



# eHealth Use on Acute Inpatient Mental Health Units: Implementation Processes, Common Practices, and Barriers to Use

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## Abstract

Information technology to promote health (eHealth) is an important and growing area of mental healthcare, yet little is known about the use of patient-facing eHealth in psychiatric inpatient settings. This quality improvement project examined the current practices, barriers, implementation processes, and contextual factors affecting eHealth use across multiple Veteran Health Administration (VHA) acute mental health inpatient units. Staff from units serving both voluntary and involuntary patients ( $n = 49$  from 37 unique sites) completed surveys regarding current, desired, and barriers to use of Veteran-facing eHealth technologies. Two subsets of respondents were then interviewed (high success sites in eHealth use,  $n = 6$ ; low success sites,  $n = 4$ ) to better understand the context of their eHealth use. Survey responses indicated that 20% or less of Veterans were using any type of eHealth technology while inpatient. Tablets and video chat were the most desired overall and most successfully used eHealth technologies. However, many sites noted difficulty implementing these technologies (e.g., limited Wi-Fi access). Qualitative analysis of interviews revealed differences in risk/benefit analysis and implementation support between high and low success eHealth sites. Despite desired use, patient-facing eHealth technology is not regularly implemented on inpatient units due to multiple barriers (e.g., limited staffing, infrastructure needs). Successful implementation of patient-facing eHealth may require an internal champion, guidance from external supports with experience in successful eHealth use, workload balance for staff, and an overall perspective shift in the benefits to eHealth technology versus the risks.

**Keywords** eHealth · Acute mental health · Inpatient · Technology · Telehealth

The use of information technology to promote health (eHealth) is an important and growing area of mental healthcare (Appleton et al., 2021; Barnett et al., 2021; Hailley, Roine, & Ohinmaa, 2008; Hilty et al., 2013). People with mental health conditions use the internet at roughly

the same rates as the general population and for similar uses (Morris, 2018). For example, the internet can provide important information on mental health treatment options, facilitate social connection, and provide remote access to manage one's life (e.g., pay bills). In addition, mobile applications have been used to provide self-guided management of a range of mental health conditions (Badesha et al., 2022; Gould et al., 2019), and have shown promising results when tested in a residential setting (Kuhn et al., 2014). However, access to electronic devices is limited on inpatient mental health units. Cell phones are often taken from patients upon admission, and some units do not allow patients access to the internet or require supervision during time-limited usage (Morris, 2018). Certainly, eHealth poses risks and complications for inpatient units where patient safety is paramount, and mobile devices or their parts could be used as weapons, ligatures, or pose cutting risks. Access also brings the potential for inappropriate use (e.g., accessing pro-suicide

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websites) and potential privacy risks (e.g., for devices with photo or video capability).

At the same time, eHealth provides unique opportunities for expanding access and supporting the mission of recovery-oriented, patient-centered inpatient care. For instance, tablets or computers may provide a platform for video-chatting with outpatient providers at remote locations (DeVido et al., 2016). Thus, eHealth provides opportunities to enhance inpatient-outpatient coordination, discharge planning, and the provision of specialty services or consultations with providers in another location. eHealth could also help maintain connection with family and significant others and help support a homelike environment while on the unit (O'Connor et al., 2018). All are important components of recovery-oriented goals (SAMHSA, 2012).

In addition to increasing recovery-oriented care on inpatient units, eHealth may also play a critical role during the ongoing COVID-19 pandemic. Acute inpatient mental healthcare was disrupted in multiple ways during the early phases of pandemic (e.g., reduced group programming, reduced individual therapy and peer services, longer wait for outpatient follow-up care; McGuire et al., 2021). Safety precautions (e.g., social distancing, limiting number of providers on the unit) may have limited the availability of in-person care on inpatient units. One possible solution for these barriers to care is the use of eHealth (e.g., using video platforms to decrease the number of clinical providers physically present on inpatient mental health units). Indeed, Zimmerman and colleagues (2021) found that treatment via telehealth for individuals in a partial hospitalization program during the COVID-19 pandemic was equally as effective and produced a higher completion rate compared to in-person treatment. Despite promising effectiveness of eHealth, little is known about the overall use of eHealth on inpatient units.

