**Institute *for* Healthcare Improvement**

# Telemedicine: Ensuring Safe, Equitable, Person-Centered Virtual Care

Guidance provided by:

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# Contents

# Executive Summary

The COVID-19 pandemic accelerated a shift that has been slowly underway for years — the transition to telemedicine, defined as the diagnosis and treatment of patients through telecommunications technology. In the eagerness to adopt telemedicine, it is crucial to not lose sight of the key principles of quality as well as the unique risks, opportunities, and potential unintended consequences of virtual care. While it is not clear exactly how telemedicine will continue to evolve and what role it will play longer term, health systems and providers will need guidance to successfully implement safe, high-quality telemedicine services.

In 2020, the Institute for Healthcare Improvement Lucian Leape Institute convened a panel of experts from around the world to develop a framework for ensuring safe, equitable, person-centered telemedicine, focusing on three aspects of quality. The framework includes six elements:

- Access
- Privacy
- Diagnostic Accuracy
- Communication
- Psychological and Emotional Safety
- Human Factors and System Design

This white paper describes these six elements in the context of telemedicine, provides recommendations for implementing them, and explores considerations for the future of telemedicine.

# Introduction

> **Telehealth** is defined as the delivery of health-related services and information via telecommunications technologies.[1] It is a broad category that encompasses patient care, administrative activities, and health education. Within patient care, telehealth includes a range of activities such as virtual visits, remote monitoring of vital signs, and store-and-forward imaging.
>
> **Telemedicine** is a more specific term, referring to diagnosis and treatment of patients through telecommunications technology, including both video- and telephone-based platforms.[2]
>
> This paper focuses primarily on telemedicine, although implications for telehealth more generally are also considered. While we strive to use these terms as precisely as possible in the paper, external sources sometimes use them interchangeably, which can make precision challenging.

Over the last two decades, many have touted the potential of telemedicine to transform health care in the United States and abroad. During this timeframe, utilization increased slowly. A 2018 study of privately insured individuals found that annual telemedicine visits in the US increased by 52 percent from 2005 to 2017.[3] Despite this increase in use, and an increase in US households that have the necessary infrastructure in place,[4] only about 8 percent of Americans utilized telemedicine services in 2019.[5]

A variety of barriers have historically impeded the wider use of telemedicine. Across the US, health care systems struggle with privacy issues, security concerns, and lack of interoperability between telemedicine technology and other existing technology systems. The United States lacks uniform laws and policies for telemedicine at the state level, and health insurance coverage and reimbursement for telemedicine services have been significantly lower than for in-person patient visits.[6] There are also issues related to health care provider licensure and liability concerns.[7,8] Finally, while infrastructure has rapidly expanded, it is important to recognize that a "digital divide" still exists in the US: Nearly one third of rural Americans lack access to high-speed broadband services,[9] and the gap in access extends beyond rural America along economic and racial lines.[10]

In 2020, telemedicine usage accelerated rapidly in much of the world as a result of the COVID-19 pandemic. Driven by an urgent need to keep patients safe from the virus while continuing to provide care, health care organizations rapidly scaled up telemedicine services for non-emergent conditions. For example, at Mass General Brigham in Massachusetts, ambulatory telemedicine usage increased from less than 1 percent of visits in February 2020 to more than 60 percent by April 2020.[11] Duke Health in North Carolina saw an increase in televisits from 1 percent to 70 percent of total visits over a four-week period, a growth curve matched by many large health systems.[12] In the United States, government bodies hastened to facilitate changes to enable health care providers to offer virtual care options. For instance, the Centers for

Medicare & Medicaid Services broadened access to Medicare telemedicine services by expanding reimbursement for telemedicine visits and The Joint Commission issued a "Quick Safety" advisory on use of telehealth amid the pandemic.[13]

While telehealth use decreased in early 2021,[14] usage levels remain far higher than prior to the COVID-19 pandemic and appear to have stabilized. The future of telemedicine beyond the pandemic is unclear, although it is highly likely that its use will continue to evolve and expand — particularly if the regulatory and payment changes enacted in 2020 are maintained. The recommendations in this paper are immediately relevant during the pandemic as well as in the future.

# Telemedicine Quality and Safety

In the evolving field of telemedicine, health care providers and systems have paid attention to issues such as technology and reimbursement. But there has been less focus on ensuring that telemedicine can meet the same goals for quality as in-person care. What might be the distinctive safety concerns and unintended consequences of telemedicine? With the rapid uptake of virtual care during the pandemic, it is more important than ever to apply improvement science to ensure that telemedicine embodies quality — that it is safe, effective, efficient, timely, person-centered, and equitable.[15]

In 2020, the Institute for Healthcare Improvement (IHI) Lucian Leape Institute convened a virtual meeting of experts from around the world to develop a framework for ensuring safe, equitable, person-centered telemedicine, focusing on three aspects of quality. The expert panel's preliminary research found that safety, equity, and person-centeredness are often afterthoughts in the design and implementation of telemedicine services. Thus, the aim of the expert panel was to help address perceived gaps in existing research in these three areas by providing recommendations for high-quality virtual care. While the panel focused specifically on three of the six aspects of quality, it is critical to consider all aspects in the expansion of telemedicine.

Two key insights emerged from the expert meeting:

- Health systems must avoid simply implementing telemedicine technology on top of current systems and instead **reimagine the entire system, fully integrating telemedicine** to ensure that it is safe, free from inequities, and truly responsive to the needs of patients, families, and the health care workforce; and

- Health systems and providers must **co-design telemedicine services** with patients, families, and other stakeholders from the outset to ensure that they work for all.

This paper describes a framework to guide health care organizations in their efforts to provide safe, equitable, person-centered telemedicine. The framework includes six elements to consider: access, privacy, diagnostic accuracy, communication, psychological and emotional safety, and human factors and system design. Where possible, examples are provided to illustrate real-world approaches, although not necessarily best practices, to some of the challenges and opportunities discussed in the paper. The paper also provides recommendations for implementing the six elements and explores considerations for the future of telemedicine.

