Examining telehealth through the Institute of Medicine quality domains: unanswered questions and research agenda

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Accepted 3 May 2024
Published Online First 9 May 2024

To cite: Guetterman TC, Buis LR. *BMJ Qual Saf* 2024;**33**:552–555.

Telehealth has been in use for decades, yet prompted by the COVID-19 pandemic, its adoption rapidly expanded globally, including Australia, India, Europe and North America.[1–4] Telehealth is a broad term for healthcare that can be delivered or supported remotely by a variety of clinicians and healthcare professionals. Through telehealth, patients and clinicians do not need to be colocated within the clinic or hospital. Delivered through various modalities, telehealth encompasses video visit encounters, telephone-based encounters, remote patient monitoring technology that transmits data to clinicians and e-visits conducted through secure messages.[5] For example, a video visit consists of a real-time virtual interaction among clinicians, patients and potentially caregivers through a secure system, such as Zoom. Telehealth can include patient and provider education, public health and administrative services,[5] but our focus is delivery and support of healthcare involving a patient and healthcare professional (eg, physician, nurse, therapist). Although use has attenuated[6] since the height of the pandemic, telehealth remains widespread and systematic research is urgently needed to guide and optimise continued usage. While telehealth presents numerous promises and potential benefits, perils can also arise.

In this issue of *BMJ Quality & Safety*, Payne *et al* report patient safety issues arising during remote encounters, primarily telephone-based, in the primary care setting.[7] Through qualitative interviews and observations, they examined why safety incidents occur and what can prevent safety incidents in developing a culture of safety. Their study presents an important piece of the larger puzzle of how to optimise telehealth in primary care, providing an instrumental example of why further research on telehealth is needed. Payne *et al* identified major themes contributing to safety incidents, including organisational and systemic issues (eg, staff shortages relative to demand and need), poor communication along with inaccurate information, clinically insufficient information, patient and caregiver burden (eg, increased onus on patients to communicate, technical skills required) and inadequate training for support staff and clinicians. Many safety incidents were rooted in more than one issue. Consequences included harm, delayed care, incorrect treatment and poor follow-up. However, they also identified times when staff took exceptional initiative to improve safety and compensate for organisational problems. Payne *et al* concluded with recommendations for how to reduce safety incidents in remote primary care, including the recommended conditions, clinical trajectories and patient characteristics that indicate the need for in-person, rather than remote care.

Telehealth implementation presents numerous unaddressed research questions. Further research is critical to developing strategies for the implementation and optimisation of telehealth in clinics, hospitals and health systems. The aim of this article is to discuss the evidence base and highlight research questions that still need to be addressed.

HOW TELEHEALTH CAN PROMOTE OR HINDER HEALTHCARE QUALITY

Over 20 years of research and demonstration, projects have provided evidence

of the feasibility and acceptability of telehealth. A comprehensive review of telehealth research is too extensive to include here, but we will briefly review primary themes of inquiry based on the six domains of healthcare quality advanced by the Institute of Medicine: safety and timeliness (combined), effectiveness, equity, patient-centeredness and efficiency.[8] For each, we pose a broad question related to telehealth, summarise what is known based on current literature and recommend what future research is needed.

What are the major safety concerns with telehealth and its timely delivery?

Despite the potential benefits of telehealth, there is a need for balanced research that investigates potential harms, such as those studied by Payne *et al*.[7] A developing body of research has focused on safety issues and potential harm to patients through remote encounters, primarily conducted via telephone. Telephone encounters raise unique safety considerations.[9] Intervention and implementation research is needed to optimise telehealth and examine the best ways to overcome implementation issues, such as over-reliance on algorithms that may limit thinking and clinical judgement, concerns about empathy and high-quality communication and the lack of holistic patient assessments that can compromise safety.[10] Harm can arise from missed or delayed diagnoses, failure to recognise severity and urgency, delayed referral or treatment, poor attention to safety instructions and limited follow-up.[7] Research examining remote encounters in primary care has raised fundamental concerns about the limits of telephone encounters and the need to better understand the clinical sufficiency of telephone-based telehealth.[7 10]

