Utah Telehealth Study - Phase 1 Report

Prepared by Pilot Healthcare Strategies for the Utah Division of Occupational and Professional Licensing

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Introduction

As described in the project work plan, this section of the project will report on major trends, drivers and data points relative to the adoption of telehealth services with a focus on public safety considerations and economic impacts. For the purposes of this report, the term "telehealth" broadly encompasses diagnosing, treating and monitoring patients remotely (versus co-located with a provider) using information and communications technology (ICT), also referred to as "telemedicine." This definition closely follows that adopted by the World Medical Association in 2009, defining telehealth as the use of information and communications technology to deliver health and healthcare services and information over large and small distances.[1]

A more expansive definition, "ehealth," has emerged to describe any health care practice supported by electronic processes and communication, including health information technology (HIT) and electronic health information exchanges (HIEs).[2]

Most recently, the term "connected health" has come into use. The February 2014 issue of the journal *Health Affairs* explores the early evidence and future promise of connected health, defined to include telemedicine, telehealth, and mobile health.[3]

A development closely related to telehealth adoption is increasing use of electronic health records (EHRs). The federal Health Information Technology for Economic and Clinical Health Act (HITECH) of 2009 appropriated more than $20 billion to encourage hospitals and health care facilities to digitize patient data and make better use of information technology. In 2013, the National Ambulatory Medical Care Survey (NAMCS) EHR Survey showed that about 78 percent of office-based physicians used an EHR system, with adoption of basic EHR systems increasing 21 percent between 2012 and 2013.[4]

Increased standardization and interoperability will pave the way toward the integration of telemedicine with EHRs, predicts Stewart Ferguson, CIO of the Alaska Native Tribal Health Consortium, a nonprofit organization based in Anchorage that provides health services to about 130,000 Alaska Natives and American Indians. Ferguson foresees that in the not-too-distant future, an EHR system will be the

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[1] WMA Statement on Guiding Principles for the Use of Telehealth for the Provision of Health Care adopted by the 60th WMA General Assembly, New Delhi, India, October 2009. *Accessed at* http://www.wma.net/en/30publications/10policies/t5/

[2] V. K. Smith, K. Gifford, S. Kramer et al., "State E-Health Activities in 2007: Findings From a State Survey." The Commonwealth Fund, February 2008. Accessed at http://www.commonwealthfund.org/Publications/Fund-Reports/2008/Feb/State-E-Health-Activities-in-2007--Findings-From-a-State-Survey.aspx

[3] "Early Evidence, Future Promise of Connected Health," *Health Affairs*, February 2014. Accessed at http://www.chcf.org/publications/2014/02/evidence-promise-connected-health

[4] U.S. Centers for Disease Control and Prevention, National Center for Health Statistics Issue Brief Number 143, January, 2014. Accessed at http://www.cdc.gov/nchs/data/databriefs/db143.htm#summary

platform on which telemedicine services run. Practitioners would have multimedia access to X-rays, stethoscope recordings and other patient information.[5]

Key drivers of telehealth adoption

The forces driving adoption of telehealth services can be categorized into four broad categories:

1. Public policy and economic
2. Demographic
3. Technological
4. Institutional

Public policy and economic drivers

- Lower hospital reimbursements and penalties assessed under the federal Patient Protection and Affordable Care Act for readmission of recently discharged Medicare patients
- Trend toward value-based care and outcomes versus fee (procedure)-based medicine
- Affordable Care Act provisions incentivizing risk sharing and care outcomes among providers using Accountable Care Organizations
- State reimbursement mandates (enacted in 20 states) requiring insurers to cover telehealth services
- Federal and state policies favoring use of telehealth services for Medicare and Medicaid patients
- Pressure to reduce and contain medical utilization costs from public and private payers
- Fewer primary care physicians to provide care at the same time demand for primary care increases under the Affordable Care Act's Medicaid eligibility expansion and insurance market reforms
- Connecting medically underserved patients in rural areas with distant providers
- Emergence of low cost, online primary care providers (Teladoc, et al.) serving patients with common acute health concerns such as colds, strep throat and urinary tract infections
- Government grants for telehealth pilot projects
- The digitization of health information via federal policy (HI-TECH Act, Meaningful Use requirements) incentivizing use of electronic health records (EHRs).

Demographic

- Aging population needing ongoing chronic disease care and home health monitoring
- Young people and those in urban areas inclined to use online and mobile telehealth services

Technological

- General increased adoption of premises and mobile Internet service
- Growth in mobile devices and health apps (mHealth)

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[5] "How VA is driving telemedicine," *FCW*, February 13, 2014. Accessed at http://fcw.com/Articles/2014/02/13/How-VA-is-driving-telemedicine.aspx?Page=1

- Broader adoption of Internet-based communications, social media and video services such as Skype
- Use of Information and Communications Technology (ICT) to bridge distance between providers and patients, especially in rural areas
- Specialized telehealth ICT platforms and devices

Institutional
- Home-delivered telehealth services for patients treated by U.S. Veterans Administration
- Use of telehealth to treat prison populations remotely without need for providers to visit prison facilities
- Virtual medical examinations and physician visits in schools

Growth trends and drivers

The number of worldwide patients receiving telehealth services is forecast to increase from less than 350,000 in 2013 to roughly seven million in 2018, according to a report published by IHS Technology.[6] According to IHS, trend toward telehealth will be driven by employers, private insurers and the federal Patient Protection and Affordable Care Act, which makes doctors and hospitals more accountable by moving medical care providers away from fee-for-service medicine where they are paid based on volume of services to reimbursement based on the value of care they provide.

In the delivery of telehealth services, doctors work as a quarterback in concert with nurses and other allied health professionals to keep patients out of the hospital where care is more expensive, explains Roeen Roashan, IHS analyst for consumer medical devices and digital health. "Telehealth has been limited in its growth potential in the past due to low reimbursement, lack of physician support, and poor cases of implementation," Roashan said. Now, Roashan predicts, changes in the regulatory environment will increase reimbursement for telehealth services at the same time more physicians support and adopt the delivery of healthcare via telehealth. "Telehealth is about increasing the quality of healthcare, in an efficient way," Roashan states. "Telehealth is proven to decrease readmission rates significantly, while increasing the patient's perception of quality by keeping the patient at home." [7]

As healthcare providers seek to reduce hospital readmission rates and track disease progression, IHS projects the number of patients monitored remotely with conditions including congestive heart failure

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[6] "Global Telehealth Market Set to Expand Tenfold by 2018," IHS news release, January 17, 2014. Accessed at http://press.ihs.com/press-release/design-supply-chain-media/global-telehealth-market-set-expand-t1enfold-2018

[7] "Obamacare, Doctor Shortage to Spur $2 Billion Telehealth Market." *Forbes*, December 22, 2013. Accessed at http://www.forbes.com/sites/brucejapsen/2013/12/22/obamacare-doctor-shortage-to-spur-2-billion-telehealth-market/

(CHF), chronic obstructive pulmonary disease (COPD), diabetes, hypertension and mental health conditions will reach 1.8 million worldwide by 2017.[8]

Telehealth is on a growth trend as evidenced by research on the market for various devices, computers and related digital technology to facilitate delivery of telehealth services. IHS predicts vendors of various devices, computers and related digital technology to facilitate telehealth services will see market growth in the U.S. from about $240 million in 2013 to $1.9 billion in 2018.[9] Internationally, telehealth services are forecast to grow about 18.5 percent per year over the same period.[10]

The global market for healthcare IT is expected to reach $103 billion by 2020, according to Grand View Research. The firm cites growing demand for point of care diagnostics, home healthcare and an expanding of geriatric population as the most significant market drivers. [11]

Another estimate by BCC Research projects the global telehealth technology market will experience a five-year compound annual growth rate (CAGR) of 16.9 percent from 2013 to 2018. It notes the implementation of the Patient Protection and Affordable Care Act has intensified the healthcare industry's focus on telehealth. "Indeed, the use of remote monitoring systems to coordinate care over time and across settings will be imperative in meeting the unprecedented demand resulting from the new healthcare law," the firm's outlook states. "In addition, recently announced best practices to cut down global healthcare costs, including outsourced medical services, home-based treatment, intervention as opposed to post-treatment, integrated information technology (IT) environments, increased efficiency of healthcare resources and reducing billing gaps, all point towards the increasing use of telemedicine."[12]

Experts see telehealth as becoming integral to care delivery

Telehealth is emerging as a crucial building block in the delivery of care, according to panelists at a forum hosted in early 2014 by the Robert Graham Center for Policy Studies in Family Medicine and

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[8] "Telehealth to Reach 1.8 Million Patients by 2017," *InMedica*, January 21, 2013. Accessed at http://in-medica.com/press-release/Telehealth_to_Reach_18_Million_Patients_by_2017

[9] "Obamacare, Doctor Shortage To Spur $2 Billion Telehealth Market," *Forbes*, December 22, 2013. Accessed at http://www.forbes.com/sites/brucejapsen/2013/12/22/obamacare-doctor-shortage-to-spur-2-billion-telehealth-market/

[10] "Global Telemedicine Market Outlook to 2018," Research and Markets, December 2013. Accessed at http://www.researchandmarkets.com/research/rfw3s9/global

[11] "Global Market for Healthcare IT is Expected to Reach USD 103.0 Billion by 2020, According to a New Study by Grand View Research, Inc.," *PR Newswire*, February 18, 2014. Accessed at http://www.prweb.com/releases/Healthcare-IT-Market/GrandViewResearch/prweb11590713.htm

[12] "BCC Research Publishes A New Report On Global Markets For Telemedicine Technologies, "October 26, 2013. Accessed at http://www.prweb.com/printer/11265314.htm

Primary Care. The implementation of the Affordable Care Act is leading to increased demand that physicians interact with more patients, speakers noted, pointing to telemedicine as a potential solution.