# A Framework for Ensuring Safe, Equitable, Person-Centered Telemedicine

The IHI-convened expert panel met in June 2020 to discuss the current state of telehealth, consider the critical components of safe, equitable, and person-centered telemedicine, and identify recommendations for improving the quality of virtual care. The culmination of those discussions is a framework for ensuring safe, equitable, person-centered telemedicine (see Figure 1) that includes six elements: access, privacy, diagnostic accuracy, communication, psychological and emotional safety, and human factors and system design. During the expert panel discussion, these six elements emerged as risks and opportunities associated with providing safe, equitable, and person-centered telemedicine.

**Figure 1. Framework for Ensuring Safe, Equitable, Person-Centered Telemedicine**



For each of the framework's six elements, this section provides more detail on the following:

- Key considerations for telemedicine safety, equity, and person-centeredness;
- Recommendations for implementing the element; and
- For each recommendation, key actors are noted as the suggested leaders to advance the recommendation, while recognizing that, in the spirit of co-design, health systems, providers, patients, families, and community organizations must all be partners in this work.

While the framework and related recommendations in this paper specifically focus on telemedicine, this approach could be applied to address telehealth more broadly across the care continuum. Integrating telemedicine services presents an opportunity to rethink and redesign existing care processes and services — to ensure care delivery via the most appropriate mechanisms, provide better access, and reach more people while also improving value and quality.

Each health care organization needs to consider its unique context when developing a plan to implement the framework. A critical early step is to identify the technological infrastructure and other resources available to both the organization and the population it serves, including determining which services can be provided safely and with high quality using telemedicine and which services cannot. Organizations may use the Model for Improvement and iterative Plan-Do-Study-Act (PDSA) cycles to guide their work by setting an aim, establishing measures, and testing and refining changes to improve telemedicine services to ensure that they are safe, equitable, and person-centered.[16]

It is important to note that while some framework elements are mutually reinforcing, there is also the potential for elements to conflict (e.g., recording a telemedicine interaction with a patient can help clarify communication, but may undermine privacy). The guiding principle throughout is to honor the patient's wishes as long as those desires are consistent with delivering safe and effective care.

# Access

To take advantage of what telemedicine can offer, patients need to be able to access it. The most important considerations for patient access to telemedicine services include appropriate technological infrastructure (e.g., devices, Internet connectivity) and basic technology knowledge and skills (sometimes referred to as digital literacy). It is also important to respect patient preference for the type of telemedicine technology they wish to use (e.g., telephone versus video).

The biggest barriers to telemedicine access involve infrastructure. About 15 percent of American households lack a smartphone and at least 10 percent lack access to the Internet beyond cellular data.[17] For video-based telemedicine visits, both the patient and provider need reliable access to the Internet or WiFi signal and a device with video capabilities (e.g., laptop, smartphone, tablet).

Infrastructure and technological barriers differ by race, income, and geographic location, among other factors. According to a 2015 Pew Research Center study, African Americans were 12 percent less likely to have high-speed broadband access than whites, and only 74 percent of US adults living in households with annual incomes of less than $30,000 used the Internet versus 97 percent of adults in households with incomes greater than $75,000.[18,19] For rural citizens in the US, almost 30 percent lack broadband access and 30 percent do not have a smartphone.[20,21]

Government intervention can help increase access.[22] For example, the US Federal Communications Commission's COVID-19 Telehealth Pilot Program and Connected Care Pilot Program fund increased access to broadband and equipment for both patients and providers.[23] Building the necessary infrastructure requires additional attention and resources from policymakers.[24]

Improving telemedicine access requires the necessary infrastructure to meet the needs of the population. Pilot programs have demonstrated the feasibility of providing in-home equipment such as tablets, laptops, or devices connected to the TV to those who would otherwise lack access.[25] Some health systems, such as Bellin Health in Wisconsin, have placed telemedicine kiosks in strategic locations, including schools and workplaces. Each kiosk includes a device, Internet connection, and access to ancillary equipment such as blood pressure cuffs and thermometers to facilitate the visit.

Another barrier to telemedicine access is an individual's comfort level with technology and their technology knowledge and skills, which older adults disproportionately lack. In 2015, 58 percent of older adults in the US reported Internet use, although that number continues to grow.[26] A 2014 study found that older adults scored lower on measures of technological problem-solving than younger adults.[27] Individuals with certain disabilities may face challenges with operating equipment.

At the same time, telemedicine offers clear opportunity for some of the very patients who may face the greatest barriers to access. Lower-income individuals may have more difficulty taking time off work, finding childcare, or accessing transportation to travel to a health care facility. Older patients and those with disabilities may face mobility constraints. Providers must address

barriers as well as realize opportunities for using telemedicine to decrease, rather than increase, health inequities.

Health systems will need to conduct outreach and education to ensure that patients have the skills and familiarity with technology to participate in telemedicine if they so choose. Health systems and providers may also partner with community-based organizations to offer education and distribute relevant materials. Some health systems have already become more proactive about educating patients in advance of a televisit to ensure that they will be ready to engage. For example, prior to a virtual visit, a dermatology clinic in the Connecticut-based Yale New Haven Health System sends patients an electronic message with written instructions and a video tutorial on how to use the telemedicine services.[28]

