

1-15-2023

Telehealth in Medicine: Predictions 2023–2024

Jiang Li

Ingrid Vasiliu-Feltes

Kathleen McGrow

Brendan F. Smith

Paul Barach

See next page for additional authors

Follow this and additional works at: <https://jdc.jefferson.edu/healthpolicyfaculty>



Part of the [Health Services Research Commons](#), and the [Telemedicine Commons](#)

[Let us know how access to this document benefits you](#)






This Article is brought to you for free and open access by the Jefferson Digital Commons. The Jefferson Digital Commons is a service of Thomas Jefferson University's [Center for Teaching and Learning \(CTL\)](#). The Commons is a showcase for Jefferson books and journals, peer-reviewed scholarly publications, unique historical collections from the University archives, and teaching tools. The Jefferson Digital Commons allows researchers and interested readers anywhere in the world to learn about and keep up to date with Jefferson scholarship. This article has been accepted for inclusion in College of Population Health Faculty Papers by an authorized administrator of the Jefferson Digital Commons. For more information, please contact: JeffersonDigitalCommons@jefferson.edu.

Authors

Jiang Li, Ingrid Vasiliu-Feltes, Kathleen McGrow, Brendan F. Smith, Paul Barach, Sweta Sneha, and Francis X. Campion

OPINION/PERSPECTIVE/POINT OF VIEW

Telehealth in Medicine: Predictions 2023–2024

Jiang Li, PhD¹ , Ingrid Vasiliu-Feltes, MD, MBA² , Kathleen McGrow DNP, MS, RN, PMP³ , Brendan F. Smith⁴, Paul Barach, MD, MPH⁵ , Sweta Sneha, PhD⁶ and Francis X. Campion, MD, FACP⁷ 

¹Vivalink, Inc., Campbell, California, USA; ²Softthread, Baltimore, Maryland, USA; ³Microsoft Health & Life Sciences, Baltimore, Maryland, USA; ⁴The MITRE Corporation, McLean, Virginia, USA; ⁵Thomas Jefferson University School of Medicine, Philadelphia, Pennsylvania, USA; ⁶Coles College of Business, Kennesaw University, Kennesaw, Georgia, USA; ⁷MITRE Corporation, McLean, Virginia, USA; Harvard Vanguard Medical Associates, Atrius Health, Eastern Massachusetts, USA

Corresponding Author: Paul Barach, Email: pbarach@gmail.com

Keywords: artificial intelligence, digital platforms, electronic medical records, healthcare, prediction, telehealth, telemedicine

Abstract

Each year, *Telehealth and Medicine Today* asks experts in the field to share their insights into the future and predict how telehealth will influence uptake and healthcare in the new year.

Received: November 1, 2022; Accepted: November 12, 2022; Published: January 15, 2023

There are three goals for telehealth: raise access to healthcare for our most vulnerable patients, achieve reimbursement parity that will encourage greater use of telemedicine, and effectively apply telemedicine to healthcare.¹ However, studies, which should have formed the backbone of telehealth adoption, were characterized by poorly designed, with wide heterogeneity and inadequate controls. Outcomes were muddled, and this fueled opposition to widespread adoption of telemedicine. Happily, the University of Rochester in a recent and first large well conducted study² demonstrated that the most vulnerable patients had the highest uptake of telemedicine. They not only complete a disproportionate share of telemedicine visits but also did so with lower no-show and cancellation rates. Telemedicine, if done well, can be a critical tool for closing care gaps for the most vulnerable patient populations without lowering quality of care delivered or increasing short-term or long-term costs.

The past 2 years have propelled us into a new realm of care and telehealth services.³ Following are several digital health trends we predict for 2023–2024. The telehealth industry will continue to drive innovation that helps bring telehealth more permanently and creatively into the care continuum with the goal of achieving the quadruple aim.³

Jiang Li, PhD

Telehealth is not new, but the concept is far from reaching even a percentage of its potential. Particularly in a post-pandemic scenario where the idea of telemedicine is more accepted as a standard component of healthcare, it is critical to examine the path to making it a foundational element of the care cycle instead of a luxury. But prophesizing that it is going to expand and become more critical is merely a vague prediction without a defined process.