According to panelist Kenneth McConnochie, M.D., M.P.H., director of the Health-e-Access Telemedicine Program and professor of pediatrics at the University of Rochester Medical Center, parents with young children consider time and lower expenses to be valuable commodities. By increasing its use of telehealth, the medical center reported a 22 percent reduction in ER visits among schoolchildren. McConnochie pointed out that the average telemedicine visit costs $75 compared with $750 for a typical ER visit. McConnochie noted that 85 percent of pediatric primary care office visits and 40 percent of ER visits could be handled via telemedicine. If a child is injured or gets sick at school, a telemedicine specialist can be at the school in one hour. The parent does not have to schedule an appointment with a physician. In such cases, the triage nurse serves as the care coordinator, helping the family make an initial decision about care and explaining the telemedicine process. [13]

Dana Giarrizzi, national medical director of telemedicine for Eagle Hospital Physicians in Dallas, Texas predicts that as telehealth becomes more commonplace, nurse practitioners and physician assistants will use it to stay in touch with both supervising physicians and patients alike. Due to the shortage in hospitalists and primary care physicians, there's an increasingly acute need for telemedicine-competent clinicians who can cover more than one hospital or clinic, Giarrizzi notes. In the future, activities ranging from admissions to post-op conversations to DNR discussions may all be done via telemedicine, Giarrizzi predicts. Another area were telehealth will be particularly useful is for NPs and PAs working in rural hospitals, where it's often difficult for patients to travel long distances to receive care. "Rural hospitals are paying a ton of money for locum tenens employees," Giarrizzi said. "They need an alternative or they're not going to survive." Pairing NPs and PAs with telemedicine will help reduce access-to-care disparities between America's rural and urban, impoverished and affluent communities, Giarrizzi and others experts predict.[14]

Growth in telehealth programs
According to Steven J. Davidson, senior vice president and CMIO at Maimonides Medical Center in Brooklyn, New York, there has been a growing body of literature since the late 1970s early 1980s showing the successful utilization of telehealth among controlled populations. Davidson, a physician, notes pediatricians have long maintained telephone hours for parents to consult with doctors. "With video," he says, "it's only going to get more useful." Davidson believes telehealth has progressed to the point where it can eliminate the need for 60 percent of co-located physician-patient interactions. [15]

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[13] "Telemedicine Can Build Bridge to Expanded Health Care, Say Panelists." American Academy of Family Physicians, February 5, 2014. Accessed at http://www.aafp.org/news/practice-professional-issues/20140205rgctelemedicineforum.html

[14] "Telemedicine facilitates collaboration, greater access to healthcare," *Clinical Advisor*, April 27, 2012. Accessed at http://www.clinicaladvisor.com/telemedicine-facilitates-collaboration-greater-access-to-healthcare/article/238649/

[15] Telephone interview, February 21, 2014.

In Virginia, a telehealth pilot for Medicaid beneficiaries began in 1995 with a small number of services. In 2003, coverage was expanded and a variety of providers were recognized. In October 2009, the program expanded the list of originating sites for telehealth services. Recently, more services have been added to the Medicaid telemedicine program based on services available in the commercial market.[16]

Since starting its telehealth program in the early 1990s, the UC Davis Health System has provided nearly 37,000 consultations in both real time and asynchronous (recorded and stored for another time) to more than 100 sites spanning 44 of California's 58 counties, according to Shelley A. Palumbo, chief administrative officer for UC Davis Health System's Center for Health and Technology and the Center for Virtual Care. In Utah, Salt lake City–based Intermountain Healthcare is rolling out telemedicine infrastructure including all 2,800 hospital beds in its system, prioritizing the emergency and intensive care units. At Mercy Health in metropolitan St. Louis, more than 70 telehealth projects are in development including e-consults with specialists, inpatient to outpatient, remote home monitoring field and video consults with patients.[17] The Georgia Department of Public Health has established a goal of having telemedicine clinics as a standard primary care setting across the state.[18]

In the United Kingdom, the National Health Service estimated in 2012 that widespread adoption of telehealth as part of an integrated care plan will mean better quality of care and greater independence for people with long-term conditions, in addition to achieving savings of up to £1.2 billion over five years through reduced emergency care and hospital bed days.[19]

Despite this growth, the adoption of virtual patient visits with doctors isn't mainstream yet, according to Joseph Kvedar, director of the Boston-based Center for Connected Health. "We're still in somewhere between early adopter and early majority, so the chances are high that if you went to your doctor and said 'Hey, I want to start doing visits virtually,' they would probably discourage that," he said. [20]

Despite the interest driving the adoption of telehealth, the adoption phase could take nearly a generation to play out. "I think we are at step one of a very, very long race," observes Brendan Carr, MD, assistant professor of emergency medicine at the University of Pennsylvania's Perelman School of

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[16] "The Role of Telehealth in an Evolving Health Care Environment," (Workshop Summary), Institute of Medicine of the National Academies. Accessed at http://www.nap.edu/openbook.php?record_id=13466&page=x#toc45

[17] "How Telemedicine Drives Volume," *Revenue. HealthLeaders Media*, October 22, 2013. Accessed at http://www.healthleadersmedia.com/print/TEC-297579/How-Telemedicine-Drives-Volume-Revenue

[18] "Georgia to expand telemedicine statewide," *Healthcare IT News*, January 25, 2013. Accessed at http://m.healthcareitnews.com/news/georgia-expand-telemedicine-statewide

[19] "Telehealth and Telecare could save NHS £1.2 billion," U.K. Department of Health press release, March 7, 2012. Accessed at https://www.gov.uk/government/news/telehealth-and-telecare-could-save-nhs-1-2-billion

[20] "Can Telemedicine Save You a Trip to the Doctor?" *Techlicious Blog*, February 5, 2014. Accessed at http://www.techlicious.com/blog/can-telemedicine-save-you-a-trip-to-the-doctor/

Medicine. Referring to a medical journal review that assessed the lag time between research and integration in the inherently conservative practice of medicine, Carr notes it can take up to 17 years for a medical discovery to transition into common practice.[21]

Technological drivers

Telehealth has matured beyond the ability to simply gather and transmit patient information over the Internet and wireless networks. Newer technologies include touch-screen devices and software that guide ongoing care. Bosch Healthcare's wireless T400 Telehealth System for discharged patients, for example, addresses dozens of medical conditions, including chronic obstructive pulmonary disease, congestive heart failure and diabetes. Patients enter their vital signs into the T400 daily, and the device transmits that data to their health care provider for review and response. [22]

Rock Health, a San Francisco seed accelerator that funds digital health-related start-ups, believes Apple may be developing a health product, noting the iPhone is loaded with sensors. Apple also is hiring medical device experts, Rock Health adds.[23]

Mobile apps, scales, and activity trackers that beam data they collect to the cloud are helping some doctors and hospitals keep tabs on their patients and inform treatments. Insurance and electronic medical records companies are investing in and partnering with tech companies like RedBrick Health and Audax Health, which encourage consumers to use activity and health tracking tools and upload the data to their platforms, Kaiser Health News (KHN) reports. According to KHN, startups are creating gadgets such as pill boxes that can monitor whether patients are taking their meds and under-the-mattress sensors that measure heart rate, breathing and movement. Microsoft HealthVault — Microsoft's web-based electronic health records platform — lets doctors access data from fitness trackers like Fitbit or Nike+ Fuel Band and glucose and heart monitors that patients have uploaded themselves. [24]

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[21] "Telemedicine Shows Satisfaction and Safety, but Obstacles Remain," *Pharmacy Practice News*, February 28, 2014. Accessed at http://www.pharmacypracticenews.com/ViewArticle.aspx?d=Web percent2BExclusives&d_id=239&i=February+2014&i_id=1035&a_id=26048

[22] "Home Is Where the Health Is: Obamacare Positions 'Telehealth' Tech as a Remedy for Chronic Hospital Readmissions." *Scientific American*, April 9, 2013. Accessed at http://www.scientificamerican.com/article/affordable-care-act-technology/

[23] "Can Telemedicine Save You a Trip to the Doctor?" *Techlicious Blog*, February 5, 2014. Accessed at http://www.techlicious.com/blog/can-telemedicine-save-you-a-trip-to-the-doctor/

[24] "Next Step for Smart Phones: Keeping Tabs on Patients," *Kaiser Health News*, March 10, 2014. Accessed at http://www.kaiserhealthnews.org/Stories/2014/March/10/Smart-Phones-Keep-Tabs-on-Patients.aspx?utm_campaign=KHN%253A+Daily+Health+Policy+Report&utm_source=hs_email&utm_medium=email&utm_content=12156734&_hsenc=p2ANqtz-_4bpRPiHHTUi6WhxNQWcZSbe82YCBt-ly8CcCsj_fg65JNEfmYV71z6wbwmhAeQaiQEpNiK83qEJTbAFA3NXYOMH1xNQ&_hsmi=12156734

mHealth

The mobile or "mHealth" apps market includes health apps and medical apps. Health apps are segmented into exercise, weight loss, women's health, sleep and meditation, medication reminder and other apps. The medical apps market is segmented into medical reference, and other applications like apps for mental health, dermatological treatment, and emergency response.

A *Harris Interactive/HealthDay* online survey of 2,050 Americans aged 18 and older conducted between May 22-24, 2013 found more than one-third of respondents said they were "very" or "extremely" interested in using smartphones or tablets to ask their doctors questions, make appointments or get medical test results. Similar numbers of respondents were eager to use mobile phones and tablets for actual health-care services -- such as monitoring blood pressure or blood sugar, or even getting a diagnosis. [25]

According to Research and Markets, North America held the largest share of the global mHealth apps market in 2013 with an estimated value of $2.9 billion in 2013. Research and Markets estimates the global mHealth apps market value at $6.6 billion in 2013 and $20.7 billion by 2018, an annual growth rate of 25.5 percent. It projects the highest mHealth growth will be for diabetes management devices due to the increasing global burden of diabetes.[26]

mHealth is poised to explode over the next decade, according to Chad Udell, managing director of Float Mobile Learning, a mobile learning consulting, strategy and research firm. "There has been a shift to an emphasis on wellness, prevention, self-care and home care as alternatives to hospitalization," says Udell. "This has been further driven by the developments of new mobile technologies. All of this new technology could mean fewer visits to the hospital or doctor's office, which would significantly reduce the amount of money spent on healthcare," Udell adds. [27]

Federal grant funding

Federal grant funding is a factor spurring telehealth services adoption. Using funding allocated by the American Recovery and Reinvestment Act of 2009, the National Telecommunications and Information Administration (NTIA) Broadband Technology Opportunities Program awarded grants to fund projects to provide Internet connectivity and upgrades for nearly 3,000 hospitals and other health care facilities. These are some projects funded according to an NTIA report on the program:

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[25] "Lots of Americans Want Health Care Via Their Smartphone," *HealthDay News*, June 18, 2013. Accessed at http://www.harrisinteractive.com/NewsRoom/PressReleases/tabid/446/mid/1506/articleId/1215/ctl/ReadCustom percent20Default/Default.aspx

[26] "mHealth Apps & Solutions Market - Global Trends & Forecast to 2018," *PR Newswire*, October 21, 2013. Accessed at http://www.prnewswire.com/news-releases/mhealth-apps--solutions-market---global-trends--forecast-to-2018-228685041.html

[27] "mHealth poised to explode, expert says," *Healthcare IT News*, May 7, 2012. Accessed at http://m.healthcareitnews.com/news/mhealth-poised-explode-expert-says

- The Iowa Health System (IHS) will upgrade its 3,200-mile broadband network connecting or improving connection speeds for more than 200 healthcare entities across Iowa, including hospitals, primary care physicians, medical facilities, community health centers, clinics, and other providers, many in rural locations. The project's broadband capabilities will improve healthcare delivery, telemedicine, 3-D imaging, diagnosis, monitoring, file transfer, electronic health records, research, and instruction.

- Central Iowa Hospital Corporation's Rural Telehealth Initiative sustainable broadband adoption project will complement the HIS infrastructure project. The Rural Telehealth Initiative project links healthcare providers, EMS units, city governments, and schools to foster demand for telehealth applications; improve health related distance learning, mentoring, and patient education; enhance EMS capability and disaster readiness; and provide telehealth services to correctional facilities.