Not every patient will want to receive telemedicine services. Some may prefer telemedicine for certain types of appointments and not for others — and these preferences may not align with the expectations or preferences of providers. Some patients may prefer to interact with providers using the phone or email versus video. Older patients with less experience using technology, and patients who are uncomfortable with providers seeing into their home environments, may prefer phone rather than video appointments, for example. At every step, the guiding principle is to respect patient preference and autonomy, making an effort to provide access to telemedicine when it is desired and access to in-person visits or other services when those are more appropriate or preferred.
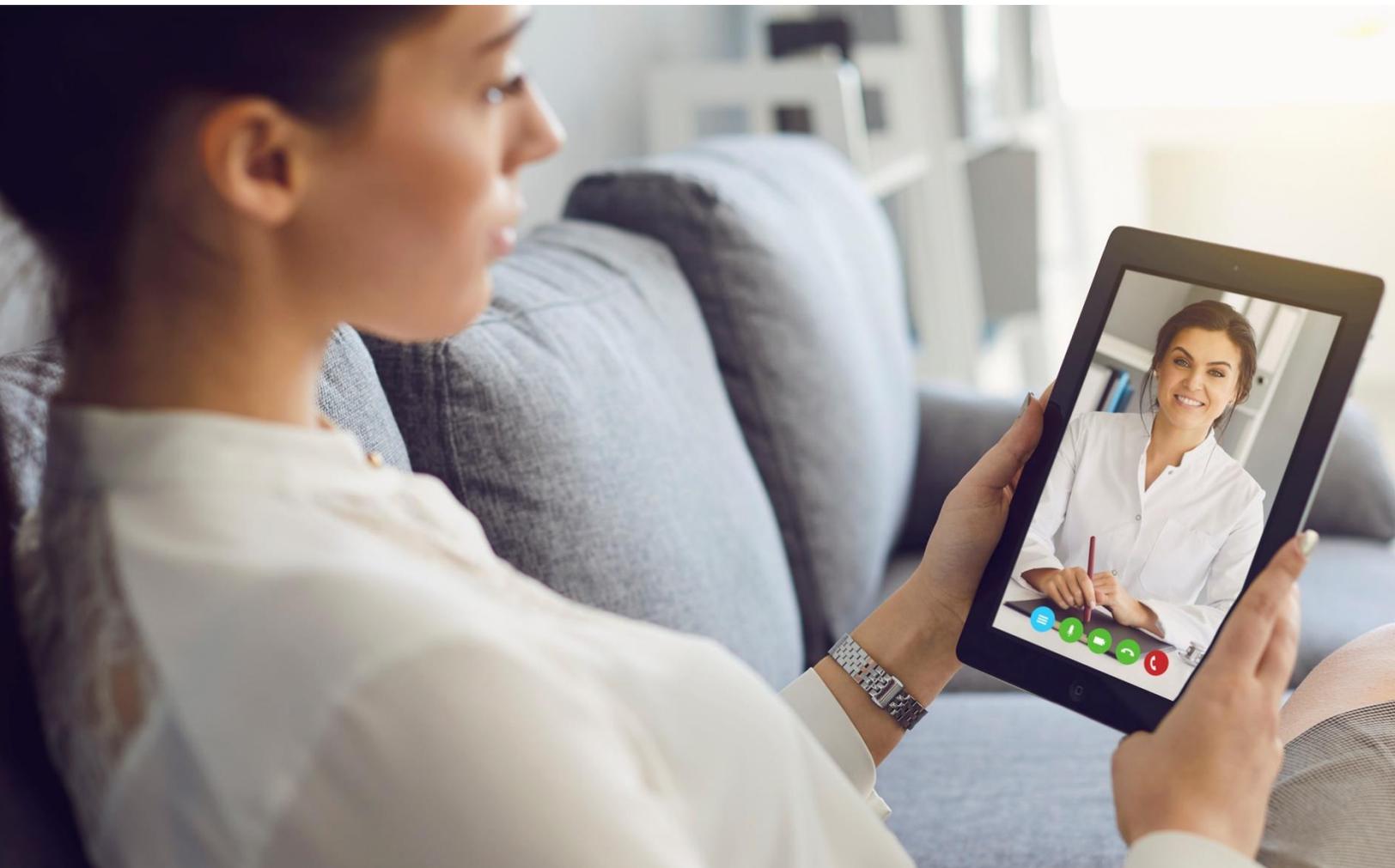
Incorporating patient preference is an important component of ensuring psychological safety. But what happens when patient and provider preferences are not aligned? Organizations need processes in place to support both patients and providers in making decisions about the most appropriate ways to deliver care, whether in person or virtual, and to coach providers on how to effectively communicate with patients around those decision points. Certain conditions also need to be in place (e.g., percentage of in-person vs. virtual visits, default to in-person visits for certain types of care or specific conditions) that support best practices established by the organization. It's also important to collect and analyze data over time on patient outcomes and patient and provider satisfaction for both in-person and virtual care to assess effectiveness, safety, and quality in an ongoing way. Ultimately, telemedicine services need to be designed to both encourage patient preference and support clinical decision making.

## Recommendations to Improve Telemedicine Access

| Recommendations | Key Actors |
|---|---|
| When possible, and as needed, provide patients with individual devices or partner with community organizations to provide access to shared devices. | • Health systems and providers<br>• Community organizations |
| Conduct outreach and education to ensure that patients have the necessary technology knowledge and skills to participate in televisits and to maximize the opportunity for a smooth visit. | • Health systems and providers<br>• Community organizations |
| Ensure continued access to phone-based care in the near term, given that it is easier for some patients and provides a viable approach that can improve access and continuity of care. | • Health systems and providers |
| Promote state and federal legislation to increase access to broadband Internet.[29] | • Government entities |
| Within the limits of what is clinically appropriate, respect patient preference for in-person visits versus telemedicine, as well as for the type of technology used with telemedicine (e.g., phone, video). | • Health systems and providers |
| Develop and track system- and provider-level metrics to ensure appropriate use of telemedicine. | • Health systems and providers |

# Privacy

Privacy is paramount in any health care interaction and telemedicine is no exception. There are several aspects of privacy that are unique to telemedicine that present both challenges and potential advantages.