Acute mental health inpatient units serve many individuals in need of immediate care. According to the National Mental Health Services Survey, on a given day in 2020, 77,622 clients received inpatient mental health services across the United States (SAMHSA, 2021). As such, optimizing care within these settings is crucial. As a possible solution to both disruptions in care due to the COVID-19 pandemic and improvement in recovery-oriented care on inpatient units, there is an urgent need to learn current effective practices regarding use of eHealth on acute mental health inpatient units, gaps and unmet needs among the inpatient mental health workforce, as well as strategies used to implement eHealth practices in a safe and efficient manner. In line with rapid learning methods for eHealth implementation (e.g., evaluability assessment; Glasgow, Phillips, & Sanchez, 2014), the current project sought to better understand the use of eHealth across acute inpatient mental health units within the Veterans Health Administration (VHA). The VHA is the nation's largest integrated

health system and has recently increased efforts in expanding evidence-based telehealth services to improve Veteran access to health care. The current quality improvement project has two overall aims: (1) Assess current eHealth usage, promising practices, and barriers to use amongst VHA acute inpatient mental health units and (2) Elucidate unit staff's perspectives of implementation processes and contextual factors that may affect eHealth use on acute inpatient mental health units.

## Methods

### Overview

The current report was conducted as a quality improvement project in response to the urgent need to learn current best practices regarding use of eHealth on inpatient units, gaps and unmet needs among the inpatient mental health workforce, as well as strategies used to implement eHealth practices in a safe and efficient manner. The purpose of this quality improvement project was to provide guidance to the Veterans Affairs Office of Mental Health and Suicide Prevention regarding the use of eHealth within acute inpatient settings to inform future policy. The activities were confirmed to be non-research, indicating that the project does not meet federal criteria for human subjects research, by the Veterans Affairs National Director of Inpatient Mental Health Services. The project was designed to inform the quality improvement efforts that are part of ongoing inpatient mental health policy reviews. We disseminated a voluntary online survey to VHA acute mental health inpatient unit staff across the United States to gather quantitative and qualitative data on Veteran-facing technology use. Following data collection, we utilized emergent, consensus-based qualitative analysis to identify core themes related to reasons and barriers for use as well as implementation processes for most successful, least successful, and most desired use of Veteran-facing eHealth.

Based on responses from the initial survey, we then interviewed two subsets of respondents to better understand the context of eHealth use. For these interviews, we focused on video chat and tablets because these were the most successfully used and the most desired technologies for future use. In addition, after internet access, video chat and tablets were also the two technologies that respondents reported as being "least successful." Because this quality improvement project is non-research, written informed consent for the survey was not required; however, all respondents were informed of the purpose of the quality improvement project as well as the voluntary and confidential nature prior to participation. After providing this information, consent was implied with

the decision to continue on with the survey. Additionally, verbal consent was obtained for interview data.

## Setting and Participants

Invitations for the voluntary survey were sent to points of contact for each inpatient unit, as indicated on the Inpatient Mental Health SharePoint site and from contact lists for VA inpatient mental health staff. A total of 219 individual email invitations were sent, an invitation to complete the survey was also posted on the Inpatient SharePoint site, and participation was encouraged by Office of Mental Health and Suicide Prevention (OMHSP) during national calls and other informal means. The extent of the recruitment effort reach to individuals is unknown; however, at least one representative from each inpatient unit would have been aware and given the opportunity to participate. Units with at least one survey respondent ( $n = 37$ ) represented about 32% of VHA acute inpatient mental health units based on available information. The online survey was open from 9/9/2021 to 10/19/2021.

Surveys were completed by 49 individuals, representing 37 unique VHA sites. We accepted multiple responses per unit, and for percentages, we took the average for that site. Most sites were represented by respondents in administrator roles (57%), most of whom also provided direct care (65%) with some also serving as program coordinator (18%). Survey respondents dedicated an average of 69.6% of their time to the unit ( $SD = 36.1$ ). Sites varied in size and operating capacity, ranging from one unit with 8 beds to multiple units with 40 beds ( $M$  of beds operating = 23.7,  $SD = 12.5$ ;  $M$  of beds authorized = 27,  $SD = 1.6$ ). All VHA acute mental health inpatient units are required to be locked units. Additionally, previous research suggests the average length of stay across 33 VHA acute mental health inpatient units was 8.1 days (McGuire et al., 2021).

For the second aim of the study, we first invited individuals from 10 sites who reported successful eHealth video chat and tablet use and interviewed 6 (4 did not respond after two email invitations each). Successful sites were identified through their response to the survey question “*What have been the most successful uses of Veteran-facing, eHealth technologies on your unit? Please describe.*” (i.e., responded with tablet and/or video chat use). We later targeted a subset of sites who had not yet been successful with these modalities (i.e., responded to survey question about their least successful use of eHealth technology with tablet and/or video chat use) and had reported more desired use in the survey. For this subset, we invited individuals from 5 sites and interviewed 4 (1 was not able to schedule within the time frame).

