diabetes complications by 37 percent).<sup>55</sup>
- A U.S. home-based telemedicine solution for CHF patients showed a 26.7 percent reduction in out-patient claims paid, 40.9 percent reduction in in-patient claims paid, and a 22.2 percent reduction in in-patient days. Estimated savings per patient was \$5,503.<sup>56</sup>
- A diabetes program at Howard University, Washington, D.C. in the United States found that the intervention group was 4.6 times more likely to have a hemoglobin A1C level drop below the target line than the control group.<sup>57</sup>
- Telemedicine pilot programs for patients with chronic conditions such as COPD, heart failure and diabetes at the sites in Wales showed a decrease in total bed days of 27 percent in Carmarthenshire, 26 percent in Cardiff and 16.5 percent in Gwynedd.<sup>58</sup>
- A trial in the United Kingdom (Isle of Bute) reported a 91 percent decrease in hospitalizations for chronic bronchitis and emphysema, saving £2,350 to £3,500 (~ \$3,820 to \$ 5,688) per admission.<sup>59</sup>
- In a five-year study of HIV patients, the treatment given virtually by physicians was as effective as in-person visits. In addition, in Spain, 85 percent of those surveyed indicated that the telemedicine program improved their access to clinical data and they felt comfortable with the system.<sup>60</sup>

#### 91% DECREASE IN HOSPITALIZATIONS

Nina Lakhani, "Britain Lags Behind in the Telemedicine Revolution," *The Independent*, December 12, 2010.

#### NEARLY 2 POINT DECREASE IN A1C LEVELS

American Association of Diabetes Educators - 37th Annual Meeting, 4-7 August 2010, meeting report, pp. 59-61.

**8. AGED CARE MONITORING AND SUPPORT:** As baby boomers throughout the world age they become one of the largest contributors to the increasing demand for care — specifically chronic disease management and aging-special risks (such as disorientation and falling). They also desire to live independently at home.

**“Global aging leaves us no choice but to invent new care models for independent living, disease management and health at home because there is no scenario in which we will magically create enough doctors, nurses, bed space or dollars to maintain our clinic- centric model of care.”**

*(Eric Dishman, Testimony to Senate Aging Committee, April 24, 2010)*

Given these realities and patient expectations, telemedicine is increasingly becoming an important tool for managing their needs — both to reduce the costs and impacts of care and to help them maintain quality lifestyles at home. The telemedicine solutions include teleconferencing equipment that enables remote visits and other interactions that help maintain relationships between these patients and their providers. However, what sets them apart, are specialized remote devices that can be used to monitor patient behavior, as well as vital signs, with little or no intervention by the patient. Examples include remote cameras, motion sensors to detect falls or lack of activity, bed sensors and even toilets that can be used to measure and record output, as well as test for urine sugar.<sup>62</sup>

Telemedicine solutions are also a key component for aged care in Europe, where home care is provided as a social service by local and federal governments. In these programs, using visiting nurses and other caregivers efficiently is critical for controlling costs, and telemedicine helps nurses and other caregivers reduce time spent on site without reducing either the level of care or their personal interactions with patients. Use of remote devices to capture vital signs and other patient data also reduces the need for patient visits to hospitals, which reduces travel costs and increases satisfaction of older patients who find hospital visits inconvenient.<sup>63</sup>

The following examples of telemedicine pilot programs for aged care monitoring and support express that the



solution needs technology to be deployed that supports health and social needs with high levels of adoption and patient satisfaction.

- The Oregon Center for Aging and Technology (ORCATECH) in the United States and the Technology Research for Independent Living Centre (TRIL) in Dublin, Ireland are using interdisciplinary teams of ethnographers, designers and engineers to investigate new technologies in people’s homes for living independently. These living labs enable researchers to observe how people interact with the technology at home and how to best design the technology for optimal adoption.<sup>64</sup>
- The DREAMING (eIDerly-fRiEndly Alarm handling and MonitorING) project currently being conducted in Denmark, Estonia, Germany, Italy, Spain and Sweden includes a range of environmental (e.g., fire alarms) and vital monitors (e.g., blood pressure meters) all connected wirelessly using Bluetooth that sends measurements to the specialist assigned to the patient. The solution enables the elderly to stay in contact with relatives, friends and a GP via a video teleconference system. The program plans to add custom decision support systems to automatically issue alerts and alarms when motion detectors, vital sign devices, such as heart rate monitors and other devices, record specified out-of-range findings.<sup>65</sup>