Cybersecurity risk is one challenge that applies to telehealth more broadly. Data security and privacy breaches are a very real risk with telemedicine services, so it is essential to establish safeguards at the system level to minimize telemedicine cybersecurity risks. While some risks can be addressed by updating privacy policies, the exchange and safe storage of patient health information is critical to maintaining patient privacy and trust in telemedicine services. The American Medical Association created a useful overview on the importance of cybersecurity.[30]

In video-enabled visits, the patient's home environment may be visible to the provider. Although this can also have clinical benefits, as discussed below, some patients may feel that their private space is being invaded. Some patients may have difficulty finding a private space for the virtual visit, which could compromise their privacy in a different way, as others in their household may be privy to the interaction. In such circumstances, patients may be reluctant to share sensitive information. Some people may not have the technological infrastructure at home to support a televisit and thus use public places such as libraries or their workplace to attend visits, which poses obvious privacy challenges. The same is true for people who are experiencing homelessness. All of these issues risk exacerbating inequities because the challenges are greatest for people with the fewest resources. Education and support in the use of virtual backgrounds and use of headphones, for example, presents an opportunity to provide patients with the means to control their privacy.

Conversely, some patients may feel that they have more privacy and a sense of security conducting the visit in their own environment. Especially for those who have experienced medical trauma, it might be more comfortable to engage in a televisit in a location where they feel safe as opposed to in the hierarchical and unfamiliar setting of a hospital or a doctor's office. This could mean that individuals who avoid in-person visits to medical facilities might seek care via telemedicine.

There are also legal aspects related to patient privacy and health care organizations must consider local, state, and national laws regarding informed consent and patient rights. The Health Resources & Services Administration, an agency of the US Department of Health and Human Services, developed a list of resources to guide organizations in obtaining informed consent.[31] The IHI-convened expert panel noted that informed consent is not just a legal consideration; it needs to be built into the telemedicine design itself. Well-executed informed consent is driven by respecting the patient's rights and role as a partner in the delivery of care, and thus, ultimately, is a determinant of patient safety.

### Recommendations to Ensure Privacy with Telemedicine Use

| Recommendations | Key Actors |
|---|---|
| Evaluate the informed consent process and ensure that effective informed consent is incorporated into the virtual visit. | • Health systems and providers |
| Consider using patient compacts (i.e., shared principles both parties agree to) that include privacy protections.[32] | • Health systems and providers |
| Develop a system-wide process for protecting patient data and managing a cyberattack. | • Health systems and providers<br>• Community organizations |
| For patients who are uncomfortable with using video because it invades their privacy, offer alternatives such as phone-based visits or suggest the use of virtual or blurred background video visits that can obscure their surroundings. | • Health systems and providers |
| When working with community-based organizations (e.g., churches, community centers, libraries) to establish community spaces for accessing telemedicine, identify ways to address privacy concerns. | • Health systems and providers<br>• Community organizations |

## Diagnostic Accuracy

Telemedicine presents new challenges for diagnosis. Providers must learn how to address and overcome these risks when possible and also determine when a virtual visit is not appropriate because the risk of diagnostic error is too high.

Diagnostic errors are one of the most prevalent safety issues in ambulatory care and this risk can be exacerbated by a virtual visit. In one study, more than 40 percent of respondents expressed concern about their ability to get a proper treatment or diagnosis virtually.[33] During an in-person interaction, a provider can observe a more complete presentation of the individual before them. For example, a skin rash can be viewed from more angles and the provider can touch the area of concern for a more complete assessment of the issue.

Moreover, clinicians often rely on other forms of observation to fully assess a patient's condition. Observing body language, personal behaviors, and other individual characteristics can offer a more complete picture and reveal opportunities for intervention. In addition, telemedicine visits typically involve an interaction between a single provider and the patient, while office visits often involve interactions with other care professionals, including nurses, medical assistants, and technicians, all of whom can inform the final diagnosis.

That said, telemedicine also has certain advantages. Video-enabled visits offer the opportunity to see the patient in context, and therefore providers may observe their living situation and how they interact within their environment. For example, the provider might ask a patient to go to the refrigerator and open a bottle or can, which enables the provider to observe the patient's mobility and dexterity as other inputs to inform diagnosis. (Of course, if the patient prefers greater privacy, as discussed above, their wishes must be respected.) Another benefit of televisits is that the technology makes it possible to engage family members or others who may

be geographically dispersed, but able to contribute a valuable perspective.[34] Finally, because a patient typically interacts with only one provider during a televisit, this type of visit may provide valuable additional time for uninterrupted conversations between patient and provider that help improve communication and inform diagnosis.

Another diagnostic risk associated with telemedicine is overreliance on technology. Over the last 20 years, health care systems have recognized that diagnostic errors often occur when physicians rely on the electronic health record (EHR) or other technology to alert them if something is wrong. In a televisit, there is less opportunity to directly observe and examine the patient, and thus providers may be more inclined to rely on patient charts and records. With a relatively limited physical exam possible during a virtual visit, the provider may be too dependent on patient history and laboratory findings to inform a diagnosis. Providers must be keenly attentive to ensure that they thoroughly check and review information with patients during televisits, and that they can distinguish when an in-person visit is truly needed.

## Recommendations to Improve Diagnostic Accuracy in Telemedicine

| Recommendations | Key Actors |
|---|---|
| Invite the patient to demonstrate various health-related behaviors in the context of their home environment. | • Health systems, providers, and patients |
| Invite the patient to engage a family member or patient advocate, either with them in person or geographically distant, in the discussion of symptoms, thus providing a more complete picture of the patient's condition. | • Health systems, providers, patients, and families |
| Train providers in televisit best practices and making diagnoses virtually, including conducting limited physical exams and looking for signs and symptoms related to mental health. | • Health systems and providers |
| Train providers to identify clues from observing the patient in their home environment, including adaptation/coping and problem-solving. | • Health systems and providers |
| Consider using ancillary support, for example, a community nurse who conducts a home visit and then connects by video to a specialty clinic to relay the patient's health information.[35] | • Health systems and providers<br>• Community organizations |

# Communication

Telemedicine requires provider training on specific communication tactics. Fortunately, with proper training and preparation, it is possible to communicate effectively via virtual modalities.