At this point, telemedicine is most used in private practices with less bureaucracy to slow adoption. According to the American Medical Association,⁴ physician use of telehealth/virtual visits increased from 14 to 80% between 2016 and 2022,⁵ which leaves room for greater use in 2023 and beyond. For telehealth to become mainstream in the cycle of care and attain widespread tangible impact, it must gain pervasive adoption in corporate healthcare systems. The Brookings Institution-cited government incentives and investment in national infrastructure as well as flexibilities in current healthcare systems to accommodate new technologies are key factors for increased adoption and access.⁶

Use of video conferencing for consultations will continue to grow in acceptance beyond Gen Z and millennial demographics, but there must be more innovation in the coming year. While they can be connected, telehealth

should be considered separately from remote patient monitoring (RPM), which can facilitate next-level patient care. The push from Centers for Medicare & Medicaid Services on Acute Hospital at Home is a clear indication of such potential.⁷ Savvy telehealth technology companies already are exploring and incorporating RPM, which can offer additional insights into care management. Medical-grade, multi-vital RPM sensors will become more mainstream enabling providers to continuously collect a broad spectrum of patient statistics related to both acute and chronic conditions. Cloud-based data security and management technology must evolve in tandem to meet the necessary requirements for data integrity.

The next phase of innovation to deliver better patient care requires advanced AI (artificial intelligence) algorithms. It is not enough to collect and store vitals, and these algorithms must result in useful information. As digital platforms process enormous quantities of data, it must be distilled into formats that are useful for data scientists, researchers, and clinicians. Leveraging AI technology will improve diagnostic as well as predictive capabilities for both general practitioners and specialists. Patients are ready. Providers are more ready. Technology companies are ready. That is why the next couple of years will see a major upswing in RPM as a critical component of telehealth.

Ingrid Vasiliu-Feltes, MD, MBA

Upon examining all Web 3.0 benefits and the remaining barriers preventing a larger-scale adoption of telehealth globally, it becomes evident that Web 3.0 could and should become a powerful enabler for telehealth. Web 3.0 is the next-generation World Wide Web characterized as ubiquitous and permission-less, and offering enhanced peer-to-peer networking and increased connectivity. It is powered by blockchain technology; edge computing; spatial, AI; augmented by a complex portfolio of spatial AR, VR, and MR (augmented, virtual, and mixed reality), and physical (IoT [internet of things], wearables, and cognitive (ML [machine learning]) AI) tools.

The digital divide causing poor access to the internet has been listed as one of the major barriers over the past decade⁸; therefore, a transition to Web 3.0 could constitute a tipping point and enable higher adoption rates globally due to the increased connectivity afforded by decentralized access.

A second major reason has been a widespread lack of digital trust and concerns for data privacy. The optimized privacy and security offered by a decentralized blockchain architecture could also significantly restore trust and allow a higher adoption of telehealth services. Furthermore, Web 3.0 will be a conduit for enhanced access to data, novel tools for data ownership, as well as a pathway to data monetization.

Web 3.0 will allow not only increased access but also optimized ability to leverage strategic insights to its semantic analysis capabilities. Forward-thinking companies in the healthcare and life sciences ecosystem will likely recognize this data monetization potential and perhaps include telehealth as part of their current services.

This could lead to an improved impact on research and development, value-based care transformation, and amplified equitable health efforts. Future iterations (e.g. web 4.0- and web 5.0-powered healthcare ecosystems) are certainly poised to include telehealth as a standard of care and perhaps trigger mass adoption.

Kathleen McGrow, DNP, MS, RN, PMP

Coronavirus disease 2019 (COVID-19) revealed how vulnerable our healthcare industry is to change and the need for structural and technological transformation. Crisis is a catalyst for innovation, and telehealth was poised to be leveraged during the pandemic. Use of telehealth during the pandemic set the expectation for patients as consumers of healthcare for an on-demand, seamless, and comprehensive telehealth solutions and experiences. It is because of this momentum that I predict in 2023–2024, we will see increased uptake and usage of telehealth. Regulatory agencies will need to be proactive and minimize current constraints on licensing, billing, and state boundaries.

In the next few years, telehealth will be comprehensive and include usage for patients inside and outside the hospital. Telehealth inside the hospital will include virtual clinicians to monitor and complete clinical tasks for patients. This will benefit clinicians who are physically caring for patients by taking on some of the tasks that do not require hands-on patient care. Telehealth will benefit these providers and alleviate some of their burden in caring for patients. Telehealth outside the hospital will include patient visits, ambulatory telehealth programs for disease management, as well as hospital in the home.

In 2023–2024, telehealth will incorporate data from consumer devices into the patient medical record, so there will be a true 360 view of the patient. Telehealth will be key to addressing the quintuple aim⁹ and will be leveraged to improve patient outcomes, improve the care experience, reduce costs, improve clinician experience, and promote health equity. We will see healthcare boundaries dissolve, and new roles will emerge as we leverage telehealth in the future.

