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Jessica L. Bailey-Wheaton, Esq., Editor
Todd A. Zigrang MBA, MHA, CVA, ASA, FACHE, Publisher

Valuation of Telemedicine: Technology

Introduction

The final installment in this five-part *Health Capital Topics* series on the valuation of telemedicine will focus on the technology available to telemedicine providers, how that technology has evolved, and its anticipated development going forward.[1] The first installment in this series introduced telemedicine and its increasing importance to, and popularity among, providers and patients, as well as the current and future challenges related to telemedicine.[2] The second installment took a deeper dive into the reimbursement environment in which telemedicine providers operate, including before and during the COVID-19 pandemic;[3] the third installment examined telemedicine's regulatory environment, with a specific focus on fraud and abuse laws;[4] and, the fourth installment discussed supply and demand related to telemedicine, as well as how telemedicine may change healthcare competition generally.[5]

History and Development

Telemedicine in the modern sense began nearly 60 years ago, but remained out of reach for the general public until much more recently. The *U.S. National Aeronautics and Space Administration* (NASA) began using telemedicine out of necessity as a way to treat and conduct symptom management for its astronauts in space.[6] In the decades since this initial innovation, the uptake of telemedicine has been slow among the general population. Technological, financial, legal, and human resource barriers have all contributed to this slow adoption by providers and demand by patients.[7] Some of these barriers, including the lack of proper reimbursement; high upfront investment costs; geographic and provider limitations set by the *Centers for Medicare and Medicaid Services* (CMS); and other medical information protection and security issues have been addressed in previous *Health Capital Topics* articles.[8] Consequently, this article will focus on both the technological barriers and advancements that slowed telemedicine's adoption rates by patients and providers in the past but have now thrust telemedicine into the foreground of the U.S. healthcare delivery system.

Over the past 15 years, targeted legislation, healthcare reform, and government funds have intersected with widening broadband availability; increased investment in developing new telemedicine technology, including the evolution of *Mobile Health* (mHealth); and, the ability for various technologies to become sufficiently secure so as to satisfy *Health Insurance Portability and Accountability Act of 1996* (HIPAA) requirements.[9] National legislation advancements include, for example, the *Health Information Technology for Economic and Clinical Health* (HITECH) *Act of 2009*, which was included as a part of the broader *American Recovery and Reinvestment Act of 2009* (ARRA). Through these acts, $32 billion was allocated to subsidies for modern *health information technology* (HIT) systems, health research, and facility construction[10] As discussed in previous *Health Capital Topics* articles, various recent measures passed by CMS during the COVID-19 *public health emergency* (PHE) allowed providers greater flexibility in, and incentives for, offering telemedicine services.[11]

Many aspects of telemedicine are dependent on robust technological networks, and broadband in particular. When the *Federal Communications Commission* (FCC) released their National Broadband Plan in 2010, which included the goal of providing every American with "*access to broadband capability*," approximately one-third of the country – 100 million Americans – *did not* have broadband at home, despite unprecedented growth over the previous decade from 8 million to 200 million Americans with broadband access.[12] The plan focused on several areas of broadband improvements related to healthcare: *electronic health records* (EHRs), video consultation, and remote patient monitoring.[13] First, hosted EHRs, where one computer acts as a server for the patient record system database, require internal IT expertise and broadband availability, but cost less and provide tools to patients more quickly than traditional solutions.[14] Cloud-based EHR systems similarly require a strong and consistent internet connection for access to files.[15] Second, video consultations, with store-and-forward technology (discussed below), could lead to cost savings and increased access to care, especially to specialists.[16] Finally, remote patient monitoring for symptoms can aid in early detection and, consequently, better health outcomes.[17] According to the *American Telemedicine Association* (ATA), mobile applications generally fall into "*acute care telemedicine*," where clinicians diagnose and treat ill patients and "*chronic disease management telemedicine*," where a chronically sick patient is regularly monitored and managed for symptoms.[18]

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In order to further the nation's technological networks, a number of recent legislative acts have allocated funds to the cause. In 2019, the FCC established a $20.4 billion Rural Digital Opportunity Fund to provide greater broadband access to currently underserved areas.[19] The FCC set aside $61.8 million of that total to expand rural broadband as a part of Phase II of the Connecting America national plan, which will allocate nearly $1.5 billion in total to expanding broadband access to over 700,000 homes and small businesses over the next decade.[20] The 2020 *Coronavirus Aid, Relief, and Economic Security* (CARES) Act similarly allocated $500 million to increase broadband access for rural communities to help support telemedicine, distance learning, and social distncing.[21]