**ANNUAL COST COMPARISONS:**

**£2,845 - HOME USING TELECARE** (- \$4,623)

**£20,800 - NURSING HOME CARE** (-\$33,800)

**£87,500 - IN-PATIENT CARE** (-\$ 142,188)

“Introduction to DREAMING and current status,” DREAMING Project, <http://www.dreaming-project.org>, accessed June 30, 2010. (Pilot at West Lothian)

## TELEMEDICINE BARRIERS AND RECOMMENDATIONS FOR OVERCOMING THEM

The barriers preventing widespread use of telemedicine are coming down, thanks to health reform initiatives, changes to legislation and advances in technology. However, these are long-term changes which take time, making it necessary to address current barriers by developing strategies and tactics for eliminating or mitigating their impact. This is no simple task. Taken singularly, barriers, such as legacy healthcare delivery models, regulatory restrictions, payment policies and technical issues, are complex. The complexity increases significantly when care crosses geographic and health system boundaries, and further still since most barriers are interrelated. As each country addresses these barriers based on their legacy health and funding models and their current progress, approaches will be different. Yet, the collective experiences provide a learning resource to those earlier in the journey.

**REIMBURSEMENT:** One traditional barrier to telemedicine has been reimbursement. As the value of telemedicine to efficiency and patient outcomes has become better known, payment policies have been changing. European countries such as Denmark have recently taken the lead by providing standard reimbursement for telemedicine services such as home care. Others are starting to follow suit. In Australia, starting in July 2011, remote consultations will become an official claimable item for practitioners serving people who live in rural areas and certain suburban communities with low specialist coverage.<sup>66</sup>

In the United States, advocates for telemedicine recommend that reimbursements for remote services should mirror reimbursement for in-person care, and that telemedicine equipment should be a reimbursable cost as part of the Medicare home healthcare benefit.<sup>67</sup> Support for these changes is growing, with some states now mandating that certain telemedicine services be reimbursed at equivalent rates to traditional care. Thirty-two state Medicare programs currently provide some form of reimbursement for telemedicine services, although reimbursement rates vary.<sup>68</sup>

Many private payers are recognizing on their own that it is in their interest to offer payments for effective care delivered in non-traditional modes. In the United States, for example, health insurer Aetna now offers remote visit coverage for minor urgent care complaints to plan members in Texas and Florida,<sup>69</sup> and HealthPartners Health Plan in Minneapolis, Minnesota just announced an interim health plan product (for people between jobs or otherwise in need of temporary coverage) that includes pre-paid and discounted visits to an “online clinic” provided by its integrated group practice.<sup>70</sup> In western New York, BlueCross BlueShield has launched a service that provides members with real-time access to local physicians over

secure, live, two-way video conferencing. For \$25, members can have a ten-minute consultation about minor conditions such as cold and flu symptoms.<sup>71</sup>

The focus is shifting away from episodic care and toward preventive, team-based care that engages the patient in self-management. New models for reimbursement, such as bundled payments, global payment (capitation) and shared savings programs are increasing the incentive that providers have to keep people healthy, using telemedicine as one enabler to improve access and productivity while providing quality care.

**LEGACY CARE MODELS:** In line with reimbursement, healthcare has traditionally been organized primarily to treat people who are sick. Patients seek care when they are sick and care has not included more proactive care management and support between acute-care visits and ongoing programs to support patients in maintaining good health. Although this is a bit of an oversimplification, medical groups and health systems have not built the robust processes and capacity to engage patients in a broader way.

Reforms such as the Affordable Care Act in the United States and government and financial pressures to reduce hospitalizations throughout Europe and Australia are the key drivers for changing the way that care is delivered. These reforms align the incentives among stakeholders, so good health and high-quality care are rewarded, and patients become active participants in their own care.

Reform also provides an opportunity to engender a team approach to delivering care, putting the patient at the center, rather than the sequential approach in which patients are handed off from one caregiver to the next. A plethora of telemedicine solutions, especially for chronic care management at home, can be used to improve health outcomes, leading to reduced physician and ER visits and in-patient stays.