One communication challenge involves technical hurdles or glitches — for example, when the quality of the televisit video or audio is low or uneven, or the patient has difficulty connecting to the telemedicine services. Technical challenges potentially contribute to inequities since low-income individuals are more likely to have inadequate infrastructure to support televisits (see Access). Also, patients with certain disabilities (e.g., vision, hearing) may face additional communication challenges with telemedicine. For patients who speak various languages, virtual communication can add another layer of difficulty in understanding or in being understood.

There are also emotional and psychological communication challenges to consider when using telemedicine. It can be more difficult for a provider to establish a rapport with the patient during a virtual visit. Without in-person proximity, people may be less able to pick up on subtle cues in facial expressions and body language. Technology as the medium for interaction can feel cold and distant.

For some patients, however, telemedicine may provide an opportunity for greater psychological safety and thus enhance rapport and communication. As discussed above, some patients may feel more comfortable in their own home than in a medical setting. The provider and the patient can establish a connection using telemedicine before the patient presents for an in-person visit to a clinical setting. In addition, some providers report that patients feel they have more of the provider's attention during a virtual visit because the provider is often focusing on a computer screen during in-person visits in a clinical setting.

It's important for providers to not only be equipped (either themselves or other staff) to handle technical issues that may arise during televisits, but also to have a good "webside manner."

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### Characteristics of a Good "Webside Manner"

- Ensure clarity around the services available for the televisit being offered.

- Offer interpretive services and set them up ahead of time if needed.

- Use active and empathetic listening.

- Incorporate patient preferences for the technology used for the visit (e.g., phone vs. video).

- Use tools (e.g., Ask Me 3,[36] Teach-Back[37]) to ensure effective communication and patient understanding.

- Encourage patients to find a quiet, private, and comfortable setting, but recognize that this might not be possible.

- Respect the patient's privacy by recognizing and remembering that you may be accessing the patient's home.

- Engage care partners in virtual visits, when appropriate.

- Focus on the patient and look into the camera to simulate eye contact.

- Ensure technology connections are clear for both patient and provider before beginning the visit.

- Ensure provider is at ease with using the technology or have another staff member available to troubleshoot issues.

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Training may be needed to help providers appropriately adapt their manner for telemedicine. Some health care systems offer providers simple guidance for communicating via telemedicine. For example, Penn Medicine developed a provider "pocket note" as important preparation and communication prompts for virtual visits with patients.[38]

## Recommendations to Improve Communication in Telemedicine

| Recommendations | Key Actors |
|---|---|
| Establish standard practices before, during, and after a virtual visit to help create a better telemedicine experience for both patients and providers.[39] | • Health systems and providers |
| Provide training, education, and tools to equip providers with best practices for effective communication using telemedicine. | • Health systems and providers |
| Ensure that interpretive services (e.g., language, hearing or vision assistive technologies), if needed, are set up ahead of time. | • Health systems and providers |
| Ensure access to screen readers (i.e., assistive technology for blind or visually impaired persons that renders text and image content as speech or Braille output) are available when needed. Telemedicine software programs work broadly with assistive technology. | • Health systems and providers |
| If appropriate and aligned with patient preferences and local consent laws, consider recording the televisit interaction so that the patient has the option to review and share important information and instructions following the visit. Record a televisit only if the patient welcomes it; do not pressure the patient to consent to recording. | • Health systems and providers |

# Psychological and Emotional Safety

Psychological and emotional safety are deeply related to both privacy and communication, but also have distinctive elements. There is growing recognition of the importance of patients' psychological and emotional safety in addition to physical safety. Moreover, there is increased attention to health care workforce psychological and emotional safety, and awareness that patient and provider safety can be mutually reinforcing.

When done well, in-person communication has certain advantages. Physical presence in the same room, including appropriate touch, can help establish a rapport and connection with patients. These conditions cannot be fully replicated in virtual interactions. As noted above (see Privacy), some patients may feel that their private space is being invaded if their home is visible to a provider.

That said, as also discussed above, some patients may actually feel safer and more comfortable in the privacy of their own home. Hospitals and other clinical settings can be intimidating, antiseptic, and hierarchical. For some individuals, medical settings may be associated with past experiences of discrimination or trauma. Televisits allow patients to invite providers as guests into their homes, rather than patients feeling like guests when they enter a clinical setting. In that sense, telemedicine can offer certain benefits. In addition, virtual visits may offer opportunities to reduce other stressors often associated with in-person clinic visits

(e.g., taking time off work for and travel time to appointments, reducing costs associated with transportation and parking).

With training and preparation for a good "webside manner" (see Communication), providers can establish a connection with patients and foster conditions that create psychological and emotional safety. This is particularly important when we consider that cues are used for the human element of delivering care, even if they are virtual.

### Recommendations to Improve Psychological and Emotional Safety in Telemedicine

| Recommendations | Key Actors |
|---|---|
| To the extent possible, honor patient preference in terms of the type of technology used for televisits (e.g., phone, video). | • Health systems and providers |
| Invite the patient to share and discuss their concerns about telemedicine, particularly if they are using this modality for the first time. | • Health systems and providers |
| Engage in active and empathetic listening throughout the visit. | • Health systems and providers |
| For video-based visits, remember to look at the camera, not just the image of the patient, to simulate eye contact. | • Health systems and providers |
| Before ending the visit, verify that you have addressed all patient concerns. | • Health systems and providers |
| Offer co-coaching opportunities among provider peers to practice effective communication that meets patients' psychological and emotional safety needs. | • Health systems and providers |
| Invite providers to engage in activities that foster and increase their own psychological and emotional safety, including opportunities for improving joy in work and promoting health care workforce mental health and well-being.[40,41] | • Health systems and providers |

## Human Factors and System Design

It is essential for telemedicine services to be fully integrated into the existing system, not just added on — and this might require fundamentally reimagining the entire system. The design of telemedicine services must ensure that the system is reliable, safe, efficient, and person-centered. The IHI White Paper, *A Framework for Safe, Reliable, and Effective Care*, presents two components that provide the foundation for creating systems of safety: culture and the learning system.[42] Foundational principles that make systems and processes more reliable include standardization, simplification, reduction of autonomy when standardized processes exists, and highlighting deviations from standard practice.