Technologies such as mHealth, mobile sensors and monitors (e.g., heart rhythms, vital sign indicators, and motion and fall detectors for older adults living independently), telemedicine kits, biosensor recliners, and remote medicine robots, all represent great potential in expanding remote patient care.[22] Similarly to the FCC, the ATA, in a 2006 report, identified 5 types of services that can be delivered through telehealth:

(1) Specialist referral services involving a specialist visit using video technology;

(2) Direct patient care using audio or video technology for diagnosis, treatment, prescriptions, advice, or patient monitoring;

(3) Remote patient monitoring using devices that collect medical data;

(4) Medical education and mentoring for health professionals and seminars; and,

(5) Consumer medical and health information, or using the internet to find health information, discussion groups, and peer support for specialized issues.[23]

However, utilization of the many technologies available to healthcare providers have not been adopted equally. In a 2013 survey:

(1) Video conferencing, wireless technologies, and data monitoring were used by approximately 50% of healthcare organizations;

(2) Internet-based technologies, smartphone apps, interactive voice response technology, and fax were used by at least 33% of organizations;

(3) Audio conferencing, mobile broadband, and fixed-line broadband were used by 25% or more of organizations; and,

(4) Mobile diagnostics and narrowband technologies were used by less than 20% of healthcare organizations surveyed.[24]

A more recent study from early 2020 similarly found that telemedicine applications and utilization are increasing. Communication through EHR almost doubled from 2018 to early 2020 (38% to 63%).[25] Remote monitoring (6% to 13%), video visits (14% to 19%), and physician-to-physician virtual consultations (17% to 22%) all increased from 2018.[26]

Current Applications of Telemedicine

Telemedicine technology grew rapidly over the past decade as well as during the COVID-19 PHE. As of mid-2020, patient portals for scheduling appointments, communicating with clinical staff, refilling prescriptions, and reviewing test results; virtual appointments through teleconferencing or phone calls; remote monitoring through mobile applications and monitoring devices; virtual consultations between doctors, especially between specialists and primary care physicians; personal EHRs for emergency vital information; and personal health applications for tracking caloric intake, physical activity, and other measures were all included as telemedicine services.[27] As noted above, the four main types of telemedicine currently utilized by healthcare providers include:

(1) *Store-and-Forward* or "*asynchronous*" telemedicine, where information such as medical histories, reports, or other data are sent to a specialist for diagnosis and treatment;

(2) *Remote patient monitoring*, where a patient's clinical status is evaluated continuously through video monitoring, images, or remotely reviewing tests; and,

(3) *Real-time* or "*synchronous*" telemedicine, which consists of a live conversation between the patient and provider.

(4) *Mobile health* or *mHealth*, which involves health information being provided through mobile devices through educational information, targeted text messages, and notifications about disease outbreaks.[28]

Availability and affordability has allowed telemedicine technology to grow considerably in recent years. However, internet issues are still a problem for approximately one in five adults living in rural areas and have led to lower adoption and utilization rates for telemedicine.[29] While the main advantages of telemedicine include quality, accessibility, and efficiency, some remaining concerns include potential gaps in care and continued limitations in broadband internet access and the cost of mobile devices, which may disproportionately affect rural patients who may also be some of the most at-need patients.[30]

Software and Hardware Requirements

Modern telemedicine setups include equipment and program requirements. First, a computer, tablet, or smartphone with an appropriate operating system is required.[31] Second, a camera or microphone is also necessary; this technology may be built into the computer or mobile device or may be external.[32] Software for live video conferences, store-and-forward technology, and patient data collection and monitoring which software (which may be located physically on the desktop or mobile device or in the "*cloud*") may all be needed.[33]

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Because of this significant software requirement, especially for uploads, downloads, and live video streaming, an internet connection with sufficient speeds is also integral.[34] Other technology that aids in telemedicine includes mobile medical devices. Currently, these options include mobile *electrocardiogram* (ECG) devices, vital signs monitors, and scopes such as stethoscopes which can capture both visual and audio information.[35] For all of these technologies that deal with sensitive patient information, data security and HIPAA compliance are of the utmost concern.