Consider the effect of one simple change in the United Kingdom and the United States, where hospital care for patients who are readmitted within 30 days is no longer reimbursed. This change has created a strong incentive to prepare patients better at discharge and monitor their status at home. The latter is a natural application for telemedicine that can afford a high degree of care interaction with the patient without requiring care professionals to visit the home or call the patient (or do so only when needed).

For most provider organizations, managing different patient populations with the aid of telemedicine will involve new roles and new processes and a lot of learning to integrate the technology smoothly into routine care management.

**REGULATORY RESTRICTIONS:** As health reform changes the care model to be patient-centric and delivered by a team of professionals and telemedicine eliminates the geographic boundaries for care, questions arise as to participating care team members and their access rights to patient's data.

**CARE TEAM MEMBERS:** One of the long-standing issues using telemedicine to connect patients with care providers is clinician licensing across district, state/province, and country borders. Within the European Union (EU), regulatory issues have largely been resolved through the adoption of rules that stipulate the automatic recognition of general practitioners. Minimum training requirements are harmonized at the EU level so that doctors, nurses and other professionals can establish themselves in other member states without seeking additional qualifications.<sup>72</sup>

In the United States and Australia, credentialing is still an issue for physicians who wish to use telemedicine to practice across state lines, except in certain circumstances. Provisions contained in the Affordable Care Act in the United States have resulted in a proposed rule to streamline credentialing for telemedicine, but the rule only relaxes certain rules related to granting physician privileges between facilities and does not address licensing across states. Historically, licensing has been subject to the exclusive authority of each state.<sup>73</sup> On the national scene, the U.S. Health Resources and Services Administration (HRSA) has engaged in activities to promote states adopting legislation to allow physicians to practice across state lines. Nineteen states are participating in the Licensure Portability Grant Program, an effort to develop tools and policies to promote physician licensure portability.<sup>74</sup> Similarly, the Australian government has recently funded a study to investigate national credentialing.<sup>75</sup>

In the interim, health systems have worked within the boundary limitation to extend care provider access and improve productivity. The California Technology Network is an example of interconnecting community centers with physicians and private hospitals to deliver care to both urban and rural patients. Another successful solution is teleradiology where radiologists in other states and countries work within the region's regulatory framework to review images to support health systems lacking in radiology resources.

**ACCESS TO PATIENT CLINICAL DATA:** Regardless of the technology progress that makes electronic data available to care providers, there is the issue of legal access — who and under what circumstances can care providers access the sources of patient data — collected by the care provider, collected by patients using telemedicine solutions and collected by other health systems in other regions and countries. The following example demonstrates how legislation that was likely adequate for its time is now too restrictive due to changes in care approaches and new data sources. In Denmark the Danish Health Act, including report L50B, grants doctors access to view patients' data. Nurses are solely allowed to view their patients' data as presented in nursing clinical applications, and other staff groups have even more limited access. It does not take into consideration data collected via telemedicine or the need by the care team to have access to historical data for trending and treatment purposes, critical for chronic disease management.

Legal access to data must be addressed locally, with a perspective of more widespread availability of data. Where needed, legislation should be amended to explicitly allow for data retrieval via telemedicine and accessibility by health and care staff from multiple sectors.



(Source: CSC LEF Report, "The Future of Healthcare: It's Health, Then Care," December 2010.)

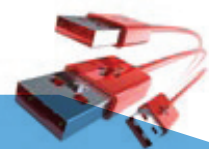
**TECHNOLOGY:** Technology barriers including the availability of the communications infrastructure, foundation systems and interoperability, costs and end-user (provider and patient) adoption are being addressed through a combination of regulatory changes, advances in solutions and devices, government funding and collaborative efforts focused on large-scale implementations and interoperability.



## CONNECTIVITY

The technological infrastructure required to make telemedicine part of routine practice can be a significant barrier to adoption, especially in rural areas where the required bandwidth and connectivity capabilities are unreliable or unavailable. This barrier, however, is diminishing as a number of government-led efforts are underway to bring broadband into remote and underserved areas in Australia, the United States, and other countries. In Australia, the National E-Health Transition Authority and the National Broadband Network are working to expand access to technology.<sup>76</sup> The United Kingdom has a slightly different issue with connectivity. It is not the availability of broadband, rather the activation of the service to a new household. In some areas this connection can take 15 to 20 days, even for households that are already physically connected by cable and phone lines.<sup>77</sup> This delay is problematic for patients who would benefit from post-acute care telemedicine services since the solution needs to be installed immediately upon discharge.