Human factors are also an important consideration for system design, that is, "the interaction of human abilities, expectations, and limitations, with work environments and system design."[43] The most foundational human factors consideration is that the patient needs to be prepared to use telemedicine technology and the methods involved in virtual care. Providers must also be comfortable with and adept at utilizing telemedicine technology. Innovation may be required to ensure both access to and the ability to use the required technology.

Another important human factors element is responsiveness to important cues that might be missed when care is provided virtually. Missed cues may lead to diagnostic errors and decrease trust between provider and patient.

Telemedicine also requires providers to learn new or adapted approaches to manage data and health systems must ensure that the technology is integrated and interoperable with the existing IT infrastructure. Telemedicine services must be designed to ensure coordination and continuity of care.

Through user-centered co-design, active learning, and feedback loops, organizations need to continuously monitor, assess, and adapt every aspect of telemedicine as needed. This process may include collaboration within the organizational learning system and with community partners, particularly when community resources are included in the design of telemedicine services. In addition, health care delivery systems need opportunities to participate in open forums to share lessons learned and best practices among organizations. As telemedicine design and implementation takes shape, assess whether the desired outcomes are being met and mitigate potential risks as they are identified.

## Recommendations to Improve Human Factors and System Design in Telemedicine

| Recommendations | Key Actors |
|---|---|
| Implement a user-centered co-design process to ensure that telemedicine services meet the needs of both patients and providers and are designed with reliability and safety in mind.[44,45] | • Health systems and providers<br>• Patient and family advisors |
| Conduct a total system analysis to identify potential errors and risks that could become issues, assess user needs and capabilities, and then identify the telemedicine technology that best meets those needs. The technology needs to be flexible to adapt to a variety of users (e.g., patients, families, clinicians, support staff, ancillary staff, social workers, community leaders) and evolving needs. | • Health systems and providers<br>• Patient and family advisors |
| Study how best to embed nurses and other multidisciplinary care providers in telemedicine services, especially to support care coordination. | • Health systems and providers |
| Ensure closed-loop specialist referrals when using telemedicine. Devise ways to ensure that the patient has followed up with the specialist and to enable the primary provider to follow the patient along the treatment cascade. | • Health systems and providers<br>• Health IT companies |

| Recommendations | Key Actors |
|---|---|
| Establish telemedicine care teams that include digital navigators,[46] language interpreters, patient advocates, and community health care workers, in addition to clinicians. Care teams periodically meet either in person or virtually. | • Health systems and providers<br>• Community organizations |
| Consider tracking data on key safety indicators for telemedicine. The safety culture of the organization can be one such indicator that is tracked. All errors and safety incidents involving telemedicine are included in incident reporting systems and escalated to leadership. | • Health systems and providers |
| Develop a telemedicine-specific Trigger Tool, a mechanism to use "triggers," or clues, to identify adverse events.[47] | • Health systems and providers |
| Utilize telemedicine to support care continuity for patients who may have logistical challenges with accessing care in person.[48] | • Health systems and providers |

# A Focus on Three Aspects of Quality

The framework described in this paper focuses specifically on three aspects of quality in telemedicine — safety, equity, and person-centeredness — which overlap and can be difficult to isolate from one another. For example, care that is unsafe cannot be person-centered, nor can care that is inequitable. This section discusses some factors that touch on all three aspects.

Most importantly, there is little research on the quality of telemedicine, and ultimately further attention to safety, equity, and person-centeredness will greatly impact telemedicine services. Providers need to ensure that telemedicine is truly optional and that patients are not pressured into using it. At the same time, providers need to understand why patients may avoid telemedicine by identifying and addressing "digital determinants of health" (e.g., lack of access to phone or video or Internet, gaps in technology knowledge and skills) that may pose barriers.

Respecting patients' preferences may require flexibility in terms of technology. For example, mobile devices can be the primary means of Internet access for lower-income Americans; thus providers need to ensure mobile-friendly telemedicine services.[49] Many patients still prefer or only have access to telephone-based virtual care. One safety-net provider noted that "telephone is still king" for virtual-based psychological services, for instance.[50] In one urology clinic serving many lower-income individuals, patients typically opted for phone rather than video visits, with 50 percent doing so because of the lack of a device or WiFi signal.[51] Another study found that older age, female sex, Black race, Latinx ethnicity, and lower household income were associated with lower use of video for telemedicine services.[52] If reimbursement for phone visits decreases dramatically, as some fear, this will likely exacerbate racial, economic, and age-related inequities. Ongoing advocacy is critical to ensure that all patients have access to telemedicine services during a time when the infrastructure necessary to support virtual services is evolving.

To assess how telemedicine services may impact equity and to make these services more equitably available to all who might benefit, it is important to aggregate, segment, and stratify population-level data.[53] Organizations need to use stratified data (e.g., by race, ethnicity, language, sexual identity) to inform co-design of telemedicine services for different population segments and track progress on equity-specific measures over time.

Paying attention to the preferences of individual patients and the needs of different groups can help avoid errors and ensure that the care provided through telemedicine services is safe for all. This can be achieved through effective co-design with stakeholders and, most importantly, with patients.

# The Importance of Co-Design

Each interaction via telemedicine must meet the needs and honor the preferences of the individual patient. When implementing the framework presented in this paper, it is essential to engage patients, families, and the health care workforce at the outset. The practice of co-design and co-producing care with key stakeholders in the process — patients, families, and care providers — can help build trust and foster connections.[54]

Overall, patient acceptance of telemedicine has been high. Press Ganey Associates reports that patients rate telemedicine visits as highly as in-person visits, and other research supports this finding.[55,56] Yet, patient preferences regarding telemedicine vary by individual. Patients prefer telemedicine for certain parts of the care cycle, and for certain disciplines or types of appointments. These preferences may not always align with provider preferences or expectations. Health care organizations must invest the time to co-design services with patients and clinicians and, through this process, work to understand how to continually improve.