- The Nevada Hospital Association will build and operate a telehealth network connecting 37 rural medical providers across Nevada, including the University of Nevada Medical Center, which cares for the largest percentage of poor and uninsured patients in the state, and the Indian Health Board of Nevada, which represents 13 tribal medical facilities. The network will enable videoconferencing, telemedicine applications and use of EHRs. [28]

On March 4, 2014, the Federal Communications Commission announced the formation of a task force to review methods to accelerate the adoption of health care technologies by leveraging broadband and other next generation communications services. [29]

The U.S. Department of Agriculture's Distance Learning and Telemedicine Loan and Grant program provides funding to rural hospitals, clinics, schools and libraries for equipment and technical assistance for telehealth and distance learning. Since 2009, the program has invested almost $150 million in the Distance Learning and Telemedicine program. Under the program, Avera Health received $294,586 in funding to purchase equipment and software to expand and improve its telemedicine network. Participating clinics and hospitals receive equipment such as telephonic stethoscopes, LifePak15 Defibrillators, Sony Handicams, video laryngoscopes and Polycom videoconferencing units. The

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[28] "The Broadband Technology Opportunities Program Expanding Broadband Access and Adoption in Communities Across America Overview of Grant Awards." Report by the National Telecommunications and Information Administration. Accessed at http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=6&cad=rja&uact=8&ved=0CFAQFjAF&url=http percent3A percent2F percent2Fwww.ntia.doc.gov percent2ffiles percent2Fntia percent2Fpublications percent2Fntia_report_on_btop_12142010_0.pdf&ei=aMUYU7X_Ds76oAT80ILAAw&usg=AFQjCNHbp2sC_meh1ep701PpSSJzUU 32Mw&sig2=a_kx3BxJb-kkUCWf4wKHCw&bvm=bv.62578216,d.cGU

[29] "FCC Chairman Announces New CONNECT2HEALTHFCC Task Force." March 4, 2014. Federal Communications Commission news release. Accessed at http://www.fcc.gov/document/fcc-chairman-announces-new-connect2health-task-force

technology will give health providers and patients real-time, face-to-face consultations with specialized physicians at hub locations in Sioux Falls and Pierre, South Dakota and Marshall, Minnesota.[30]

In a state with a large rural population, such as Arkansas, the need for telemedicine is especially acute because 73 of 75 counties in the state are designated as medically underserved. The University of Arkansas received a $102 million federal grant to expand its telemedicine program. Sites are spread throughout the state, thereby increasing access to specialty care that many patients previously could obtain only by traveling to the state capitol, Little Rock. The practice uses a T-1 Internet connection with video conferencing technology. [31]

Examples of how telehealth services are being provided

Primary care

Some limited non-urgent primary care is being provided by online clinics including Teladoc, Stat Health Services and American Well that connect patients by phone and online to doctors. A major impetus for these services is access and convenience compared to an in-person visit to a doctor's office or clinic or waiting until normal business hours to see a provider. "There's a huge market out there for very convenient and timely access to doctors," said Jason Gorevic, president and CEO of Dallas-based Teladoc, which began by offering simple, phone-based consults with a doctor and is now branching into online solutions, virtual onsite clinics (making use of kiosks) and physician-facing portals.

Health plans and employers have contracted with Teladoc primarily to improve access and decrease costs. Because Teladoc uses the telephone and Internet, it can provide medical care at a patient's home or workplace. This could increase access in areas where there is a shortage of other providers. By replacing emergency department (ED) or primary care visits with a Teladoc visit, patients could save time and money, potentially improving productivity by taking less time away from work and reducing utilization costs for health plans.[32]

Catholic Health Initiatives (CHI), a not-for-profit hospital system based in Englewood, Colorado, holds a majority ownership stake in KentuckyOne. Louisville-based KentuckyOne has launched its Anywhere Care service, providing statewide access for a flat $35 fee. Anywhere Care is also partnering with Seattle-based Carena, Seattle-based virtual telehealth provider of urgent and primary care, which offers

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[30] "Avera Receives Grant To Expand Rural Telemedicine,"*Yankton Daily Press & Dakotan*, February 16, 2014. Accessed at http://www.yankton.net/healthlines/article_e037a198-9772-11e3-959f-0019bb2963f4.html

[31] "Telemedicine Can Build Bridge to Expanded Health Care, Say Panelists." American Academy of Family Physicians, February 5, 2014. Accessed at http://www.aafp.org/news/practice-professional-issues/20140205rgctelemedicineforum.html

[32] "Analysis Of Teladoc Use Seems To Indicate Expanded Access To Care For Patients Without Prior Connection To A Provider," *Health Aff February 2014 33:2258-264;* doi: 10.1377/hlthaff.2013.0989

the same service with Franciscan Health System, a CHI affiliate based in Tacoma, Washington. Anywhere Care providers can prescribe drugs or recommend over-the-counter remedies, but cannot refill prescriptions or prescribe controlled substances.

Seattle-based primary care telehealth provider Carena began offering 20-minute virtual visits via Skype in 2011. A team of 15 providers work from home in shifts round the clock, charging a $35 fee for virtual visits. Common conditions treated include urinary, sinus and upper respiratory infections, and allergies, rashes and pink eye.[33] Ben Green, a physician who leads the Carena provider team, estimates about 75 percent of the time, patients will not need to be seen in person. "We can escalate patients to an ER, urgent care, or PCP office, but that happens only about 25 percent of the time," he notes. Patients get follow up contacts five days after each virtual visit to find out if they sought care at another setting.[34]

OptumHealth, a Eden Prairie, Minnesota health-care services delivery company, partnered with American Well (Technology company American Well produces the equipment that allows for doctors to engage in virtual house calls via video, the phone and Internet) to offer NowClinic in Arizona, California, Connecticut, Illinois, Kansas, Kentucky, Maryland, Massachusetts, Minnesota, Missouri, Michigan, Nebraska, New Mexico, New York, North Dakota, Ohio, Pennsylvania, South Dakota, Utah, Wisconsin and Wyoming and to certain commercial health plan members in Nevada. Patients engage a physician through instant messenger, secure chat, webcam or telephonically, with plans to include other types of providers including behaviorists and pharmacists. Patients pay a fee of $45 for each 10-minute consult.[35]

Telehealth as technological extension of retail store clinics, urgent care centers
Telehealth could be viewed as technological extension or even as an alternative to the growth trend in recent years of retail outlets and urgent care clinics, providing even more flexible hours and convenience than brick and mortar sites. Online clinics like Portland-based chain ZoomCare diagnose and treat more than 27 common medical conditions via an interactive online video service like Skype. But ZoomCare CEO Dave Sanders said his clinic has been limited in offering the service since it's only available for patients willing to pay cash since insurance doesn't reimburse for it.[36]

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[33] "Licensing issues could slow telehealth services," *Modern Healthcare*, September 23, 2013. Accessed at http://www.modernhealthcare.com/article/20130923/NEWS/309239969

[34] "Telemedicine a Win for Stressed-Out Doctors," *HealthLeaders Media*, January 16, 2014. Accessed at http://www.healthleadersmedia.com/page-1/PHY-300035/Telemedicine-a-Win-for-StressedOut-Doctors

[35] "TeleHealth: The Doctor Will See You Now, Wherever You Are," *FOXBusiness*, August 30, 2011. Accessed at http://www.foxbusiness.com/personal-finance/2011/08/30/telehealth-doctor-will-see-now-wherever-are/

[36] "Hospitals, Along with Providence and Regence, Stop Bill Requiring Telemedicine Payments," *The Lund Report*, February 12, 2014. Accessed at http://www.thelundreport.org/content/hospitals-along-providence-and-regence-stop-bill-requiring-telemedicine-payments

Telehealth and employers, insurers

Primary care telehealth services are also being adopted by employers. According to an article appearing in *BloombergBusinessweek* in early 2014, hundreds of employers of all sizes are contracting directly or through their insurers with telehealth providers to cut medical costs and give workers 24-hour access to doctors and nurse practitioners. WellPoint partnered with Boston-based American Well to offer telehealth services to 3.5 million of its health-plan subscribers last year and intends to extend the service to another 32.5 million over the next 12 to 18 months. UnitedHealth Group began a pilot program in January 2014, providing 310,000 subscribers in Nevada with virtual physician visits.[37]

"Every time an employee goes to the ER, the employer is paying for it," notes Alan Roga, MD, of Scottsdale, Arizona-based Stat Health, which focuses its business on non-critical visits that are usually handled in emergency rooms but could just as easily be handled in an online visit. "This gives them an alternative, while also improving ER throughput and efficiency." Teladoc has launched a pilot program with Aetna for its fully insured medical plans in Texas and Florida, offering a 24-hour service by phone or online. A physician responds to a request within 30 minutes, offering a diagnosis, recommending treatment and any prescriptions needed, coordinating follow-up care with the patient's primary care provider and entering the information into the patient's electronic medical record.[38]

Emergency care

At Oregon's Clackamas Fire District #1, tablet computers are on every fire engine and responders carry wireless hot spots with them. District Director Kyle Gorman, estimates as many as 30 percent of emergency calls could be handled with a physician Skyping the patient, but instead medics have to drive patients to a hospital emergency room because insurers would not otherwise reimburse for care, incurring costs of $1,200 for ambulance transport and large emergency costs.[39]

Consults among providers

One of the more established forms of telehealth is consults among providers. One example involves a patient with a severe case of scoliosis — an abnormal curvature of his spine. This led to severe chronic pain, anxiety, depression and sleep apnea. To develop a treatment plan, a physician assistant remotely presented the case to University of New Mexico experts in psychiatry, internal medicine, neurology, physical therapy and rehabilitation medicine. The health care providers took turns asking questions and

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[37] "Telemedicine: Doctor Visits via Video Calls," *BloombergBusinessweek,* February 27, 2014. Accessed at http://www.businessweek.com/articles/2014-02-27/health-insurers-add-telemedicine-services-to-cut-costs

[38] "Telehealth services make business sense," *Healthcare Finance News*, November 4, 2011. Accessed at http://m.healthcarefinancenews.com/news/telehealth-services-make-business-sense?single-page=true

[39] "Hospitals, Along with Providence and Regence, Stop Bill Requiring Telemedicine Payments," *The Lund Report*, February 12, 2014. Accessed at http://www.thelundreport.org/content/hospitals-along-providence-and-regence-stop-bill-requiring-telemedicine-payments

discussing the patient. Together, they came up with a course of treatment that resulted in the patient sleeping through the night and getting his anxiety under control, improving his quality of life. [40]

Younger, urban more affluent demographic more likely to receive primary care via telehealth
A study found people who are younger, more affluent and do not have established health care relationships are more likely to utilize telehealth services. The findings, published in early 2014 in the journal *Health Affairs*, are the first assessment of a telemedicine program offered to a large, diverse group of patients across the United States. The authors studied 3,701 patient telehealth visits provided from April 2012 to February 2013 by Teladoc, a provider of primary care telehealth services. The patients were covered through a health plan offered by the California Public Employees' Retirement System, which provides health insurance to the state's public sector workers. Patients who used Teladoc were compared to peers who visited hospital emergency departments or a doctor's office for a similar problem such as acute respiratory conditions, urinary tract infections and skin problems, which accounted for more than half the cases. Other frequent reasons for Teladoc visits were abdominal pain, back and joint problems, viral illnesses, eye problems and ear infections.