Besides broadband, the expansion of cellular communication networks can also fill gaps in coverage. Internet-connected end-user devices such as smartphones and notebooks using 3G and 4G connectivity are increasingly present in our pockets and our homes. Its use in healthcare is already becoming part of mobile telemedicine solutions. For example, cardiologists participating in an emergency care program in Newark, New Jersey, use wireless smartphones to review ECG tracings and advise EMTs on the go. Patients with chronic conditions use smartphones to record vital signs and receive reminders and alerts.



## SYSTEMS IMPLEMENTATION AND INTEROPERABILITY

In Australia and the United States, the lack of a widespread health information exchange and electronic health records limits access beyond the health system providers. Both have large-scale government-funded efforts underway to increase number of EHR and health information exchanges (HIE) implementations and are working on developing the rules for connectivity and interoperability.

In Europe, where EHR adoption nears 100 percent in a growing number of countries and regional and country-wide HIEs allow data sharing within the region, the issue is not the availability of data but interoperability of disparate data, and is actively being addressed within the European Commission. Specifically, to allow and enhance data exchange between different European countries, the European Commission launched the Smart Open Services for European Patients (epSOS), a project organized by 27 beneficiaries representing 12 EU-member states, including ministries of health, national competence centers and numerous companies. The overarching goal of epSOS is to develop a practical eHealth framework and an ICT infrastructure that will enable secure access to patient health information, particularly with respect to basic patient summaries and ePrescriptions between different European healthcare systems. It is the first European eHealth project clustering a large number of countries in practical cooperation.<sup>78</sup>





## COSTS

Cost barriers are also dropping as the cost of telemedicine solutions has plummeted. According to a recent Health Leaders Media report, the in-hospital telemedicine command centers, which 15 years ago cost as much as \$200,000, can be purchased for about \$30,000 today.<sup>79</sup> The prohibitive costs that used to be associated with installation, maintenance and scalability are also decreasing, as the components are becoming commoditized — not expensive specialized equipment. Smartphone and tablet vendors encourage development of new solutions by providing software development kits. Finally, remote technologies such as cameras, microphones, blood sugar readers, other medical devices and end-user hand-held wireless devices for accessing systems have become affordable consumer products.

In addition to the decrease in the cost of the solution, another avenue to pursue to further decrease costs is to explore the availability of grant funding and to participate in demonstration projects. In the United States, federally-funded HITECH Act subsidies for EHR features and HIE programs are available, as are numerous new and ongoing grant programs for telemedicine pilots that can be converted to production implementations. In the United Kingdom and Europe, recent examples include the European Centre for Connected Health award of £18 million (~\$29.25 million) that went to the Public Health Agency of Ireland,<sup>80</sup> and the RENEWING HEALTH (REgions of Europe WorkINg toGether for HEALTH) project in nine countries in Europe that has committed funding (from the ICT Policy Support Programme and other groups) of € 14 million (~\$20 million).<sup>81</sup> Recently, the Scottish government also announced plans to spend £10 million (~\$16.25 million) on a 4-year effort to bring telehealth systems into the homes of patients.<sup>82</sup> This demonstration program is intended to help 10,000 elderly and disabled people live more independently while they receive care.



## END-USER ADOPTION

End-user adoption is probably the most critical technology barrier. If providers and patients are not comfortable with telemedicine, then they will not use it, rendering the effort worthless. Some providers and patients lack computer skills. In rural areas, at least, this often can be attributed to a lack of equipment rather than a lack of familiarity with, or interest, in using the technology. A recent study of providers in rural Australia found that doctors are indeed adept at using the technologies they have, including telephone, teleconferencing equipment and facsimile.<sup>83</sup>

With the introduction of user-friendly consumer electronics, the barrier that physicians are not comfortable with computers, digital cameras and video equipment has largely gone away. Patient adoption of self-management “apps” on Internet-enabled devices in the home and mobile devices are becoming extremely popular, with thousands of apps available at little or no cost. Another growing area of adoption is patient and provider communication. For example in the United States, 42 percent of physicians indicate that they have discussed clinical symptoms online with patients, and more than nine million consumers indicate that they have had e-mail communication with their doctor.<sup>84</sup>

## CONCLUSION

Telemedicine solutions have proven their value in numerous pilots and in different care delivery modes. Until recently, they have not been critical for success within the healthcare industry, but healthcare reform is aligning incentives for all players: patients, employers, payers and providers. This has positioned telemedicine as a key enabler for widespread delivery of cost-effective, resource-efficient and high-quality healthcare.