Telemedicine Technology during the COVID-19 PHE and Future Prospects

Besides greater utilization of telemedicine visits,[36] the COVID-19 PHE has brought about several changes in the development of telemedicine technology. Recent developments include an *emergency medical service* (EMS) remote monitoring and defibrillator device; wearable biomedical electronics that can be drawn onto the skin using special inked pens to monitor vitals and other measurements; an ultrasound device that connects to a smartphone; and, a wireless, smart hospital bed with numerous monitoring features.[37]

Today, in order to provide telemedicine services, a healthcare organization must have a secure broadband connection with sufficient internet speed to handle intensive technologies, a video connection and platform, technical support staff, the ability to record virtual visits and interactions, and mobile telemedicine units or similar technology that can be used during a telemedicine visit to diagnose and treat ailments.[38] Broadband connections, a lack of staff training and licensure, and the cost of purchasing, setting up, troubleshooting, and maintaining this technology may all be deterrents.[39] More research is needed to develop effective best practices, and there are still some exams and procedures that must be conducted in person.[40] Whether that remains the case as technology continues to develop remains to be seen. If past patterns continue, however, it can be expected that telemedicine technology will only become more prevalent in our everyday care outside of the physician's office and that this technology will become more capable and accessible. Until then, it is vital that nationwide technological infrastructure rise to meet the demands of this new technology so that all patients (especially those in rural, underserved areas) can have wider access to remote care and so that new gaps and barriers in access to care do not emerge as a result of healthcare becoming increasingly reliant upon internet, mobile devices, and other technology.

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1 For the purposes of this series, the terms "telemedicine" and "telehealth" will be considered to be synonymous, with the former used exclusively for the sake of consistency.
2 See the September 2020 *Health Capital Topics* article entitled, "Valuation of Telemedicine: Introduction" Vol. 13, Issue 9 (September 2020), https://www.healthcapital.com/hcc/newsletter/09_20/HTML/TELEMEDICINE/convert_introduction_to_telemedicine_9.22.20a.php (Accessed 10/12/20).
3 See the October 2020 *Health Capital Topics* article entitled, "Valuation of Telemedicine: Reimbursement" Vol. 13, Issue 10 (October 2020), https://www.healthcapital.com/hcc/newsletter/10_20/HTML/TELE/convert_telemedicine_reimbursement_10.26.20.php (Accessed 11/2/20).
4 See the November 2020 *Health Capital Topics* article entitled, "Valuation of Telemedicine: Regulatory" Vol. 13, Issue 11 (November 2020), https://www.healthcapital.com/hcc/newsletter/11_20/HTML/TELE/convert_telemedicine_regulatory_11.21.20.php (Accessed 11/30/20).
5 See the December 2020 *Health Capital Topics* article entitled, "Valuation of Telemedicine: Competition" Vol. 13, Issue 12 (December 2020), https://www.healthcapital.com/hcc/newsletter/12_20/HTML/TELE/convert_telemedicine_competition_12.17.20b.php (Accessed 12/28/20).
6 "Crossing the Telemedicine Chasm: Have the U.S. Barriers to Widespread Adoption of Telemedicine Been Significantly Reduced?" By Cynthia LeRouge and Monice J. Garfield, International Journal of Environmental Research and Public Health, Vol. 10, No. 12, p. 6473.
7 *Ibid*, p. 6473-6474.
8 *Ibid*, p. 6473; see the September 2020 Health Capital Topics article entitled, "Valuation of Telemedicine: Introduction" Vol. 13, Issue 9; see the October 2020 Health Capital Topics article entitled, "Valuation of Telemedicine: Reimbursement" Vol. 13, Issue 10; see the November 2020 Health Capital Topics article entitled, "Valuation of Telemedicine: Regulatory" Vol. 13, Issue 11.
9 LeRouge and Garfield, p. 6473-6476.
10 *Ibid*, p. 6474.
11 See the September 2020 Health Capital Topics article entitled, "Valuation of Telemedicine: Introduction" Vol. 13, Issue 9.
12 "Connecting America: The National Broadband Plan" Federal Communications Commission, https://transition.fcc.gov/national-broadband-plan/national-broadband-plan.pdf (Accessed 12/16/20) p. xi.
13 *Ibid*, p. 201.
14 *Ibid*; "Hosted Vs. Cloud-based EMR Systems: What's the Difference?" PracticePerfect, March 15, 2019, https://practiceperfectemr.com/blog/hosted-vs-cloud-based-emr-systems-whats-the-difference/ (Accessed 12/28/20).
15 PracticePerfect, March 15, 2019.
16 Federal Communications Commission, p. 201.
17 *Ibid*.
18 "Innovation in telemedicine technology: An entrepreneur's perspective" By Yulun Wang, Healthcare IT News, May 6, 2013, https://www.healthcareitnews.com/news/innovation-telemedicine-technology-entrepreneurs-perspective (Accessed 12/16/20).
19 "FCC Authorizes Over $61.8 Million In Funding For Rural Broadband" Federal Communications Commission, October 10, 2019, https://docs.fcc.gov/public/attachments/DOC-360165A1.pdf (Accessed 12/28/20).
20 *Ibid*.
21 "Keeping Rural Communities Connected while Socially Distanced" American Farm Bureau Federation, August 10, 2020, https://www.fb.org/market-intel/keeping-rural-communities-connected-while-socially-distanced (Accessed 12/28/20).
22 Federal Communications Commission, p. 201-202; LeRouge and Garfield, Vol. 10, No. 12, p. 6476.
23 "Telemedicine, Telehealth, and Health Information Technology" The American Telemedicine Association, May 2006, https://www.who.int/goe/policies/countries/usa_support_tele.pdf?ua=1 (Accessed 12/16/20), p. 3.
24 "12 Technologies Used in Telehealth Programs" Becker's Health IT, August 15, 2013, https://www.beckershospitalreview.com/healthcare-information-