Teladoc users as a group were younger, had fewer chronic conditions and were less likely to have used health care in the previous year when compared to other enrollees who used a hospital emergency department or visited a physician's office for similar conditions. Teladoc users were slightly more likely to be women and live in more affluent areas. In addition, more than a third of Teladoc visits occurred on weekends or holidays. "The people who are attracted to this type of telemedicine may be a more technologically savvy group that has less time to obtain medical care through traditional settings," observed one of the researchers.[41]

Previous research found telehealth adoption more prevalent today among urban populations. Drawing on a 53,000 household data set collected by the Census Bureau in July 2011, the National Telecommunications and Information Administration found that Internet users living in urban areas are twice as likely to participate in telehealth as rural Internet users – with utilization rates of 8 percent and 4 percent, respectively. [42] These findings of these studies paradoxically counter the general view that the greatest need for primary care telehealth exists in rural areas where there are fewer primary care providers.

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[40] "Telemedicine program helps those with chronic pain in New Mexico," *Santa Fe New Mexican*, February 23, 2014. Accessed at http://www.santafenewmexican.com/news/health_and_science/telemedicine-program-helps-those-with-chronic-pain-in-new-mexico/article_d9fd2268-d22a-5239-b8d6-a33b3e67b2e2.html

[41] "Telemedicine Service May Expand Access To Acute Medical Care," *Red Orbit*, February 3, 2014. Accessed at http://www.redorbit.com/news/health/1113062902/telemedicine-service-may-expand-access-to-acute-medical-care/?goback=.gde_1875051_member_5837209041364856834?print=true#dWKhpsmxFEgvbY4u.99

[42] "Exploring the Digital Nation: America's Emerging Online Experience," National Telecommunications and Information Administration and Economics and Statistics Administration, June 2013. Accessed at http://www.ntia.doc.gov/files/ntia/publications/exploring_the_digital_nation_-_americas_emerging_online_experience.pdf

Institutional use of telehealth

In February 2014, AMD Global Telemedicine Inc. (AMD), a supplier of clinical Telemedicine Encounter Management Solutions (TEMS)™, announced a partnership with US Telehealth to deliver telemedicine services for the Louisiana Department of Corrections. AMD is providing the telemedicine equipment that resides on site in the prison facilities, where it enables remote physician services, clinic scheduling for routine check-ups, emergency consultations and scheduled visits.[43]

The Department of Corrections began relying more on telemedicine to fill gaps created when the LSU Earl K. Long Medical Center in Baton Rouge, where many state inmates had been sent for care, was closed. Telemedicine clinics are offered in dermatology, orthopedics, general surgery, infectious disease, ophthalmology, cardiology, oncology, rheumatology, ear, nose and throat, endocrinology, pulmonary, neurosurgery, urology, neurology, gastroenterology, HIV and Hepatitis C. One warden notes telemedicine is safer for the public since inmates remain within secured facilities and don't have to be transferred on public streets and is more efficient for the department.[44]

Beginning in March 2014, students at Ossun Elementary School in Lafayette, Louisiana (which operates a municipal fiber optic telecommunications network) with minor medical issues such as earaches, sore throats or other common ailments will be seen on the elementary school campus by a doctor in an exam room about five miles away at Carencro Middle School's school-based health center. Using Bluetooth-enabled stethoscopes, otoscopes and ophthalmoscopes, a pediatrician will examine patients at the elementary school as part of a telehealth program partnership between the Lafayette Parish School System and Lafayette General Health and its foundation. The goal is to test the telehealth model and explore a more cost-effective way to expand school-based health services across the district.[45]

Hospital and hospital outpatient care

One area where telehealth is being used in hospitals is by intensivists to remotely monitor patients in critical care units. While few studies have evaluated both the overall effect of ICU telehealth programs and the effect of individual components of the intervention on clinical outcomes, a study of 118,990 adult ICU patients found ICU telemedicine interventions, specifically interventions that increase early intensivist case involvement, improve adherence to ICU best practices, reduce response times to alarms,

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[43] "AMD Global Telemedicine and US Telehealth Partner to Deliver Telemedicine Services for Louisiana Department of Corrections," *PRWEB*, February 12, 2014. Accessed at http://www.virtual-strategy.com/2014/02/12/amd-global-telemedicine-and-us-telehealth-partner-deliver-telemedicine-services-louisiana#c7XFks6ler7xd6o3.99

[44] "State expands use of telemedicine for prison inmates," *The Advocate*, December 3, 2013. Accessed at http://theadvocate.com/news/7691156-123/state-expands-use-of-telemedicine

[45] "Minor ailments treated at school via Lafayette program," *The Advocate*, February 13, 2014. Accessed at http://theadvocate.com/news/8315714-123/minor-ailments-treated-at-school

encourage the use of performance data and were associated with lower mortality and length of stay.[46] Another study found a program in which nurses screened ICU patients for best practices from a remote location was associated with improvements in the quality of care and reductions in duration of mechanical ventilation and length of stay, but with no impact on patient mortality. [47] A review of controlled trials or observational studies of critically ill adults or children found telehealth was associated with lower ICU and hospital mortality among critically ill patients. It noted optimal telehealth technology configuration and use tailored to ICU organization and case mix remain unclear.[48]

Some believe small ICUs might be able to improve care with less expensive measures, noting telehealth costs hospitals roughly $40,000 to $50,000 a year for each covered bed. While Maryland eCare is adding hospital ICUs, a study found that the number of U.S. hospitals using telemedicine in ICUs increased from 16, or 0.4 percent, in 2003, to 213, or 4.6 percent, in 2010, with usage doubling in the first four years but dropping to average growth of 8.1 percent from 2010 to 2014.[49]

Massachusetts General Hospital in Boston launched its TeleStroke program in 2000, allowing specialists to examine and diagnose patients at remote clinical locations throughout New England and recommend a plan of care to local physicians. In 2013, the hospital launched a telehealth pilot program serving psychiatric, neurology and heart failure patients. The program began with heart failure patients as they require close monitoring by their care team and gives cardiologists the ability to hold video visits with patients at home. For neurology patients, the program focuses on follow-up visits for patients with limited mobility, which makes travel difficult and home visits ideal. For child and adolescent psychiatry, the telehealth program serves children and adolescents with autism spectrum disorder and attention deficit hyperactivity disorder. Parents and children dealing with autism and ADHD often find it difficult to find appropriate resources locally or to secure after school appointments. The program allows participating physicians to see these patients in their own homes.[50]

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[46] Craig M. Lilly, MD, FCCP; John M. McLaughlin, PhD, MSPH; Huifang Zhao, PhD; Stephen P. Baker, MScPH; Shawn Cody, RN, MSN, MBA; Richard S. Irwin, MD, Master FCCP, "A Multicenter Study of ICU Telemedicine Reengineering of Adult Critical Care." *Chest*. 2014;145(3):500-507. doi:10.1378/chest.13-1973

[47] Kahn, Jeremy M., Gunn, Scott R., Lorenz, Holly L, Alvarez, Jeffrey, Angus, Derek C, "Impact of Nurse-Led Remote Screening and Prompting for Evidence-Based Practices in the ICU," *Critical Care Medicine*, November 6, 2013. doi: 10.1097/CCM.0000000000000052.

[48] M Elizabeth Wilcox, Neill KJ Adhikari, "The effect of telemedicine in critically ill patients: systematic review and meta-analysis. " *Critical Care* 2012, 16:R127 doi:10.1186/cc11429.

[49] "Telemedicine Bolsters ICU Care In Rural Maryland Hospitals," *The Washington Post*, February 12, 2014. Accessed at http://www.washingtonpost.com/national/health-science/telemedicine-bolsters-icu-care-in-rural-maryland-hospitals/2014/02/12/6588206a-93cd-11e3-9e13-770265cf4962_story.html

[50] "Mass General launches telehealth pilot," *Healthcare IT News*, April 9, 2013. Accessed at http://m.healthcareitnews.com/news/mass-general-launches-telehealth-pilot

At Mercy Hospital in St. Louis, the telemedicine program includes areas of care such as pediatric neurology and endocrinology, as well as pulmonology and dermatology. "We are using telemedicine across the continuum of care, from the inpatient setting to the outpatient clinic setting and then into the home setting," said Wendy Deibert, RN, BSN, vice president of Mercy Telehealth Services.[51]

The use of telehealth by the United Kingdom's National Health Service (NHS) has provided tens of thousands of patients with remote tele-medical health treatment and monitoring. In Scotland this has accounted for a savings of 70,000 bed-days. Specialist telehealth programs such as the Scottish telestroke network and the ENT tele-endoscopy have reduced waiting lists, travelling needs between remote areas and specialist clinics for both patients and consultants and have achieved savings in hospital stay costs. [52]

A 2013 online survey of 12,000 adults ages 18 and older in Brazil, China, France, India, Indonesia, Italy, Japan and the United States from July 28 to Aug. 15, 2013 found 57 percent believe traditional hospitals will be obsolete in the future. Technology innovation holds the promise of unburdening people from having to see a healthcare provider in person for many aspects of their healthcare management, liberating people from the conventional restraints of time and location. Seventy-two percent of those surveyed expressed a willingness to see a doctor via video conference for non-urgent needs. The survey concluded that as remote healthcare technology and self-monitoring tools improve, people may embrace technologies that will allow them to connect with their caregivers in new ways, such as sensor technology that transmits health data in real time. [53]

A study of a telehealth network with daily 24-hour service using a high-speed data transmission for digital brain images and real-time clinical examination of patients via videoconference concluded it offered a novel and pragmatic way to extend the benefits of systemic thrombolysis stroke treatment to rural areas. [54]

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[51] "Telemedicine Shows Satisfaction and Safety, but Obstacles Remain," *Pharmacy Practice News*, February 28, 2014. Accessed at http://www.pharmacypracticenews.com/ViewArticle.aspx?d=Web percent2BExclusives&d_id=239&i=February+2014&i_id=1035&a_id=26048

[52] "Broadband in the Columbia Basin," *BC Local News*, January 23, 2014. Accessed at http://www.bclocalnews.com/news/241745161.html

[53] "The World Agrees: Technology Inspires Optimism for Healthcare," *Intel Newsroom*, December 9, 2013. Accessed at http://newsroom.intel.com/community/intel_newsroom/blog/2013/12/09/the-world-agrees-technology-inspires-optimism-for-healthcare

[54] Heinrich J. Audebert, MD; Christian Kukla, MD; Bijan Vatankhah, MD; Berthold Gotzler, MD; Johannes Schenkel, MD, MPH; Stephan Hofer, MD; Andrea Fürst, MD; Roman L. Haberl, MD, "Comparison of Tissue Plasminogen Activator Administration Management Between Telestroke Network Hospitals and Academic Stroke Centers, *Stroke*, *2006; 37: 1822-1827.* Accessed at http://stroke.ahajournals.org/content/37/7/1822.full

Chronic disease management and home-based care to avoid hospitalization

One of the biggest potentials for telemedicine to reduce costs is the use of remote monitoring to keep patients with chronic conditions out of the hospital and reduce their use of emergency departments, according to Jonathan Linkous, CEO of the American Telemedicine Association. "Having them send in their vital signs for assessment on a regular basis is much more efficient than waiting until they call to say something is wrong," he says.[55]