Government healthcare providers are encouraged to look beyond legacy care and funding models that are characterized by organization and policy constraints. This includes cross-jurisdictional models where telemedicine costs and patient data are shared across health systems to ensure patients receive healthcare based on where they can be best supported and not by the health system in which they reside.

Specific recommendations on moving forward with telemedicine include:

- Develop a telemedicine strategy with representatives of health plans (where applicable), patients and clinicians to define sponsors, programs, processes and responsibilities. Prepare an implementation roadmap.
- Start with a program that addresses an immediate problem in an area with as few barriers as possible. Pilot

only to work through technology and workflow issues, with agreed-upon plans to full-scale rollout. If possible focus on the areas of chronic disease, as these will deliver substantial early benefits to the health system.

- Commence early with policy reform to ensure healthcare delivery is not constrained by legacy jurisdictional boundaries. Telemedicine requires policy and technology innovation.
- Leverage commercial, consumer technology and products. These technologies are available inexpensively — they offer the option to avoid technical and application problems and focus instead on organizational issues, such as overcoming the resistance to change.
- Whenever possible, integrate telemedicine solutions within an overall clinical platform to reduce data redundancy, care alerts and the need to build and maintain interfaces.
- Do not overlook Cloud, Software as a Service (SaaS) and other outsourcing solutions. Not only do these solutions add new technical capabilities, they “operationalize” costs that would otherwise need to be managed as large capital expenses.
- Look for opportunities set out by government initiatives (e.g., funding to expand access to rural providers), but pursue only the opportunities that are aligned or compatible with your organization’s broader goals and IT strategy.

***“The societal and economic benefits from wider use of telemedicine are positively huge. Yet, at the present moment, they are far from being fully appreciated or achieved.”***

“Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions,” Commission of the European Communities, Brussels, November 4, 2008, p11.