Research is needed to examine how to best prepare the healthcare workforce for telehealth to ingrain safety practices. Both primary training and continuing education for healthcare professionals need inquiry to understand how to better equip health professionals to provide telehealth.[11] In addition to incorporating telehealth training into curricula, the current workforce may need skill-building in preparing for virtual visits (eg, technical requirements, room setup, patient instructions), communicating during a virtual visit (eg, ensure visibility, attend to tone of voice and body language) and engaging in follow-up for continuity of care. Incorporating video and telephone-based care into workflows, especially in blended clinics that include in-person care, would likely benefit from further research.

What modes of telehealth are most effective and safe for which clinical conditions and care levels?

Two primary modes of telehealth encounters are video and telephone. Video visits ostensibly offer advantages—convenience and improved access for individuals with physical disabilities or mobility issues, safety in terms of reducing exposure to pathogens, the potential to visually observe the patient and the ability to include family members, other support persons and interpreters.[12]

However, video visits also bring challenges, such as technical issues,[13] which can disrupt the flow of the conversation,[14] and increased cognitive load.[15] Although telephone-based provision has limitations, it is an important mode of delivery. For some patients, audio-only care via telephone may be the only option relative to having no care.

Another modality of delivery is remote patient monitoring, which involves the collection of patient-generated health data outside of inpatient and ambulatory care settings for use by healthcare providers in clinical care. Remote patient monitoring data are typically collected by patients or their caregivers through devices (eg, blood pressure cuffs, pulse oximeters, weight scales, glucometers, thermometers and sometimes a connected tablet) for automated transmission to a care team. Remote patient monitoring has been examined through clinical trials that generally supported potential clinical benefits for specific conditions. However, many of the trials have tested older forms of monitoring that do not reflect the automated, integrated remote monitoring available today. Systematic reviews have indicated that remote patient monitoring has been found effective for chronic disease management, including cardiovascular disease, diabetes and chronic obstructive pulmonary disease in reducing readmissions and acute care visits.[16]

Remote patient monitoring usage expanded quickly, yet questions remain about who should review data, how often and what communication and feedback with the patient is optimal. Moreover, research needs to examine ethical issues, such as providers' responsibility to review and respond to data provided.

Evidence of the effectiveness of telehealth for various conditions is generally lacking. Perhaps the larger issue is that little comparative research has examined health outcomes of telehealth relative to in-person care. This type of inquiry is essential to illuminate a critical research question: under what conditions is telehealth optimal? This line of inquiry should include when different telehealth modalities are appropriate. The need for this research is amplified when the alternative to telehealth is no care. For example, in the event of another pandemic, what is the potential consequence of having no visit relative to a telephone or video encounter? Relatedly, what is needed for a health system to remain nimble and rapidly pivot to telehealth should in-person clinics need to close because of a future pandemic or other factors prompting closure?

How can telehealth be delivered equitably?

A critical topic is equity in telehealth access and implementation. Access to a patient portal of an electronic

health record is typically a gateway to receive telehealth care, yet patient portal enrolment tends to be lower for older adults and those with poorer broadband access. Regarding spoken languages, patients tend to experience barriers when portals are unavailable in their preferred language.[12] Moreover, video visits in primary care have been shown to be more likely to be cancelled by historically minoritised groups relative to white patients. In the USA, black Americans, older adults and those with less education are also less likely to use telehealth, indicating a disparity in telehealth.[17] It should be noted that telehealth may pose unique advantages for those with physical disabilities and limited mobility. On the other hand, lower income and rural individuals tend to have lower utilisation.[18]

Telehealth research needs to account for equity and any disparities that arise during implementation. Participation in telehealth often has prerequisites—access to the internet, a capable device and technical skills. However, there are numerous systematic barriers to these prerequisites among historically under-represented minorities, individuals with lower income, those whose preferred language is not commonly spoken and those with disabilities. For instance, persons with low vision, those who are deaf and hard of hearing or those with dexterity issues may need additional assistance. Research is needed to develop strategies to improve access and implementation to reduce telehealth inequities.