In the United Kingdom, more than 100 telehealth projects are running across National Health Services (NHS) organizations to address patients with chronic conditions such as congestive heart failure (CHF), chronic obstructive pulmonary disease (COPD) and diabetes.[56] According to InMedica, a division of IMS Research, 308,000 patients around the world were monitored remotely by providers in 2012 for congestive heart failure, chronic obstructive pulmonary disease, diabetes, hypertension and mental health conditions.[57]

In Florida, tablet computers are being used to monitor cardiac patients at home recovering from surgery. The tablet turns on automatically each morning to transmit data on weight and blood pressure and oxygen monitors connected to it. The data also are instantly added to the patient's EHR. An administrator for Florida's Memorial Regional's Home Health Services credits the program for reducing its 30-day hospital readmission rate among cardiac patients drop to less than two percent — far lower than the 22.8 percent national average and Memorial's overall 19.9 percent readmission rate.[58]

The Mid-Appalachia Telehealth Project is in East Tennessee is focused on improving chronic disease management in accordance with Healthy People 2010 objectives. Diabetes patients in need of close monitoring are given home-based telehealth equipment to record and forward daily glucose readings and other vital statistics to nurses in local health departments and community health centers. Nurses conduct weekly telephone assessments with patients and proactively call them when monitoring data indicate that something is amiss. The nurses also contact patients to offer preventive education, support adherence to treatment, adjust medications, and schedule appointments as needed. Videoconferencing capabilities enable nurses to make visual contact and observations. The project has conducted nearly 2,000 in-home televisits with 117 adult diabetes patients since 2004. Among 42 diabetes patients who completed six months in the program, 71 percent had an improvement in blood sugar control and one-

[55] "Telemedicine: Patient demand, cost containment drive growth." *Medical Economics*, February 10, 2013. Accessed at http://medicaleconomics.modernmedicine.com/medical-economics/news/modernmedicine/modern-medicine-feature-articles/telemedicine-patient-demand-c

[56] "Telehealth's promising global future," *Analytics & Healthcare*, January-February, 2012. Accessed at http://www.analytics-magazine.org/januaryfebruary-2012/508-telehealths-promising-global-future

[57] "Telemedicine: Patient demand, cost containment drive growth," *Medical Economics,* February 10, 2013. Accessed at http://medicaleconomics.modernmedicine.com

[58] "The doctor will see you now, virtually, *"Sun Sentinel*, February 16, 2014. Accessed at http://articles.sun-sentinel.com/2014-02-16/health/fl-telemedicine-hospitals-20140214_1_telemedicine-cleveland-clinic-florida-home-health

third achieved a decrease of 1 percent or greater. Among 53 participating school children with asthma, two-thirds showed an improvement in peak flow meter readings after being in the program for an average of six months.

The Delta Health Partnership in collaboration between UTHSC and the University of Mississippi Medical Center provides comprehensive diabetes care for an underserved population of predominantly African American patients in rural areas of the Mississippi Delta region. Funded by the federal Office for the Advancement of Telehealth, the project uses videoconferencing to link local nurse practitioners, physician assistants, and pharmacists with a multidisciplinary diabetes team for patient consultations, patient and provider education, case management, and quality assurance. These specialty services would otherwise be available only through four- to six-hour round trips by patients or providers. The Delta Health Partnership has enrolled 61 patients for at least six months and provided more than 1,000 televisits during one year of operation. Preliminary outcomes include improved blood sugar control, improved blood pressure control, and improved blood lipids. Telehealth communications have reduced travel expenses and freed up about 20 percent of faculty specialists' travel time.[59]

Another Mississippi project set to launch in early 2014 in, the Diabetes Telehealth Network, will monitor patients with tablets to help them track and share health data like weight, blood pressure, and glucose levels. It will provide interactive video consults, deliver patient education and engage with the patient daily to meet their needs. "Until now," she said, "this type of coordinated care that engages the patient in their home setting was simply not an option." Henderson said the initiative will serve as a proof of concept to expand the model geographically and to other diseases.[60]

An electronic literature search was conducted to identify studies on home telehealth and patients with diabetes that were published between 1998 and 2008 using Medline, Medline In-Process & Other Non-Indexed Citations, BIOSIS Previews and EMBASE. Twenty-six studies involving 5,069 patients on home telehealth treatment for diabetes were selected. Study results indicated that home telehealth helps to reduce the number of patients hospitalized and bed days of care. In general, the authors concluded home telehealth had a positive impact on the use of numerous health services and glycemic control. The authors recommended additional studies of higher methodological quality to provide more precise insights into the potential clinical effectiveness of home telehealth interventions.[61]

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[59] "Case Study: University of Tennessee Health Science Center's Telehealth Network," *The Commonwealth Fund*, March 12, 2007. Accessed at http://www.commonwealthfund.org/Innovations/Case-Studies/2007/Mar/Case-Study--University-of-Tennessee-Health-Science-Centers-Telehealth-Network.aspx

[60] "Mississippi telehealth pilot to tackle diabetes with tablets," *EHR Intelligence*, January 27, 2014. Accessed at http://ehrintelligence.com/2014/01/27/mississippi-telehealth-pilot-to-tackle-diabetes-with-tablets/

[61] J. Polisena, K. Tran, K. Cimon, B. Hutton, S. McGill, K. Palmer, "Home telehealth for diabetes management: a systematic review and meta-analysis," *Diabetes, Obesity and Metabolism*, Volume 11, Issue 10, pages 913–930, October 2009. DOI: 10.1111/j.1463-1326.2009.01057.x

Established in 1998, Visiting Nurse Association (VNA) of Ohio's Chronic Disease Management program helps physicians care for patients at home with congestive heart failure (CHF), chronic obstructive pulmonary disease (COPD), hypertension, coronary artery disease, diabetes, movement disorders, chronic pain and obesity. "Our goal is to keep our patients home — out of the ER and out of the hospital — by helping them and their physicians manage their chronic disease," notes Claire M. Zangerle, president and CEO of VNA of Ohio. VNA of Ohio's statistics for its telehealth patients show a 19.85 percent reduction in emergency care events, a 29.78 percent reduction in inpatient events, and 4.25 percent reduction in 30-day readmits with same diagnosis. Zangerle attributes much of the program's success to one-on-one interaction of the homecare nurse or aide with the patient and family to teach and reinforce the importance of managing their chronic disease through the technology.

VNA utilizes Honeywell's HomMed Health Monitoring System to collect, transmit and track a patient's vital signs on a daily basis according to parameters set for the patient by his/her physician. This enables detection of even slight health changes and allows intervention before a problem escalates. The patient's in-home equipment includes a monitoring unit and a variety of medical device peripherals or attachments, such as a scale to measure body weight or a blood pressure cuff. The monitor can be connected either to a phone landline or to a mobile device.[62]

Between July 2003 and December 2007, the Veterans Health Administration (VHA) introduced a national home telehealth program to coordinate the care of veteran patients with chronic conditions and avoid their unnecessary admission to long-term institutional care. A review of the program found a 25 percent reduction in numbers of bed days of care, a 19 percent reduction in numbers of hospital admissions and a mean patient satisfaction score rating of 86 percent after enrollment into the program. The review concluded the VHA's experience shows an enterprise-wide home telehealth implementation is an appropriate and cost-effective way of managing chronic care patients in both urban and rural settings.[63]

The VA spent $500 million in 2013 on telehealth services, which include telemental health, telehome health and clinical consultation by video. The VA is also developing iPads with a suite of 10 apps that enable veterans to renew medications, communicate with their provider and review their medical record information.[64]

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[62] "Need Help Managing Your Patients' Chronic Disease at Home? Consider VNA of Ohio TeleHealth" *MD News*, February 17, 2014. Accessed at http://www.mdnews.com/news/2014_02/05788-spr14-vna-of-ohio-telehealth.aspx

[63] Adam Darkins, Patricia Ryan, Rita Kobb, Linda Foster, Ellen Edmonson, Bonnie Wakefield, and Anne E. Lancaster. "Care Coordination/Home Telehealth: The Systematic Implementation of Health Informatics, Home Telehealth, and Disease Management to Support the Care of Veteran Patients with Chronic Conditions, *"Telemedicine and e-Health*. December 2008, 14(10): 1118-1126. doi: 10.1089/tmj.2008.0021.

[64] "VA counting on telemedicine to improve, expand care to vets," *Federal News Radio*, October 11, 2013. Accessed at http://www.federalnewsradio.com/538/3409529/VA-counting-on-telemedicine-to-improve-expand-care-to-vets

Essentia Health of Minnesota is using telehealth to home monitor and prevent the hospitalization of patients with heart problems as part of accountable care organization (ACO) created under the Affordable Care Act. [65]

A project to improve healthcare access and outcomes for congestive heart failure (CHF) patients relative to patient satisfaction, mortality rate, emergency room visits, and resource consumption found patients who did not use telehealth services spent more on out-of-pocket expenses more than those who used telehealth. Most of the expense was associated with long distance travel to see providers.[66]

Richard Della Penna is a former physician with Kaiser Permanente and chief medical officer at Independa, a company that sells software and services designed specifically to help the elderly live independently. "If a health device is able to capture data that predicts when a person with, say, heart failure is starting a readmission trajectory, and someone quickly responds appropriately to the incoming data, only then may readmission rates be impacted," he says. Affordable Care Act penalties assessed on hospitals designed to penalize short term readmissions could induce hospitals and their staff to take fuller advantage of EHRs and a variety of other technologies to keep closer tabs on discharged patients, Della Penna notes, adding, "We now have the tools to merge the boundaries between hospital and home."[67]

A Pennsylvania health system reports telemedicine technology reduced readmissions in its 26 facilities and netted a 100 percent return on investment in just two months. That success mirrors that of Geisinger Health Plan's two-year study of home telemonitoring. That trial showed a 44 percent drop in readmissions among the monitored patients compared to a control group. The Geisinger study looked at the use of an interactive voice response system for monitoring patients with congestive heart failure. The IVR system enabled the patients to report their weight and answer a series of questions about their symptoms. In the Pennsylvania study, Bluetooth-enabled stethoscopes enabled physicians listen to patients' heart and lung sounds remotely. It also utilized videoconferencing between primary care physicians in rural hospitals and specialists in urban facilities and telehealth care for stroke, cardiology, oncology patients as well as a bariatric wellness program.[68]

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[65] "Talking Scales And Telemedicine: ACO Tools To Keep Patients Out Of The Hospital," *MPR News*, August 15, 2013. Accessed at http://www.kaiserhealthnews.org/stories/2013/august/15/minnesota-aco-accountable-care-organizations.aspx

[66] Enemuoh, Chiamaka J, *"Implementation of telehealth for rural patients with congestive heart failure: Evaluation of healthcare access and outcome."* D.N.P Dissertation, The College Of St. Scholastica, 2013.