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## REFERENCES

1. "Virginia Legislature Passes Bill Requiring Reimbursement for Telemedicine," *Fierce Healthcare*, March 3, 2010.
2. Sheri Porter, "CMS Proposes Easier Telemedicine Credentialing Processes for Hospitals," *AAFP News Now*, June 16, 2011.
3. John Farrell, "New South Wales Readies for large-scale telehealth undertaking," *Mobile Health Watch*, February 24, 2011.
4. Eric Dishman, "Changing Practices: Personal Health Technologies for a Swiftly Aging Planet," HIMSS Conference, February 22, 2011.
5. Fran Turisco, "The Future of Healthcare: It's Health, Then Care," CSC, December 2010.
6. "Health at a Glance: Europe 2010," Organisation for Economic Co-operation and Development, 2010.
7. "OECD Health Data 2010," Organisation for Economic Co-operation and Development, July 2010.
8. "National Health Expenditure Projections 2009-2019," U.S. Centers for Medicare and Medicaid Services, 2009, p1.
9. "Projection of Australian Health Care Expenditure by Disease, 2003 to 2033," *Health and Welfare Expenditure Series No. 36*, Australian Institute of Health and Welfare, December 2008, p11.
10. "DHHS 42 CFR Part 425, Medicare Program; Medicare Shared Savings Program: Accountable Care Organizations" Department of Health and Human Services, March 31, 2011.
11. Ann Carrns, "Health Reform Takes Aim at Hospital Readmissions" *US News*, July 21, 2010.
12. "Britain Lags behind in the telemedicine revolution," *The Independent*, December 12, 2010 .
13. "What are the public health implications of global ageing?" World Health Organization (WHO), September 2006.
14. "Obesity and Overweight, Fact Sheet No. 322," World Health Organization (WHO), September 2006.
15. Sarah Wild et al., "Global Prevalence of Diabetes," *Diabetes Care*, Vol 27, No. 5, May 2004, p1047.
16. Cheryl Pellerin, "Global Causes of Death Move from Infectious to Chronic Diseases," *America.gov*, June 12, 2008.
17. Nursing Shortage: "American Association of Colleges of Nursing (AACN) Nursing Shortage Fact Sheet," September 2010, (original source) Peter I. Buerhaus et al., "The Recent Surge in Nurse Employment: Causes and Implications," *Health Affairs*, Vol. 28, No. 4, July/August 2009, p w663. Physician Shortage: "The Complexities of Physician Supply and Demand: Projections through 2025," Center for Workforce Studies, Association of American Medical Colleges, November 2008, p5.
18. Hospital Compare, [www.hospitalcompare.hhs.gov](http://www.hospitalcompare.hhs.gov), viewed April 12, 2011.
19. "Ten percent of hospital funding set to be linked to patient satisfaction," *Mailonline*, [www.dailymail.co.uk](http://www.dailymail.co.uk), December 9, 2009 and "Performance pay for NHS hospitals," *BBC News*, May 14, 2008.
20. Lucas Mearian, "Remote IT Allows Docs to Care for ICU Patients from a Distance," *Computerworld*, March 2, 2011.
21. Ibid.
22. Debra Woods, RN, "Medical Connectivity: Tele-ICU Saves Money as well as Lives," *Telemedicine and e-Health*, March 2011, p 64.
23. Ibid.
24. Gienna Shaw, "Does E-Health Stand a Remote Chance?," *HealthLeaders Media*, February 4, 2011.
25. Young, LB et al., "Impact of telemedicine intensive care unit coverage on patient outcomes," *Arch Intern Med*, 2011; 171(6): 498-506.
26. James Hutchinson, "Victoria extends rural telehealth trial," *Computerworld*, December 10, 2010.
27. In Touch case study on Website [http://www.intouchhealth.com/apps\\_Patients.html](http://www.intouchhealth.com/apps_Patients.html), viewed April 27, 2011.
28. In Touch case study on Website <http://www.intouchhealth.com/7SMCC-PhysicianSurvey.pdf>, viewed May 17, 2011.
29. Daruwalla, Z. et al., "'Orthobot, to your station:' The application of the remote presence robotic system in orthopaedic surgery in Ireland: a pilot study on patient and nursing staff satisfaction," *J Robots Surg*, (2010) 4: 177-182.
30. "Telemedicine Opportunities and Developments in Member States," World Health Organization, 2010, pp 46-47.
31. Molly Merrill, "Smartphones Speed Heart Attack Treatment," *Healthcare IT News*, December 22, 2010.
32. "Telemedicine Opportunities and Developments in Member States," World Health Organization, 2010, pp 46-47.
33. Merrill.
34. Kyle Hardy, "Telehealth Tech Helps Provide Better Patient Care," *Healthcare IT News*, June 2, 2010.
35. Robert Litan, "Vital Signs Via Broadband: Remote Health Monitoring Transmits Savings, Enhances Lives," *Better Health Care Together*, October 24, 2008.
36. "Study Shows Benefits of Telerhabilitation for Knee Surgery Patients," *iHealthBeat*, January 31, 2011.
37. "Position Paper: Technologies for Improving Post-Acute Care Transitions, Discussion Draft," Center for Technology and Aging, September 2010.
38. Frances Dare and James Macauley, "The Health of Nations: Perspectives from Global Leaders Reveal Untapped Opportunity," Cisco IBSG, 2011.
39. Ibid.
40. "Healthcare takes a digital leap forward," *Sacramento Bee*, August 18, 2010.
41. "Department of Defense Study Finds Telehealth Cuts Pediatric Costs," *iHealthBeat*, February 10, 2011.
42. "Remote Reading Services: Answering the Call for Better Quality and Lower Cost," *HealthImaging.com*, February 2, 2010 .
43. "Telemedicine Clinic: A Modern Pan-European Healthcare Service Provider Backed by Sectra," Sectra Corporation, April 22, 2011.
44. "Scottish Telestroke Programme," Scottish Centre for Telehealth, <http://www.sct.scot.nhs.uk/stroke.html>.
45. Turisco.
46. David Gorn, "California Telehealth Network Gears Up for Launch," *iHealthbeat*, January 31, 2011.
47. "Texas A&M Team Providing Mental Health Services by Videoconference," KBTX, March 30, 2011.
48. "E-Health and Web 2.0: The doctor will tweet you now," *Computerworld*, May 20 2010.
49. Amanda Chan, "Doctor will Skype you now: More MDs Use Web for House Call," *Yahoo News*, January 2, 2011.
50. "Telemedicine Clinics and Mobile Health Screening Services for Indigenous Children," The University of Queensland, Australia, <http://www.uq.edu.au/coh/health-e-screen-4-kids>.
51. Kennedy, et al., "Establishment of a Sustainable Telehealth Service for PreAdmission Clinic Consultations," Queensland Government, [http://www.health.qld.gov.au/ghcss/telehealth/resources/documents/preadmission\\_pres.pdf](http://www.health.qld.gov.au/ghcss/telehealth/resources/documents/preadmission_pres.pdf).
52. "Home Health Monitoring May Significantly Improve Blood Pressure Control, Kaiser Permanente Study Finds," Kaiser Permanente News Service Press Release, May 21, 2010.