(Continued on next page)

technology/12-technologies-used-in-telehealth-programs.html (Accessed 12/16/20).

25 "How the virtual health landscape is shifting in a rapidly changing world" By Ken Abrams, Urvi Shah, Casey Korba, and Natasha Elsner, Deloitte Insights, July 9, 2020, https://www2.deloitte.com/us/en/insights/industry/health-care/physician-survey.html (Accessed: 12/28/20).

26 *Ibid*.

27 "Telehealth: Technology meets health care" Mayo Clinic, May 15, 2020, https://www.mayoclinic.org/healthy-lifestyle/consumer-health/in-depth/telehealth/art-20044878 (Accessed 12/16/20).

28 "Telehealth Systems" By Oren Mechanic, Yudy Persaud, and Alexa Kimball, StatPearls, July 26, 2020, https://www.ncbi.nlm.nih.gov/books/NBK459384/ (Accessed 9/11/20); "Telemedicine and Telehealth" HealthIT.gov, September 24, 2020, https://www.healthit.gov/topic/health-it-health-care-settings/telemedicine-and-telehealth (Accessed 12/16/20).

29 "HHS Issues New Report Highlighting Dramatic Trends in Medicare Beneficiary Telehealth Utilization amid COVID-19" Department of Health and Human Services, July 28, 2020, https://www.hhs.gov/about/news/2020/07/28/hhs-issues-new-report-highlighting-dramatic-trends-in-medicare-beneficiary-telehealth-utilization-amid-covid-19.html (Accessed 8/6/20); "Life in Rural America: Part II" National Public Radio, May 2019, https://media.npr.org/documents/2019/may/NPR-RWJF-HARVARD_Rural_Poll_Part_2.pdf (Accessed 9/15/20), p. 10.

30 Mayo Clinic, May 15, 2020.

31 "What are the basic technical requirements for telehealth?" By Teresa Iafolla, eVisit, May 12, 2016, https://blog.evisit.com/virtual-care-blog/what-are-the-basic-technical-requirements-for-telehealth (Accessed 12/28/20).

32 *Ibid*.

33 "Telemedicine Devices, Equipment, Technologies & Products" eVisit, https://evisit.com/resources/telemedicine-telehealth-equipment/ (Accessed: 12/28/20).

34 "Technology Requirements in Telemedicine" American Academy of Allergy, Asthma & Immunology, https://www.aaaai.org/practice-resources/running-your-practice/practice-management-resources/Telemedicine/technology (Accessed 12/16/20); Iafolla, May 12, 2016.

35 "Telemedicine Devices, Equipment, Technologies & Products" eVisit, (Accessed: 12/28/20).

36 "Trump Administration Proposes to Expand Telehealth Benefits Permanently for Medicare Beneficiaries Beyond the COVID-19 Public Health Emergency and Advances Access to Care in Rural Areas" Centers for Medicare & Medicaid Services, August 3, 2020, https://www.cms.gov/newsroom/press-releases/trump-administration-proposes-expand-telehealth-benefits-permanently-medicare-beneficiaries-beyond (Accessed 9/11/20); Department of Health and Human Services, July 28, 2020.

37 "Philips Wins FDA Clearance and Launches EMS Remote Monitoring and Defibrillation Solution in U.S." By Michael Batista, Medgadget, July 30, 2020, https://www.medgadget.com/2020/07/philips-wins-fda-clearance-and-launches-ems-remote-monitoring-and-defibrillator-solution-in-u-s.html (Accessed 12/16/20); "Drawing Biomedical Electronics Directly Onto Skin" Medgadget, July 30, 2020, https://www.medgadget.com/2020/07/drawing-biomedical-electronics-directly-onto-skin.html (Accessed 12/16/20); "PulseNmore At-Home Tele-Ultrasound for Pregnant Women" Medgadget, August 10, 2020, https://www.medgadget.com/2020/08/pulsenmore-at-home-tele-ultrasound-for-pregnant-women.html (Accessed 12/16/20); "Stryker Unveils Wireless Hospital Bed with Smart Monitoring Features" Medgadget, October 22, 2020, https://www.medgadget.com/2020/10/stryker-unveils-wireless-hospital-bed-with-smart-monitoring-features.html (Accessed 12/16/20).