[67] "Home Is Where the Health Is: Obamacare Positions 'Telehealth' Tech as a Remedy for Chronic Hospital Readmissions." *Scientific American*, April 9, 2013. Accessed at http://www.scientificamerican.com/article/affordable-care-act-technology/

[68] "Telehealth cuts readmission rates, earns system a speedy return on investment," *FierceHealthIT*, May 23, 2012. Accessed at http://www.fiercehealthit.com/story/telehealth-cuts-readmission-rates-earns-system-speedy-return-investment/2012-05-23#ixzz2sll1VqKM

Home-based primary care of the elderly to avoid institutionalization

A new school of thought is emerging relative to health care for the elderly, particularly those with multiple chronic conditions that can result in very costly institutional care that prolongs their lives but does not improve quality of life. Instead, the new approach is keeping these patients in their home through the provision of intensive, coordinated primary care.[69]

The South Texas Veterans Health Care System (STVHCS) provides primary care services in the home to complex and or frail patients who are usually homebound using an interdisciplinary team of physicians, nurses, physical therapists and a dietitian. The program offers care coordination, disease management and home telehealth technology to provide close monitoring of veterans with chronic obstructive pulmonary disease, congestive heart failure, hypertension, coronary artery disease and diabetes who have increased need for hospitalization or urgent care visits. [70]

Relative to EHR integration, a 2005 study found integrating home telehealth with the healthcare institution's electronic database significantly reduces resource use and improves cognitive status, treatment compliance, and stability of chronic disease for homebound elderly with common complex co-morbidities.[71]

Given an expected increase in those suffering from Alzheimer's and other forms of dementia as the baby boomer demographic ages, telehealth home monitoring of these patients could prove beneficial and help mitigate institutionalization. A 2007 study found televideo monitoring could improve medication self-administration accuracy and improve mood for persons with mild dementia who live alone or spend a significant amount of their day alone.[72]

Mental health care

According to a recent estimate, psychologists, psychiatrists, and clinical social workers accounted for 49 percent of the health care professionals who provided 10 or more telehealth services in Medicare. [73]

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[69] `"The Hospital Is No Place for the Elderly," *The Atlantic*, November 20, 2013. Accessed at http://www.theatlantic.com/magazine/archive/2013/12/the-home-remedy-for-old-age/354680/

[70] Home Based Primary Care, South Texas Veterans Health Care System. Accessed at http://www.southtexas.va.gov/services/HBPC.asp

[71] Helen C. Noel, Donna C. Vogel, Joseph J. Erdos, David Cornwall, and Forrest Levin, "Home Telehealth Reduces Healthcare Costs." *Telemedicine Journal and e-Health*. Summer 2004, 10(2): 170-183. doi:10.1089/tmj.2004.10.170.

[72] Glenn E. Smith, Angela Lunde, Julie Hathaway, Kristen Vickers, "Telehealth Home Monitoring of Solitary Persons With Mild Dementia," *Alzheimer's & Dementia: The Journal of the Alzheimer's Association.* Volume 2, Issue 3, Supplement, Pages S617-S618, July 2006. doi:10.1016/j.jalz.2006.05.2084

[73] Jeff Stensland, Medicare Payment Advisory Commission (MedPAC). "The Role of Telehealth in an Evolving Health Care Environment: Workshop Summary" (2012). Accessed at http://www.nap.edu/openbook.php?record_id=13466&page=x#toc21

"Telepsychiatry has been available for years," observes David Pruitt, M.D., director of the Division of Child and Adolescent Psychiatry at the University of Maryland. "It's critically important for children and adolescent psychiatry, as nearly half of psychiatric disorders start in childhood," he notes. Pruitt adds there is a major shortage of pediatric specialists that will deepen with the Affordable Care Act, which is expected to bring in 600,000 new Medicaid recipients, 40 percent of whom will be children.[74]

A current application of telehealth for mental health treatment utilizes mobile devices – in this case tablet computers – designed to make obtaining mental health treatment more confidential and reduce the stigma associated with seeking psychotherapy, particularly among older people, while making treatment more accessible for seniors residing in low income neighborhoods. Utilizing grant funds provided by the aging advocacy group LeadingAge, The Front Porch Center for Wellbeing and Innovation in Los Angeles launched a pilot program in February 2014 offering computer-based therapy sessions being dubbed "telemental health." Initial sessions between a therapist and client take place in person. Follow up session are done with iPads to videoconference with counselors either at the facility or in their homes. The telemental health initiative comes on the heels of another digitally-based Front Porch project targeting physical health. Following telehealth consultations, patients uploaded data from scales, blood pressure cuffs, and glucometers that were assessed by remote nurses. [75]

Veterans returning from deployments to the Middle East are being provided mental health care via telehealth. An example cited in a study is a veteran with post-traumatic stress disorder (PTSD) who presented severe suicidal ideation and required emergency hospitalization. Through a series of immediate enhanced communications by videoconference between the patient, the patient's family, treatment team and local resources, the patient's symptoms were assessed to identify suicidality. An intervention was successfully carried out, involving the development of a safety plan and eventual transportation to an inpatient unit at the local Veterans Administration Medical Center, where the patient was hospitalized for three days. "This demonstrates the value of telehealth in identifying and treating severe psychiatric symptoms in addition to supporting the safety of these procedures to address suicidality," the authors concluded.[76]

Another study of videoconference as an alternative mode for the psychiatric treatment of mental health patients who reside in remote communities produced mixed results. It found telepsychiatry treatment was more expensive than face-to-face care and produced increased hospitalizations. However, treatment adherence –a major challenge for psychotherapy patients – was better than for a control

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[74] "Telehealth Expands Care Beyond Office Walls," *Maryland Physician*, May 1, 2013. Accessed at http://www.mdphysicianmag.com/2013/05/01/telehealth-expands-care-beyond-office-walls/

[75] "The iPad Therapist: Mental Health for the Aging," *California Health Report*, March 17, 2014. Accessed at http://www.healthycal.org/archives/15079

[76] Daniel F Gros, Kimberly Veronee, Martha Strachan, Kenneth J Ruggiero, Ron Acierno, "Managing suicidality in home-based telehealth," *J Telemed Telecare* September 2011 vol. 17 no. 6 332-335. doi: 10.1258/jtt.2011.101207

group of patients who did not receive telepsychiatry. The authors cautioned against drawing of definite conclusions, noting further studies involving a larger study population and longer duration of investigation are needed.[77]

Quality of Care and patient safety

A study that evaluated the quality of care for pediatric patients who visited five rural emergency departments concluded physician-rated quality of care was higher for patients who received consultations via telehealth than for patients who received either telephone or no consultation. Telehealth consultations were associated with more frequent changes in diagnostic and therapeutic interventions, and higher parent satisfaction, than telephone consultations. "In our experience, patients are very satisfied with the consultation [through] telemedicine," wrote the author of the study, Madan Dharmar, an assistant research professor from the Center for Healthcare Policy and Research and Department of Pediatrics at the University of California Davis in Sacramento.[78]

Another study found telehealth could result in fewer medication errors in rural emergency departments when physicians used Internet consults to get help. Rural emergency physicians who had telehealth consults with pediatric critical care colleagues at larger academic medical centers were able to administer care more appropriately about nine percent of the time than those with no outside aid, the study found. "Medication errors occur frequently among pediatric patients, particularly those treated in rural [EDs]," noted the study author. "The use of telemedicine to provide pediatric critical care consultations to rural EDs is associated with less frequent physician-related ED medication errors among seriously ill and injured children. The study noted the use of telemedicine to provide pediatric specialty consultations may be a means to improve patient access to specialists and increase safety for seriously ill or injured children receiving emergency care in rural, underserved hospitals. [79]

Despite favorable accounts of the medical and economic benefits of telehealth, an earlier 2009 review of the academic literature found a lack of concrete evidence with which to fully assess its economic impact. "The absence of a cohesive body of rigorous economic evaluation studies is a key obstacle to the widespread adoption, proliferation, and funding of telemedicine programs," the study authors wrote. The authors attribute the dearth of rigorous economic studies showing to the multidimensionality of telemedicine, the lack of funding for large-scale programs, experimental problems (e.g., multi-outcome interventions, delayed and unintended effects) and technological issues related to rapid improvement in

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[77] Ilan Modai, Mahmoud Jabarin, Rena Kurs, Peretz Barak, Ilan Hanan, and Ludmila Kitain, "Cost Effectiveness, Safety, and Satisfaction with Video Telepsychiatry versus Face-to-Face Care in Ambulatory Settings." *Telemedicine and e-Health*. October 2006, 12(5): 515-520. doi:10.1089/tmj.2006.12.515

[78] "Telemedicine Shows Satisfaction and Safety, but Obstacles Remain," *Pharmacy Practice News*, February 28, 2014. Accessed at http://www.pharmacypracticenews.com/ViewArticle.aspx?d=Web percent2BExclusives&d_id=239&i=February+2014&i_id=1035&a_id=26048

[79] "Study: Telemedicine slashes ED errors for rural kids," *EHR Intelligence*, November 26, 2013. Accessed at http://ehrintelligence.com/2013/11/26/study-telemedicine-slashes-ed-errors-for-rural-kids/

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technologies and their application to telemedicine. They added it can be difficult to build a cohesive body of evidence when some of the lessons and conclusions derived from economic evaluations of telemedicine programs can lose validity in a relatively short period of time (e.g., due to the rapid and continuous decline in equipment prices). The authors suggested limited information on the efficacy and costs of telehealth impedes its adoption in turn creates an obstacle for the coverage and reimbursement of telehealth services by insurance providers.[80]

 "I don't think we know how it works, the risks and benefits at the moment," James Perrin, president of the American Academy of Pediatrics, says of telehealth. Richard Rosenfeld, chairman of otolaryngology at SUNY Downstate Medical Center in Brooklyn, New York, also believes telehealth has its limits. For example, Rosenfeld believes the only accurate way to diagnose strep throat is with a test. "Best practices say you can't just throw an antibiotic at somebody," Rosenfeld notes in a recent *Bloomberg/Business Week* article, adding there's only so much a doctor can tell without an examination performed in-person and telemedicine visits could result in unnecessary medication. Timothy Howard, senior medical director for telemed provider Teladoc describes a primary care telehealth is not a substitute for having a relationship with a primary care physician. Many doctors who provide telehealth services often advise patients to follow up with their doctors, Howard notes.[81]

Kenneth Krakaur, senior vice president of Sentara Healthcare, said his company has developed protocols to prevent overprescription in telehealth primary care and to highlight conditions that warrant an on-site visit. Krakaur notes some patients who sign up for a virtual visit are disappointed if a prescription doesn't materialize, but adds that happens during in-office visits as well. [82]

Researchers caution that more research is necessary to further assess the quality and safety of primary care delivered by telehealth services. There are concerns that its expanded use may lead to fragmentation of care since physicians do not have access to information (due to the lack of integration of EHRs) that can be gathered during a patient exam or diagnostic testing. Some providers fear these and other limitations can lead to misdiagnosis and higher rates of follow-up visits.[83]

Some view telehealth as more appropriate for a follow up than initial primary care visit. Patty O'Sullivan, lobbyist for the Oregon Association of Hospitals and Health Systems, opined in recent testimony to the