Co-designing telemedicine services requires attention to three important considerations.

- **Patient needs and preferences:** Individual patients' needs and preferences for how they receive care, whether in person or virtually, may vary greatly. Large health systems that serve diverse populations, for example, are likely to identify starkly different needs among population segments. When designing telemedicine services, it is important to first identify patients' needs and expectations and then create services to meet those needs. It is imperative that health systems engage patient representatives in co-designing services, from the outset and in an ongoing way, to ensure that these diverse needs are met.

- **Equity is paramount:** While telemedicine has the potential to bridge inequities, there is also the risk of inadvertently perpetuating or even exacerbating them. Not all patients, for example, have access to the necessary equipment or high-speed Internet for virtual visits, and some who do may not have the knowledge and skills to use the technology and require assistance from a caregiver. Some patients may need to conduct visits by telephone, which is also within the purview of telemedicine. Other patients may not have a private space in which to conduct televisits.

A co-design process that engages patients, families, and clinicians can identify and address issues such as these that may impact equity in telemedicine. Both clinical and office staff, particularly schedulers and triage staff, need to be involved in the co-design process. It is also important to engage patient safety officers,[57] who can help incorporate quality and safety considerations into the design and implementation of telemedicine services.

- **Partner with community organizations:** Health care organizations are encouraged to partner with community organizations (e.g., a trusted pharmacy, church, school, or community center) to provide support in the form of knowledge of the community, physical space (e.g., to house telemedicine kiosks), technological infrastructure, and assistance that can facilitate televisits. These types of collaborations can provide additional expertise that may help health care organizations appropriately design telemedicine services for their patients and the community.

Ultimately, telemedicine is not "one size fits all." Providers, in consultation with patients and families, need to assess the most appropriate use of telemedicine to meet care delivery needs. A patient's health and medical conditions are dynamic, and thus the care provided must also be dynamic to meet the patient's needs. It is essential, therefore, to include patient and family representatives as partners in the co-design of telemedicine services.

# Ongoing Challenges and Future Considerations

The future expansion of telemedicine will most likely depend on three key factors: evidence for its clinical effectiveness, a reimbursement model, and patient demand. Telemedicine uptake by providers will increase when the necessary systems, supports, incentives, and training are in place. The pace of telemedicine use has repercussions for both patient and provider experience and for health equity, each of which need further consideration.

Some evidence suggests that patients will continue to seek telemedicine when they most value speed and convenience.[58,59] Where other concerns trump these priorities (e.g., building a doctor/patient relationship, privacy and sense of security, receiving exceptional quality of care), patients will likely continue to seek in-person care. This suggests that opportunities exist to use telemedicine for routine care (e.g., follow-up primary care), ongoing management of common chronic conditions (e.g., depression, heart failure, hypertension, diabetes), and care for patients with concerns about mobility or transportation (e.g., postoperative care where patients may have mobility constraints). Part of this effort must include having a system in place to support both providers and patients in decision making around whether an in-person or virtual visit is the most appropriate way to deliver care.

The factors that influence patient experience overall will also influence patient experience with telemedicine, including confidence in the care provider, coordination of care, responsiveness to patient concerns, listening, and courtesy.[60] It is important to understand how the telemedicine patient experience is substantially different from traditional in-person care and ensure that those discrepancies are addressed.

Reimbursement for and regulation of telemedicine are key considerations that will drive clinician and health system behavior. For example, providers have noted that reimbursement is the key factor influencing their decision to continue using telemedicine in the future.[61,62] The evolving payment landscape for telemedicine is further complicated by the different value propositions in a fee-for-service model (where payment parity with face-to-face visits may be seen as desirable) versus a value-based care model (where telemedicine may have some discount to help lower total medical expense). Sorting through those details will be an important area to watch as we transition into a post-pandemic era.

In addition, for telemedicine to be effective, users and recipients must employ the appropriate technology that enables optimum communication in the mode that best fits the needs of the patient. For clinicians, the technology must be reliable and easy to integrate into existing EHRs. For patients, technology must be accessible and a meaningful part of their care plan.

Finally, in lower-income communities and countries, limited infrastructure and resources contribute to persistent challenges in expanding telemedicine services.[63,64] Lack of reliable Internet access in rural communities across the United States creates inequities in care delivery that must be addressed. While the recommendations in this paper focus on the US context, telemedicine presents an opportunity to restructure medical care worldwide, bringing care

providers closer to those living in communities far from hospitals or clinics and enabling specialists to traverse borders and time zones. The opportunities and challenges that come with the virtual mode of care delivery need to be assessed and addressed globally.

The deployment and use of telemedicine will continue to be largely driven by stakeholders invested in the outcomes. Telemedicine evolution will likely happen at the clinical service level, requiring support from telemedicine staff for technical assistance. Quality improvement staff will need to be engaged to test changes on a small scale, adjust clinical workflows, and provide additional support to clinicians. Patients and family members must be included in all telemedicine initiatives to inform co-design of services.

While certain aspects of in-person care can be difficult to replicate with telemedicine (e.g., identifying non-verbal cues), there are potential advantages telemedicine offers over in-person care: access to continuous physiologic data, access to patient-reported outcomes data, easier exchange of asynchronous information, and improved access to care for certain patients.[65] By partnering with patients, providers, and communities, we must consider how telemedicine can help us redesign how we deliver high-quality care. The opportunity is now, while we are still in the design and innovation stages of telemedicine. Incorporating what is working well with telehealth and recognizing the many benefits offers the opportunity to enhance care, improve health and health care, and make substantial change.