53. Turisco.
54. "Home Health Monitoring May Significantly Improve Blood Pressure Control, Kaiser Permanente Study Finds," Kaiser Permanente News Service Press Release, May 21, 2010.
55. American Association of Diabetes Educators – 37th Annual Meeting, 4-7 August 2010, meeting report, pp. 59-61.
56. "AultCare Sees Positive Results From Cardiocom Program," Cardiocom, <http://www.cardiocom.com>.
57. "Study: Diabetes Self-management Portal Yields Promising Results," Cardiovascular Business, March 10, 2011.
58. Fiona Barr, "Welsh Telehealth Pilots Save £2.2m," *E-Health Insider*, November 15, 2010.
59. Nina Lakhani, "Britain Lags Behind in the Telemedicine Revolution," *The Independent*, December 12, 2010.
60. Lucas Mearian, "Study: Virtual medicine as effective as physical doc visits," Computerworld, March 21, 2011.
61. Joseph Goedert, "Trucker Fights Hypertension and Wins," *Health Data Management*, November 15, 2010.
62. Turisco.
63. "Introduction to DREAMING and current status," DREAMING Project, <http://www.dreaming-project.org>, accessed June 30, 2010.
64. Turisco.
65. "Introduction to DREAMING and current status," DREAMING Project, <http://www.dreaming-project.org>, accessed June 30, 2010.
66. Peter Ryan, "Telemedicine taking-off in rural areas," *Australian Broadcasting Corporation*, April 4, 2011.
67. Litan.
68. Shaw.
69. Bernie Monegain, "Aetna Members Now Have Access to Telehealth Consultations," *Healthcare IT News*, February 25, 2011.
70. "HealthPartners Offering Insurance Plan without all the Paper," HealthPartners Press Release, January 31, 2011.
71. "BlueCross BlueShield Brings Online Care to WNY," BCBS Press Release, November 17, 2011.
72. "System for the recognition of professional qualifications," Europa Summary of EU Legislation, [http://europa.eu/legislation\\_summaries/education\\_training\\_youth/vocational\\_training/c11065\\_en.htm](http://europa.eu/legislation_summaries/education_training_youth/vocational_training/c11065_en.htm).
73. Cohen, M., "Telemedicine Laws Vary By State," Complementary and Alternative Medicine Law, <http://www.camlawblog.com/articles/licensure-and-credentialing/telemedicine-laws-vary-by-state>.
74. "Health Licensing Board Report to Congress," Health Resources and Services Administration, August 2010.
75. "Who We Are," Australian Health Practitioner Regulation Agency, <http://www.ahpra.gov.au/About-AHPRA/Who-We-Are.aspx>.
76. Brian Dalzell, "Identified National Broadband Network (NBN) funding sources and allocations," Australian Policy Online, August 16, 2010.
77. Interview with Andrew Young, Managing Consultant, CSC European Group, April 13, 2011.
78. "About epSOS," European Patients Smart Open Services, <http://www.epsos.eu/home/about-epsos.html>.
79. Shaw.
80. Sarah Bruce, "TF3 Wins £18m NI Telehealth Deal," *E-Health Insider*, March 18, 2011.
81. "EU: RENEWING HEALTH Project Launched," epractice.eu, May 5, 2010.
82. Gill Hitchcock, "Scotland spends £10m to transfer telehealth technology," *Guardian.co.uk*, March 16, 2011.
83. JJ Moffatt and DS Eley, "Barriers to the up-take of telemedicine in Australia: A view from providers," *Rural and Remote Health*, 2011: 1581.
84. Lisa Zamosky, "The Doctor's In-Box," *Los Angeles Times*, June 7, 2010.



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