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[80] Marı´a E. Da´valos, Michael T. French, Anne E. Burdick, and Scott C. Simmons, "Economic Evaluation of Telemedicine: Review of the Literature and Research Guidelines for Benefit–Cost Analysis," *TELEMEDICINE and e-HEALTH,* Vol. 15 No. 10. December 2009. DOI: 10.1089=tmj.2009.0067

[81] "Telemedicine: Doctor Visits via Video Calls," *Bloomberg/Businessweek*, February 27, 2014. Accessed at http://www.businessweek.com/articles/2014-02-27/health-insurers-add-telemedicine-services-to-cut-costs

[82] "Telehealth visits bring convenience, some worries," *The Virginian-Pilot*, February 23, 2014. Accessed at http://hamptonroads.com/2014/02/telehealth-visits-bring-convenience-some-worries#

[83] "Telemedicine Service May Expand Access To Acute Medical Care," *Red Orbit*, February 3, 2014. Accessed at http://www.redorbit.com/news/health/1113062902/telemedicine-service-may-expand-access-to-acute-medical-care/?goback=.gde_1875051_member_5837209041364856834?print=true#dWKhpsmxFEgvbY4u.99

Oregon Legislature that telehealth may be appropriate for follow-up visits but not for primary care examinations without a linked-up hospital or clinic visit. [84]

A 2010 study suggests remote care of primary care patients is more appropriate for follow up care than initial visits. "Although telephone consultations are convenient and judged satisfactory by patients and doctors, they may compromise patient safety more than face-to-face consultations and further research is required to elucidate this," the authors wrote. "Telephone consultations may be more suited to follow-up and management of long-term conditions than for in-hours acute management." [85]

Some practitioners have different methods for how they assess patients remotely versus in person. Emily Cooper, a family practice doctor, notes more questions must be asked of patients than during an in-office visit to make up for not being able to see the patient. She might not be able to feel patients' swollen neck glands or see their flushed faces, but she can hear they're congested. Providers must also be able to spot red flags that signal the need for referral to an ER or urgent care center. "There are some things where someone needs to lay eyes on you," Cooper observes. Cooper adds another best practice in telehealth primary care is to advise patients to connect with their primary care doctors to keep them in the loop and maintain an ongoing doctor-patient relationship. This suggests primary care providers cannot function as a patient's medical home delivering services exclusively on a remote basis.[86]

Many practitioners see the benefit of using telehealth to treat patients in rural areas. Dr. Paul Preslar, of Midwest City, Oklahoma, notes are many cases where telehealth is appropriate in this circumstance. However, he adds, there are also situations where telehealth isn't appropriate, such as prescribing narcotics. And while things like poison ivy and minor colds are treatable using only telehealth, Preslar opines many diagnoses must be made with a face-to-face, in-person visit. [87]

Some commentators foresee a broader risk associated with the growing use of health telematics that does not involve providers laying hands on patients. They point to an increasing reliance upon technology and the "de-skilling" this may entail for medical professionals that some similarly believe airline pilots operating modern aircraft with automated controls can experience relative to hands on piloting skills. They also see heightened privacy risks through the use of electronic rather than paper-

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[84] "Hospitals, Along with Providence and Regence, Stop Bill Requiring Telemedicine Payments," *The Lund Report*, February 12, 2014. Accessed at http://www.thelundreport.org/content/hospitals-along-providence-and-regence-stop-bill-requiring-telemedicine-payments

[85] B McKinstry, V Hammersley, C Burton, H Pinnock, R Elton, J Dowell, N Sawdon, D Heaney, G Elwyn, A Sheikh, "The quality, safety and content of telephone and face-to-face consultations: a comparative study." *Qual Saf Health Care 2010;19:298-303 doi:10.1136/qshc.2008.027763*

[86] "Telehealth visits bring convenience, some worries," *The Virginian-Pilot*, February 23, 2014. Accessed at http://hamptonroads.com/2014/02/telehealth-visits-bring-convenience-some-worries#

[87] "Oklahoma state medical board adopts policy following Skype case," *The Oklahoman*, September 25, 2013. Accessed at http://newsok.com/oklahoma-state-medical-board-adopts-policy-following-skype-case/article/3886663/?page=1

based health records, threats to the quality and integrity of medical services caused by the fragmentation of care and the possible eventual loss of personal choice in how medical services are obtained.[88]

Limited evidence on mHealth effectiveness; integration with EHRs key

The brief existence and evolution of mHealth as a remote form of accessing medical care makes it difficult to measure its effectiveness. "We really found limited evidence that mHealth in and of itself has shown its effectiveness," observes Keith Toussaint, executive director of business development, Global Health Solutions, at Mayo Clinic. "We still believe there is a pony in there, but the truth is we're still looking for the definitive approaches that give us those definitively improved outcomes. If we get to the point where we're able to marry the applications with effective biometric data capture that is well integrated with clinical workflow, that could change the story but we're not there yet."[89]

Some initial efforts are underway in that regard. In March 2014, Practice Fusion announced a partnership with AliveCor, Inc., maker of a smartphone heart monitor, and Diasend, an online diabetes management system. When patients approve sharing data from these FDA-approved services, their information will start flowing into their Practice Fusion medical records, reports *Kaiser Health News*. [90]

Writing in *EHR Intelligence*, Kyle Murphy notes the challenge for the healthcare industry to resolve is the means for validating data from multiple sources, not just from providers, and ensuring that mHealth devices and applications are properly vetted. "At stake are issues of trust both in terms of the sources of data and the integrity of the information flowing into a central record," Murphy writes. Murphy adds that healthcare organizations and providers already mired in the adoption and meaningful use of EHR systems as well as improvements to data capture and clinical documentation and are not quite ready to take on the additional burden of mHealth.

Nevertheless, some practitioners are optimistic. Steven J. Davidson, senior vice president and CMIO at Maimonides Medical Center in Brooklyn, New York, notes that while mHealth is still at an experimental phase, it is inevitable. "I'd like to offer a vision as a longtime clinician who talked to lots of patients over

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[88] B. Stanberry, "Telemedicine: barriers and opportunities in the 21st century," *Journal of Internal Medicine* Volume 247, Issue 6, pages 615–628, June 2000. DOI: 10.1046/j.1365-2796.2000.00699.

[89] "When will mHealth become part of clinical workflows, EHRs? *EHR Intelligence*, April 17, 2014. Accessed at http://ehrintelligence.com/2013/04/17/when-will-mhealth-become-part-of-clinical-workflows-ehrs/

[90] "Next Step for Smart Phones: Keeping Tabs on Patients," *Kaiser Health News*, March 10, 2014. Accessed at http://www.kaiserhealthnews.org/Stories/2014/March/10/Smart-Phones-Keep-Tabs-on-Patients.aspx?utm_campaign=KHN percent253A+Daily+Health+Policy+Report&utm_source=hs_email&utm_medium=email&utm_content=12156734&_hsenc=p2A Nqtz-_4bpRPiHHTUi6WhxNQWcZSbe82YCBt- ly8CcCsj_fg65JNEfmYV71z6wbwmhAeQaiQEpNiK83qEJTbAFA3NXYOMH1xNQ&_hsmi=12156734

the years that the cloud is where patients and physicians are going to meet," Davidson predicts. "I believe they're going to get that access on these," he said as he pointed to his smartphone.[91]

Need for telehealth standards seen

One academic paper urges that to ensure telehealth services maintain current levels of patient safety, underlying clinical, technology and business processes should be standardized as part of a systems approach to healthcare transformation. It cannot be assumed that existing clinical risk management and patient safety processes within legacy healthcare platforms offer the structure, process and outcomes that are necessary to ensure telehealth programs are implemented and sustained in a safe, appropriate and effective way, it asserts.[92]

These concerns were highlighted by the authors of a study of a large California agency serving public employees who engaged in remote telehealth visits with primary providers. "Although telehealth is, in many respects, a fundamentally different model for providing health care, very few standards have been developed to guide practitioners on how to safely and effectively administer telehealth services," the authors opine. "This includes, for example, standards and protocols to prevent transmission errors that could cut off remote communications, standards on how to properly use telehealth equipment (such as imaging devices), and standards relating to the informed consent process in the telehealth setting." The authors assert it is "imperative that hospitals and health systems develop protocols and standards around their telehealth practice, and supply patients with information upfront that highlights the medical risks associated with telehealth." Moreover, they write despite the potential benefits of telehealth applications, little is known about their overall impact on care.

The study authors found providers saw patients with many diagnoses that typically require a physical exam, diagnostic testing, or both. They additionally found patients using the primary care telehealth provider Teladoc were less likely to have a follow-up visit to any setting, compared to those patients who physically visited a physician's office or emergency department. They suggest additional research to address questions about the quality of care, such as rates of antibiotic prescribing across settings, the management of conditions that require physical exams or diagnostic testing, and the use of telehealth by patients with potentially emergent conditions. "Because alternatives to the ED and physicians' offices for acute care, such as Teladoc, are growing rapidly, a clear understanding of early experiences with Teladoc can help predict the likely impact of these alternatives," the authors conclude. [93]

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[91] "When will mHealth become part of clinical workflows, EHRs?" *EHR Intelligence*, April 17, 2013. Accessed at http://ehrintelligence.com/2013/04/17/when-will-mhealth-become-part-of-clinical-workflows-ehrs/

[92] Adam Darkins, "Patient safety considerations in developing large telehealth networks." *Clinical Risk,* May 2012 vol. 18 no. 3 90-94doi: 10.1258/cr.2012.012006.

[93] Lori Uscher-Pines and Ateev Mehrotra, "Analysis Of Teladoc Use Seems To Indicate Expanded Access To Care For Patients Without Prior Connection To A Provider," *Health Affairs,* February *2014 33:2258-264;* doi: 10.1377/hlthaff.2013.0989

Another paper acknowledges the significant potential benefits of home monitoring telehealth services for patients with multiple chronic conditions including decreased rates of mortality, improved quality of life and savings for third party payers. But the current regulatory process does not provide adequate oversight and standards for these systems that transmit and process data (telehealth systems) critical for patient management, the paper's authors argue. Home telehealth vendors must address the possibility that increased utilization increases their risk of liability due to patient safety issues including effectiveness of patient management, evidence-based outcomes, regulation, cost effectiveness and reimbursement and certification to ensure reliability, the authors contend.[94]

Another study found simple telephone-based follow up with patients can safely substitute for the standard postoperative clinic visit while maintaining a high level of patient satisfaction. The study reviewed clinical experience with 115 patients who underwent elective open hernia repair and 26 patients who had laparoscopic cholecystectomy at the VA Palo Alto Hospital in California. Both groups received postoperative follow-up involving telephone calls about three weeks after surgery from a physician assistant. The physician assistant performed the assessment using a scripted template that covered the most frequent postoperative complications for each procedure. The authors found that nearly all patients expressed great satisfaction with the telephone follow-up method. It was credited with saving patients time and reducing their travel expenses, as well as with enabling physicians to free up more time for other patients. [95]

A study to test whether treatment for hepatitis C virus (HCV) infection delivered remotely via telehealth in the community is as safe and effective as co-located treatment provided at a medical center found treatment outcomes did not vary significantly between the two settings. However, it found that more patients treated at the medical center than those remotely had a serious adverse event. The study authors concluded the results show that the telehealth model is an effective way to treat HCV infection in rural and underserved communities. "Patients are likely to have greater trust in local providers, who tend to be culturally competent with respect to their specific communities," the authors concluded. "This may enhance patients' adherence to treatment and allow for greater direct contact with the clinician, including more frequent visits. As a result, local providers may be better able to comply with best-practice protocols, ensure close assessment of the results of laboratory tests, offer education tailored to the patient and provide better and more timely management of side effects." [96]

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[94] Farberow B, Hatton V, Leenknecht C, Goldberg LR, Hornung CA, Reyes B, "Caveat emptor: the need for evidence, regulation, and certification of home telehealth systems for the management of chronic conditions," *Am J Med Qual*. 2008 May-Jun;23(3):208-14.doi: 10.1177/1062860608315123.