Brendan F. Smith

The face-to-face physical exam encounter follows a fairly consistent process: first, a nurse checks vitals: weight and height, blood pressure, pulse, respirations, and temperature. Then, the patient informs of any concerns and complaints and reviews current medicines. Next is the exam: a check of general appearance, followed by a check of heart

and lungs using a stethoscope. Based on age, gender, and medical condition, a few other examinations occur. My exams typically conclude with the following three steps: Lie on the exam table for an electrocardiogram, then a blood draw, and conclude with a urine sample. Barring any significant discovery, I am sent home to await results. In about 1 week, I get a phone call from my doctor to review test results and determine next steps.

My prediction is virtual health, and RPM devices will revolutionize the yearly physical. Imagine a box arrives at your door, containing several RPM devices and a mobile tablet, with software tailored for the patient by the healthcare team. The tablet provides setup instructions, when to use each device, and regular exercises to perform during the monitoring period. The tablet also includes dietary and health information. There is also a log for the patient to express how they are doing and feeling. A script for lab work is included in the kit. At the completion of the monitoring period, the healthcare team completes a thorough review of all the RPM data and lab work. Finally, the patient and healthcare team participate in virtual video visit where the healthcare team assesses the patients' health history, along with labs and RPM results. (The author recognizes that not all elements of the physical exam can be performed remotely—today.) Then, the healthcare team and patient—together—agree on next steps and determine if an in-patient visit is needed.

Paul Barach, MD, MPH

FDA will clear more at-home testing products and platforms. We have all adjusted to social distancing since the start of the pandemic, which in healthcare has translated to more telehealth consultations. HHS (U.S. Department of Health and Human Services) has expanded telehealth access for Medicare beneficiaries. During this same time period, we have seen the biggest volume of rapid home tests available on the market. These days, most people are comfortable accepting an increased use of home-based tests for monitoring and informing health. FDA is paying attention, and at the midpoint of 2022, the FDA granted 129 break-through designations, suggesting it will break the previous full-year record of 206.¹⁰

We need telehealth that mitigates against the increased cognitive load on clinicians. The healthcare environment—with its packed workdays, demanding pace, time pressures, and clunky EMR (electronic medical records) that do not improve quality¹¹ and emotional intensity—is placing physicians and other clinicians at high risk for burnout—a long-term stress reaction marked by emotional exhaustion, depersonalization, and a lack of sense of personal accomplishment. In recent years, the rising prevalence of burnout among clinicians (greater than 50% in some studies) is finally leading to questions on how to better design using human factors tools the

information platforms such as EMR, and telehealth tools that affect access to care, patient safety, and care quality. Burned-out doctors are leaving practice, and this reduces patients' access to and continuity of care. Burnout threatens patient safety and quality of care when depersonalization leads to poor interactions with patients and when burned-out physicians suffer from impaired attention, memory, and executive function. Many present telehealth and RPM tools intrude into physicians' and nurses' evenings and weekends, which takes away from their relationships with others and contributes to burnout. New designs must be addressed in order to reduce what is often referred to as “pajama time.”¹² Telehealth designers must consider these negative impacts and balance them in their new design iterations.

Population health must have a greater focus on preventative medicine. Two or three generations ago, watching your health meant reactively treating sickness. This idea of “get sick, then get care” means a healthcare system has to treat things when they have already gone wrong, creating a mountain of massive healthcare costs and poor patient outcomes.

Now, people are engaging in proactive ways to stay healthy before something becomes a problem. They are using fitness wearables and daily wellness tools to keep to routines, preventing chronic issues such as asthma,¹³ diabetes, circulation issues, dehydration, and depression. More employers offer wellness products like access to athletic classes, meditation apps, and more, with emphasis on maintaining wellness to prevent chronic disease. In addition, wearables and digital health platforms also provide biomarkers that indicate wellness and illness to allow users visibility into their personal health trends and illuminate preventative risk factors early. And because information is stored digitally, it remains simple to share with providers and doctors for a more comprehensive health analysis including effective RPM.

There will be a Federal requirement to incorporate human-centered design and human factors in all telehealth innovations. Accordingly, human factors and usability assessments will be addressed first when designing and fitting telehealth systems to clinicians and patients' needs. The FDA requires a human factors assessment for devices, and this will be required for software. These will be positive developments.¹⁴ These robust methods are key in designing the effective interface requirements of devices/apps according to how clinicians and patients think, and how they will interact to manage patients' needs and expectations more effectively than forcing providers to adapt their behavior to the technology.