38 American Academy of Allergy, Asthma & Immunology, (Accessed 12/16/20).

39 "Telemedicine during COVID-19: Benefits, limitations, burdens, adaptation" By Bill Siwicki, Healthcare IT News, March 19, 2020, https://www.healthcareitnews.com/news/telemedicine-during-covid-19-benefits-limitations-burdens-adaptation (Accessed 12/16/20); "What Are the Limits of Telehealth?" By Lisa Esposito, U.S. News, May 13, 2020, https://health.usnews.com/conditions/articles/what-are-the-limits-of-telehealth (Accessed 12/16/20); American Academy of Allergy, Asthma & Immunology, (Accessed 12/16/20).

40 Esposito, May 13, 2020.

(Continued on next page)

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Todd A. Zigrang, MBA, MHA, CVA, ASA, FACHE, is the President of **HEALTH CAPITAL CONSULTANTS** (HCC), where he focuses on the areas of valuation and financial analysis for hospitals, physician practices, and other healthcare enterprises. Mr. Zigrang has over 25 years of experience providing valuation, financial, transaction and strategic advisory services nationwide in over 2,000 transactions and joint ventures. Mr. Zigrang is also considered an expert in the field of healthcare compensation for physicians, executives and other professionals.

Mr. Zigrang is the co-author of "*The Adviser's Guide to Healthcare – 2nd Edition*" [2015 – AICPA], numerous chapters in legal treatises and anthologies, and peer-reviewed and industry articles such as: *The Accountant's Business Manual* (AICPA); *Valuing Professional Practices and Licenses* (Aspen Publishers); *Valuation Strategies; Business Appraisal Practice*; and, *NACVA QuickRead*. In addition to his contributions as an author, Mr. Zigrang has served as faculty before professional and trade associations such as the American Society of Appraisers (ASA); American Health Lawyers Associate (AHLA); the American Bar Association (ABA); the National Association of Certified Valuators and Analysts (NACVA); Physician Hospitals of America (PHA); the Institute of Business Appraisers (IBA); the Healthcare Financial Management Association (HFMA); and, the CPA Leadership Institute.

Mr. Zigrang holds a Master of Science in Health Administration (MHA) and a Master of Business Administration (MBA) from the University of Missouri at Columbia. He is a Fellow of the American College of Healthcare Executives (FACHE) and holds the Accredited Senior Appraiser (ASA) designation from the American Society of Appraisers, where he has served as President of the St. Louis Chapter, and is current Chair of the ASA Healthcare Special Interest Group (HSIG).

Jessica L. Bailey-Wheaton, Esq., is Senior Vice President and General Counsel of HCC, where she conducts project management and consulting services related to the impact of both federal and state regulations on healthcare exempt organization transactions, and provides research services necessary to support certified opinions of value related to the Fair Market Value and Commercial Reasonableness of transactions related to healthcare enterprises, assets, and services.

She serves on the editorial boards of NACVA's The Value Examiner and of the American Health Lawyers Association's (AHLA's) Journal of Health & Life Sciences Law. Additionally, she is the current Chair of the American Bar Association's (ABA) Young Lawyers Division (YLD) Health Law Committee and the YLD Liaison for the ABA Health Law Section's Membership Committee. She has previously presented before the ABA, NACVA, and the National Society of Certified Healthcare Business Consultants (NSCHBC).

Ms. Bailey-Wheaton is a member of the Missouri and Illinois Bars and holds a J.D., with a concentration in Health Law, from Saint Louis University School of Law, where she served as Fall Managing Editor for the Journal of Health Law & Policy.

Daniel J. Chen, MSF, CVA, focuses on developing Fair Market Value and Commercial Reasonableness opinions related to healthcare enterprises, assets, and services. In addition he prepares, reviews and analyzes forecasted and pro forma financial statements to determine the most probable future net economic benefit related to healthcare enterprises, assets, and services and applies utilization demand and reimbursement trends to project professional medical revenue streams and ancillary services and technical component (ASTC) revenue streams. Mr. Chen holds the Certified Valuation Analyst (CVA) designation from NACVA.