[95] Kimberly Hwa, MMS, PA-C; Sherry M. Wren, MD, "Telehealth Follow-up in Lieu of Postoperative Clinic Visit for Ambulatory Surgery," *JAMA Surg.* 2013;148(9):823-827. doi:10.1001/jamasurg.2013.2672.

[96] Sanjeev Arora, M.D., Karla Thornton, M.D., Glen Murata, M.D., Paulina Deming, Pharm.D., Summers Kalishman, Ph.D., Denise Dion, Ph.D., Brooke Parish, M.D., Thomas Burke, B.S., Wesley Pak, M.B.A., Jeffrey Dunkelberg, M.D., Martin Kistin, M.D., John Brown, M.A., Steven Jenkusky, M.D., Miriam Komaromy, M.D., and Clifford Qualls, Ph.D. "Outcomes of Treatment for Hepatitis C Virus Infection by Primary Care Providers." *N Engl J Med* 2011; 364:2199-2207June 9, 2011. DOI: 10.1056/NEJMoa1009370

While telehealth is emerging as a crucial building block in the delivery of care, without a protocol to determine the quality of patient service, the volume of payments could increase at the expense of patient care quality, according to Kenneth McConnochie, M.D., M.P.H., director of the Health-e-Access Telemedicine Program and professor of pediatrics at the University of Rochester Medical Center.[97]

The World Medical Association (WMA) has developed Standards of Practice/Quality of Clinical Care guidelines for physicians who use telehealth to provide health care services. While the practice of telehealth challenges the conventional perception of the physician-patient relationship, there is a "duty of care" established in all telehealth encounters between the physician and the patient as in any healthcare encounter," the WMA notes. Under the duty of care:

- The physician must be satisfied that the standard of care delivered via telehealth is "reasonable" and at least equivalent to any other type of care that can be delivered to the patient/client, considering the specific context, location and timing, and relative availability of traditional care
- If the "reasonable" standard cannot be satisfied via telehealth, the physician should inform the patient and suggest an alternative type of health care delivery/service
- The physician should use existing clinical practice guidelines, whenever possible, to guide the delivery of care in the telehealth setting, recognizing that certain modifications may need to be made to accommodate specific circumstances
- The physician should give clear and explicit direction to the patient during the telehealth encounter as to who has ongoing responsibility for any required follow-up and ongoing health care
- Physician supervision regarding protocols, conferencing and medical record review is required in all settings and circumstances
- The physician should clarify ongoing responsibility for the patient with any other health care providers who are involved in the patient's care
- Legal responsibility of health professionals providing health care through means of telehealth `must be clearly defined by the appropriate jurisdiction. [98]

"Considerable debate" over remote mental health care
Telehealth primary care services that rely on video conferencing have their limitations in the view of some practitioners accostomed to examining patients with their hands, eyes and ears. That even extends to mental health care. Robert Cuyler, a practicing psychologist, notes considerable debate about remote patient consultations exists even within his field. A practitioner may not be aware of the potential for domestic violence, for instance, or lack of privacy, suicide risk and other emergencies,

[97] "Telemedicine Can Build Bridge to Expanded Health Care, Say Panelists." American Academy of Family Physicians, February 5, 2014. Accessed at http://www.aafp.org/news/practice-professional-issues/20140205rgctelemedicineforum.html

[98] WMA Statement on Guiding Principles for the Use of Telehealth for the Provision of Health Care, Adopted by the 60th WMA General Assembly, New Delhi, India, October 2009. Accessed at http://www.wma.net/en/30publications/10policies/t5/

Cuyler explained. Cuyler added that when he practices teletherapy he may inquire "a little bit differently," to make sure that he isn't mistaking what might look like a case of the sniffles from someone who is tearing up. Practitioners must be aware of so-called telling micro-expressions that reveal hidden emotions, which may be more difficult to notice over even a high-definition video transmission.

While the physician's recognition of micro-expressions has proven crucial to a patient feeling that the doctor is empathetic, the expressions won't be noticed unless the resolution and lighting are good, according to Paul Ekman, a pioneer in micro-expression research. Ekman said the face should fill up at least half of the camera view and the therapist has to be able to see, for example, the tightening or tensing of the lower eyelid, "enough to begin to cover the iris." Even with high-resolution tools, he notes, without proper training these cues can be missed. [99]

Another study notes interactive videoconferencing to provide psychiatric services to geographically remote regions has gained wide acceptance. The study compared a variety of clinical outcomes after psychiatric consultation and, where needed, brief follow-up for outpatients referred to a psychiatric clinic who were randomly assigned to be examined face to face or by telepsychiatry. It found psychiatric consultation and follow-up delivered by telepsychiatry produced clinical outcomes that were equivalent to those achieved when the service was provided face to face. Patients in the two groups expressed similar levels of satisfaction with service. [100] Telehealth primary care provider Carena surveys patients after each consult via an automated survey developed by Carena. According to Carena, 98 percent of patients report they would use Carena again and recommend it to a friend. The company states more data with a larger sample size is needed to produce statistically significant results. [101]

Impediments, potential drawbacks to adoption of telehealth services

The Healthcare Information and Management Systems Society, a nonprofit organization focused on better health through information technology (IT), sees several reasons for the slow adoption of telehealth and barriers to use including:

- Reluctance of many insurers to pay for services
- Licensure of physicians in multiple states
- Unavailability of services and technologies in many areas

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[99] "Providers: Don't overlook telemedicine drawbacks," *FierceHealthIT*, January 14, 2014. Accessed at
http://www.fiercehealthit.com/story/providers-dont-overlook-telemedicine-drawbacks/2014-01-14#ixzz2sIxJQyq6

[100] O'Reilly R, Bishop J, Maddox K, Hutchinson L, Fisman M, Takhar J. "Is telepsychiatry equivalent to face-to-face psychiatry? Results from a randomized controlled equivalence trial." *Psychiatr Serv.* 2007 Jun;58(6):836-43. doi: 10.1176/appi.ps.58.6.836.

[101] "Telemedicine a Win for Stressed-Out Doctors*," HealthLeaders Media*, January 16, 2014. Accessed at
http://www.healthleadersmedia.com/page-1/PHY-300035/Telemedicine-a-Win-for-StressedOut-Doctors

- Credentialing of service providers
- Pending regulations for patient safety
- Limited broadband access for patients in many regions
- Lack of knowledge about telehealth services and availability [102]

Data generated by telehealth raises concerns over provider workload, patient privacy

Patient telehealth monitoring has raised concerns of increased provider workload and patient privacy. "A big challenge is addressing the huge amount of data that is obtained through monitoring," says Mary Rodgers, professor and chair of the Department of Physical Therapy and Rehabilitation Science at the University of Maryland School of Medicine. "It has to be analyzed, points of concern have to be identified, and communication has to occur." Other challenges include protecting patient privacy, determining who will pay for the technology and ensuring that different wearable sensors can communicate with the variety of smartphones and computers trying to read the data.[103]

Joseph L. Hall, chief technologist at the Center for Democracy and Technology, and Deven McGraw, director of the Health Privacy Project at the Center for Democracy and Technology, assert the success of telehealth could be undermined if serious privacy and security risks are not addressed. Sensors that are located in a patient's home or that interface with the patient's body to detect safety issues or medical emergencies may inadvertently transmit sensitive information about household activities or medical data shared with third-party advertisers. Without adequate security and privacy protections for underlying telehealth data and systems, providers and patients will lack trust in the use of telehealth solutions, Hall and McGraw note. They add that although some federal and state guidelines for telehealth security and privacy have been established many gaps remain, noting no federal agency currently has authority to enact privacy and security requirements to cover the telehealth ecosystem. The authors call for a comprehensive federal regulatory framework for telehealth, developed and enforced by a single federal entity, the Federal Trade Commission, to bolster trust and fully realize the benefits of telehealth. [104]

Telecommunications infrastructure deficits

A 2013 study forecasts telehealth will evolve along three axes: care models, clinical applications, and technology. It notes, however, the need for advanced network telecommunications infrastructure that does not have an upper limit on quality of service and allows telehealth to address mobility, usability,

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[102] "What are the barriers to telehealth technology adoption?" *HIMSS*. Accessed at http://www.himss.org/library/patient-engagement/telehealth?navItemNumber=17845

[103] "Home Is Where the Health Is: Obamacare Positions 'Telehealth' Tech as a Remedy for Chronic Hospital Readmissions." *Scientific American*, April 9, 2013. Accessed at http://www.scientificamerican.com/article/affordable-care-act-technology/

[104] Joseph L. Hall and Deven McGraw, "For Telehealth To Succeed, Privacy And Security Risks Must Be Identified And Addressed." *Health Affairs,* February 2014 vol. 33 no. 2 216-221. doi: 10.1377/hlthaff.2013.0997

interoperability, intelligence, and adaptability in a systematic way.[105] This poses a problem in many areas including less urbanized areas of the United States that have experienced market failure over the so-called "last mile" of Internet telecommunications infrastructure and the lack of broad-based government initiatives to address it such as Australia's National Broadband Network (NBN). The NBN includes a pilot program to demonstrate how the NBN infrastructure enables better access to high quality healthcare services, particularly aged care, palliative care and cancer care, using telehealth services in the home.[106]

Modern Internet access is still not universal outside of U.S. city and suburban areas, and 3G or 4G mobile networks lag behind as well, observed Steve Barrow, executive director of the California State Rural Health Association, in late 2012. In addition, Barrow notes low-income populations have a hard time affording broadband access in the home. Barrow noted Internet connectivity is rapidly changing in remote rural areas, particularly for mobile services that cost less to deploy than wired premise services. "Sometimes it's still spotty," he explains. "But in most places, you can use it." Barrow added healthcare providers were looking to leverage the increased availability of mobile service to help supplement services for rural patients who may live too far away from their primary provider to access all available resources. [107]

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[105] Li J., Wilson L.S., "Telehealth trends and the challenge for infrastructure," *Telemed J E Health* 2013 Oct;19(10):772-9. doi:10.1089/tmj.2012.0324

[106] Australian Government Department of Health. Accessed at
http://www.health.gov.au/internet/main/publishing.nsf/Content/ehealth-nbntelehealth-pilots

[107] "Rural California turns to mobile health IT for patient support," *EHR Intelligence*, November 20, 2012. Accessed at
http://ehrintelligence.com/2012/11/20/rural-california-turns-to-mobile-health-it-for-patient-support/