Telehealth has the potential to solve many problems faced by the healthcare industry. The ability to put an experienced medical professional “inside” the home leads to better care and societal health, overall. It will take work,

but there is no doubt that this work is worth doing. The virtual care continuum is vital for telemedicine to succeed in delivering on the quadruple aim.¹⁵ Health system leaders cannot rely on piecemeal layers tied together with virtual duct tape. It ruins the care continuum and makes for an interrupted workflow. Whether you see a patient in the ICU or at home, it should be within the same workflow to simplify the process and make it scalable. We need meaningful and seamless enterprise integration. Doctors and nurses do not need more technology—they are care providers, not technologists. Every time you add another layer, platform, workflow, or technology, they must learn how to use it. Ultimately, the seamless integration of technologies and workflows will be the most important telehealth innovations over the next decade.

Sweta Snehay, PhD

Five issues will be addressed by telehealth in the next few years. First, there was explosive growth in telehealth during COVID-19. Post-COVID-19, the stats are leveling, yet, telehealth visits are approximately 20% higher now. Looking into the future, the telehealth industry will mature, and there will be more investments and growth in managing chronic conditions in more meaningful ways.

Second, technological advancements such as those in smart AI, informatics/data analytics, ML, wearables, and sensors will continue to propel diseases detection, prediction, risk assessment, remote monitoring, population health management for chronic conditions, etc. These technological advancements will become more pervasive, with EHR (electronic health records) plugged into telehealth solutions.

Third, decentralization and access to healthcare in rural areas remote regions will become more accessible, with telehealth taking central stage to healthcare delivery and practice.

Fourth, telehealth will see more uptake in mental health/behavioral health, children healthcare, chronic conditions management, and remote monitoring with wearables.

Finally, while the United States continues to lead the telehealth industry, there are regions in western Europe and Nordic countries that are also seeing an increase.

Francis X. Campion, MD, FACP

The telehealth market will continue to mature in 2023. Health systems are now integrating telehealth as a key component for many clinical workflows. In particular, telehealth is increasingly used for triage of complaints in primary care. The COVID-19 pandemic taught us to evaluate adults and children with upper respiratory illness remotely, incorporating a combination of home and “drive-through” testing. Telemedicine after hospitalization, ambulatory surgery, and emergency room care is

now the preferred method for follow-up care for many patients. RPM adoption will continue on a steady increase as health systems become accustomed to the use of a vendor solution for RPM equipment and data management.

“Digital first” health plans will become available to millions of Americans during their 2023 benefits selection process. These health plans will test the concept of a “fully remote front door” for medical care. This will be a significant challenge for most brick-and-mortar physician organizations and will lead to the creation of teams of providers who are fully remote. IEEE (Institute of Electrical and Electronics Engineers), HIMSS (Healthcare Information and Management Systems Society), and the American Telemedicine Association will continue to establish standards and policies to achieve a sustainable and equitable telemedicine infrastructure. We encourage foundations and government agencies to expand research funding for telemedicine, with a particular focus on clinical outcomes and patient experience.

Funding Statement

Authors list no funding for their contributions to this article.

Financial and non-Financial Relationship and Activities

Dr. Li is an employee of Vivalink, Inc., which has not sponsored or funded this viewpoint or endorsement. Dr. McGrow’s affiliation with Microsoft is provided for identification purposes only and is not intended to convey or imply Microsoft’s concurrence with, or support for, the positions, opinions, or viewpoints expressed by the author. Mr Smith’s affiliation with The MITRE Corporation is provided for identification purposes only and is not intended to convey or imply MITRE’s concurrence with, or support for, the positions, opinions, or viewpoints expressed by the author. ©2022 The MITRE Corporation. All rights reserved. Approved for Public Release; Distribution Unlimited. Public Release Case Number 22-364. Dr Barach, Dr Vasiliu-Feltes, Dr Campion, and Dr Sneha list no financial or nonfinancial relationships or activities.

Contributors

Each author contributed sections of the article attributed to their name.

Acknowledgments

None.