How can we deliver patient-centred telehealth?

To be patient-centred, telehealth needs to be convenient for patients and reflect their preferences as well. Convenience and satisfaction are important considerations, yet results remain mixed, suggesting the need for continued research. Researchers have examined the experiences of both patients and clinicians delivering visits through telehealth in primary care and specialty settings. Studies conducted during the COVID-19 pandemic examined the rapid adoption of telehealth, investigating benefits and potential concerns of patients and clinicians. In addition to reducing the spread of viruses, telehealth can reduce access barriers, such as transportation and time commitments for patients. Results of satisfaction and suitability studies are generally mixed, with some studies indicating that the suitability of telehealth is at least as good as face-to-face based care, based on provider perspectives,[19] while others indicate a preference for face-to-face among providers and patients.[20]

Because much of the recent research was conducted during the COVID-19 pandemic and perceptions may evolve over time, it is important to reassess patient-centeredness of telehealth. Similar to effectiveness lines of inquiry, comparative research on patient-centeredness and satisfaction of telehealth relative to in-person care is relatively lacking. Moreover, there may be differences in modalities. For example, video visits may promote better rapport building and communication, but they are also more prone to technical difficulties.

How can telehealth be delivered to improve efficiency?

Efficiency and related workflow issue are important domains of healthcare quality. Payne *et al* identified safety concerns such as delayed care, which can affect clinical outcomes and potential harm.[7] Researchers have reported instances of initial telehealth visits for which phone or video were not clinically sufficient and required a follow-up in-person visit.[7 12] These problems are also indicative of inefficiency. For example, an inappropriate initial routing to telehealth that will ultimately require a follow-up in-person visit can waste time and resources of clinicians and the healthcare system in addition to frustrating patients. Research on efficiency of telehealth may benefit from implementation science. For example, clinics may adopt an evidence-based algorithm to route patients for an initial telehealth visit or an in-person visit based on condition and characteristics. If professionals deviate from the algorithm, the issue would be well suited to implementation research, which may help to understand reasons for deviation and potential solutions to improve implementation outcomes.

TELEHEALTH QUALITY: WHAT WORKS AND WHAT REMAINS TO BE STUDIED?

Research about the quality of telehealth has not matched the pace of clinical adoption since the start of the COVID-19 pandemic. The dramatic increased adoption provided a serendipitous opportunity to examine patient and physician perspectives, patient-centeredness, equity and safety. However, considering the state of the research with respect to healthcare quality domains, it is clear the investigation of clinical outcomes is relatively lacking. Payne *et al* provide critical research to prompt further reflection on potential safety issues and harms. Much remains to be known: what is the effectiveness of telehealth relative to in-person care on clinical outcomes for a variety of conditions, what modalities are best given a set of conditions and patient factors, and how can organisations embed a culture of safety that includes telehealth?

Research conducted during the pandemic may not apply to settings postpandemic, given the unique set of circumstances leading to the physical closure or restrictions of clinics, workplaces, schools and other organisations. Perhaps, future replication studies of telehealth would be illuminating. Moreover, new technologies are continually in development. Platforms such as Zoom have evolved and become commonplace for many individuals. Although technical support will be needed, now is an optimal time to investigate how those needs may have changed for both patients and clinicians. New technologies allow integration

of home health devices (eg, blood pressure monitors, fitness watches) into the electronic record in ways not previously possible. As new technology evolves, research is needed to critically evaluate effectiveness and implementation outcomes to inform health system strategies. Implementing telehealth without evidence and strategies is likely to worsen disparities and harm the quality they are intended to improve.

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Contributors TCG and LRB contributed equally to the conceptualisation and writing of the manuscript.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent for publication Not applicable.

Ethics approval Not applicable.

Provenance and peer review Commissioned; internally peer reviewed.

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