# Conclusion

In 2020, telemedicine use accelerated rapidly as a result of the COVID-19 pandemic. In their eagerness to adopt telemedicine, it is crucial that health care systems and providers do not lose sight of the key principles of quality as well as the unique risks and potential unintended consequences of providing care virtually. The framework and recommendations provided in this paper aim to guide health systems in establishing telemedicine services that provide safe, equitable, high-quality health care for all. As telemedicine evolves and we continue to learn, it will be important to revisit and refine the framework to ensure a focus on key aspects of quality, safety, and equity of telemedicine services.

# Appendix A: IHI Lucian Leape Institute Expert Panel Participants

**Expert Panel Co-Chairs**

- Lindsay Deveaux, Family Partner, Doernbecher Children's Hospital, Cystic Fibrosis Care Center; Patient/Family Partner Work Group Co-Lead, Cystic Fibrosis Learning Network
- Gregg Meyer, MD, MSc, CPPS, Chief Clinical Officer, Partners Healthcare System, Inc.; Interim President, Newton-Wellesley Hospital; Professor of Medicine, Massachusetts General Hospital and Harvard Medical School
- Sharon Quinlan, RN, MSN, MBA, NEA-BC, System Vice President, Ambulatory Nursing and Professional Practice, Advocate Aurora Health

**Expert Panel Participants**

- Rosie Bartel, MA, Patient Advisor, PFAnetwork
- Richard C. Boothman, JD, Owner, The Boothman Consulting Group, LLC; Adjunct Assistant Professor, University of Michigan Medical School; Visiting Scholar, Vanderbilt University Medical School, Center for Patient and Professional Advocacy
- Isaac Shin Chua, MD, MPH, CPPS, Physician, Instructor of Medicine, Division of General Internal Medicine, Brigham and Women's Hospital; Department of Psychosocial Oncology and Palliative Care, Dana Farber Cancer Institute; Harvard Medical School
- Todd Czartoski, MD, Chief Executive of Telehealth and Chief Medical Technology Officer, Providence St. Joseph Health
- Theresa Davis, PhD, RN, NE-BC, FAAN, Clinical Operations Director, enVision eICU Inova Telemedicine
- Martin E. Doerfler, MD, Senior Vice President, Clinical Strategy and Development, and Associate Chief Medical Officer, Northwell Health System
- Kristine Dyre, MSc, Teknologikonsulent, The Capital Region of Denmark; Amager and Hvidovre Hospital
- Susan Edgman-Levitan, PA, Executive Director, John D. Stoeckle Center for Primary Care Innovation, Massachusetts General Hospital
- Barbara Edson, RN, MBA, MHA, Executive Director, Virtual Care Center, UNC Health Care
- Sithabisile Gugu Gigaba, MA, Mental Health Integration Programme Manager, School of Nursing and Public Health, University of KwaZulu-Natal (South Africa)
- Göran Henriks, Chief Executive of Learning and Innovation, Region Jönköping County (Sweden)
- Gary Kaplan, MD, Chairman and CEO, Virginia Mason Franciscan Health; Chair, IHI Lucian Leape Institute
- Carol Keohane, MS, BSN, RN, Vice President for Quality Safety and Experience, Kaiser Permanente
- Barbara Kivowitz, MSW, Patient Family Advisor at Stanford Health Care and at Sutter Health; Member of Patient and Family Centered Care Partners Advisory Network

- Joseph Kvedar, MD, Senior Advisor, Virtual Care, Partners HealthCare
- Melissa Kwiatkowski, MPH, MHA, Primary Health Director, Guelph Community Health Centre
- Sabrina Lakhani, MSc, Director of Health Equity, Planned Parenthood Federation of America
- Meghan Lane-Fall, MD, MSHP, FCCM, Associate Professor of Anesthesiology and Critical Care and Epidemiology, Penn Medicine; Co-Director, Penn Center for Perioperative Outcomes Research and Transformation; Member of the Board of Directors, Anesthesia Patient Safety Foundation
- Della M. Lin, MS, MD FASA, Board Member, Anesthesia Patient Safety Foundation
- Nancy May, DNP, RN-BC, NEA-BC, Chief Nurse Executive, University of Michigan Health System
- Najmedin (Najm) Meshkati, PhD, CPE, Professor of Engineering, University of Southern California
- Clare Morrison, BPharm, FRPharmS, MBE, National Near Me Lead, Scottish Government
- Silvia Perez-Protto, MD, MSc, Anesthesiologist-Critical Care Physician; Medical Director of the End of Life Center at the Office of Patient Experience, Cleveland Clinic
- Michael R. Powers, MD, Credit Unions for Kids Professor in Pediatrics; Cystic Fibrosis Learning Network Co-Chair; Division Head, Pediatric Pulmonology and Sleep Medicine; CF Center and Pediatric Program Director, Doernbecher Children's Hospital, Oregon Health and Science University
- Barbra G. Rabson, MPH, President and CEO, Massachusetts Health Quality Partners
- Sylvie Rosenkalt, Graduate Assistant, Disability Cultural Center
- Corey A. Siegel, MD, MS, Section Chief of Gastroenterology and Hepatology; Co-Director of the Inflammatory Bowel Disease Center, Dartmouth-Hitchcock Medical Center
- Janice Tufte, Patient Partner Advisor, Small Business Owner, Patient and Family Centered Care Partners PFCC; University of Washington CERTAIN Patient Advisory Network; Kaiser Permanente Washington Senior Caucus
- Robert Wachter, MD, Professor and Chair, Department of Medicine; Holly Smith Distinguished Professor in Science and Medicine; Marc and Lynne Benioff Endowed Chair, University of California, San Francisco
- Ron Wyatt, MD, MHA, Vice President and Patient Safety Officer, MCIC Vermont

**IHI Leadership and Staff**

- Frank Federico, RPh, Vice President and Senior Safety Expert
- Joellen Huebner, Director
- Patricia McGaffigan, RN, MS, CPPS, Vice President; President, Certification Board for Professionals in Patient Safety
- Allison F. Perry, MA, Director
- Jeff Rakover, MPP, Senior Research Associate

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