References

1. Karimi M, Lee EC, Couture SJ, Gonzales A, Grigorescu V, Smith SR, et al. National survey trends in telehealth use in 2021: disparities in utilization and audio vs. video services. ASPE. February 1, 2022. Available from: <https://aspe.hhs.gov/sites/>

- default/files/documents/4e1853c0b4885112b2994680a58af9ed/telehealth-hps-ib.pdf [cited 20 October 2022].
2. Fear K, Hochreiter C, Hasselberg MJ. Busting three myths about the impact of telemedicine parity. *NEJM Catalyt*. 3(10). doi: 10.1056/CAT.22.0086
 3. Wong AH, Ahmed RA, Ray JM, Khan H, Hughes PG, McCoy CE, et al. Supporting the quadruple aim using simulation and human factors during COVID-19 care. *Am J Med Qual*. 2021 Mar-Apr 01;36(2):73–83. doi: 10.1097/01.JMQ.0000735432.16289.d2
 4. AMA digital health care 2022 study findings. AMA. Updated September 28, 2022. Available from: <https://www.ama-assn.org/about/research/ama-digital-health-care-2022-study-findings#:~:text=The%20percentage%20of%20physicians%20using,2016%20to%2030%25%20in%202022> [cited 20 October 2022].
 5. AMA Digital Health Research. Physicians' motivations and key requirements for adopting digital health adoption and attitudinal shifts from 2016 to 2022. 2022. Available from: <https://www.ama-assn.org/system/files/ama-digital-health-study.pdf> [cited 20 October 2022].
 6. Lee NT, Yaraghi N, Lai S. Brookings Institution, The roadmap to telehealth efficacy: care, health, and digital equities. *Governance Studies at Brookings*; 2022. Available from: https://www.brookings.edu/wp-content/uploads/2022/07/GS_07262022-TelehealthReport.pdf [cited 20 October 2022].
 7. Acute hospital care at home individual waiver only (not a blank waiver). Available from: <https://qualitynet.cms.gov/acute-hospital-care-at-home> [cited 20 October 2022].
 8. Cortelyou-Ward K, Atkins DN, Noblin A, Rotarius T, White P, Carey C. Navigating the digital divide: barriers to telehealth in rural areas. *J Health Care Poor Underserved*. 2020;31(4): 1546–56. doi: 10.1353/hpu.2020.0116
 9. Itchhaporia, D. The evolution of the quintuple aim: health equity, health outcomes, and the economy. *J Am Coll Cardiol*. 2021;78(22):2262–4. doi: 10.1016/j.jacc.2021.10.018
 10. Taylor NP. FDA's breakthrough device designations poised for another record year. *MEDTECHDIVE*. August 8, 2022. Available from: https://www.medtechdive.com/news/fda-breakthrough-device-designations-q2-2022/629056/?utm_campaign=Newsletter&utm_medium=email&_hsmi=231918924&_hsenc=p2ANqtz-8YPd9WwcQGoOE6H-hl1j7wOmpidoQDtVomYkfCcRig-ARhEH-jxNMw8j8Oa_cjVZ-BPizsivIUsvNKEk6jhHZwwW_HOA&utm_content=231921562&utm_source=hs_email [cited 20 October 2022].
 11. Subbe C, Barach P. Impact of electronic health records on pre-defined safety outcomes in patients admitted to hospital. A scoping review. *BMJ Open*. 2021;11:e047446. doi: 10.1136/bmjopen-2020-047446
 12. Berg S. Family doctors spend 86 minutes of “pajama time” with EHRs nightly. AMA. September 11, 2017. Available from: <https://www.ama-assn.org/practice-management/digital/family-doctors-spend-86-minutes-pajama-time-ehrs-nightly> [cited 20 October 2022].
 13. March C, Gandy K, Domen J, Hamdi S, Chen R, Barach P, et al. Remote patient monitoring effectively assures continuity of care in asthma patients during the COVID-19 pandemic. *Telehealth and Medicine Today* 2022;7(5). doi: 10.30953/thmt.v7.374
 14. Parretti C, Tartaglia R, Regina M, Venneri F, Sbrana G, Mandò M, et al. Improved FMEA methods for proactive healthcare risk assessment of the effectiveness and efficiency of COVID-19 remote patient telemonitoring. *Am J Med Qual*. Nov-Dec 2022; 37(6):535–44. doi: 10.1097/JMQ.000000000000089
 15. Wang A, Ahmed R, Ray J, Hughes P, Eric McCoy E, Marc A, et al. Supporting the quadruple aim using simulation and human factors during COVID-19 care. *Am J Med Qual*. 2021 Mar-Apr 01;36(2):73–83. doi: 10.1097/01.JMQ.0000735432.16289.d2

Copyright Ownership: This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, adapt, enhance this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0>