## Survey Procedures

In consultation with OMHSP, the team developed a voluntary survey consisting of 36 items assessing contextual information about the site (e.g., number of beds), current use of eHealth, desired use of eHealth, and barriers encountered. Specifically, participants were asked to estimate the current use (at the Veteran level) for several types of technology that could be used for eHealth (i.e., wearable technologies, applications, video games/virtual reality, Veteran cell phones, tablets, personal access to internet, video chat, and VA Video Connect). Secondly, the survey consisted of a series of open-ended questions asking participants to describe: (1) the most successful types of technology their unit has tried, (2) the least successful types of technology their unit has tried and the associated barriers to use, and lastly, (3) Veteran-facing eHealth technologies that the unit would like to use more of, how they would use them, and the barriers to increased use.

## Interview Procedures

Interviews for aim 2 of the study were conducted iteratively from 10/25/2021 to 2/2/2022 by video conferencing (i.e., Microsoft Teams), with rapid qualitative analysis techniques after each interview to guide refinement of questions such that themes emerging from early interviews were explored with subsequent respondents (Hamilton & Finley, 2019). For the successful sites, interview questions centered on processes used to implement (or attempts to implement) specific eHealth technologies (i.e., tablets and video chat). Additionally, we asked about contextual factors (e.g., unit culture and climate, local or national policy, competing priorities) affecting implementation attempts. Sites evidencing success with eHealth were interviewed earlier so that their reported processes could be explored with less successful sites. All interviews were recorded, transcribed, and de-identified.

## Data Analysis

To understand the frequency of most successful, least successful, and most desired types of technology mentioned, open-ended responses from the survey were coded using the list of possible types of Veteran-facing eHealth technology described above. However, video chat and VA Video Connect (i.e., a VHA platform for video chat) were collapsed into 1 code because participants often used these interchangeably in their responses. Following coding for the type of technology, we used an emergent, content analytic approach (Hsieh & Shannon, 2005) in analyzing open-ended responses regarding reasons for using the technology and barriers associated with use. Specifically, two authors (author #1 and author #6) independently reviewed

open-ended responses and created provisional codebooks for (1) common reasons for using technology on the unit, and (2) common barriers contributing to technology use. Authors then met to develop a set of stable codes for each of these two topics. Lastly, author #1 coded reasons for use and barriers to use mentioned across open-ended responses for most successful, least successful, and most desired eHealth technologies. After coding was complete, author #1 and author #6 reviewed the contents under each code to ensure the coding accuracy and completeness.

For qualitative interview data, transcripts were again subjected to emergent content analysis (Hsieh & Shannon, 2005) with immersion and reflection (Crabtree & Miller, 1999). Specifically, one author (author #3) used constant comparison methods (Glaser, 1965) comparing interviews from successful sites, with those from less successful sites. Author #3 also compared sites within each of those two categories to highlight similarities and identify potential differences. Initially, interviews were read by alternating a successful site with a less successful site, identifying text that described the context of how they used Veteran-facing technology, including how it started, and factors that supported technology. We already knew about key barriers identified in the surveys, so we used the interviews to better understand how barriers were related to each other and whether strategies used in the successful sites could be applied to other sites desiring more use of video chat and tablets.

## Results

### Overview

Survey responses indicated that 20% or less of Veterans were using any type of eHealth technology. Survey respondents reported video chat and tablets as the most successful and most desired use of technology. Access to services (e.g., provider Telehealth visits) was the most common reason for use. Further, anticipated infrastructure and staffing concerns were frequently reported barriers to desired technology implementation. Additionally, respondents indicated that Veteran internet access was the least successful use of technology, followed by use of tablets and video chat, with Wi-Fi access being the most frequent reported barrier for least successful use.

Interview data revealed that while some sites successfully established use of video chat or tablets prior to the COVID-19 pandemic, many successful sites were motivated by the pandemic to implement Veteran-facing eHealth for social distancing on the unit. Sustainability of successful technology use on units post-pandemic varied. Additionally, all interview participants discussed safety concerns related to using technology; however, many respondents with success

in implementation indicated that the benefits of Veteran-facing eHealth outweighed the risks.

Strategies surrounding how sites successfully implemented new eHealth varied, with many having at least one champion of Veteran-facing technology on the unit (e.g., person willing to advocate for use on the unit). Additionally, interviewees discussed the need to overcome staff burden for successful implementation, particularly with nursing. Successful sites discussed positive interactions between disciplines on the unit as a facilitator (e.g., finding most convenient time for nursing to help facilitate Telehealth visits, discussing positive impact of nursing involvement in Telehealth appointments). A detailed description of findings for each project aim is reported below.

### Aim 1

#### Current Use of Veteran-Facing Technology

Survey respondents estimated the current use (at the Veteran level) for several types of technology that could be used for eHealth. These percentages were averaged first within sites, for those with multiple respondents, and then across sites. By these reports, 20% or less of Veterans were using any type of eHealth technology, ranging from 4% (wearable technologies) to 20% (VA Video Connect, a software used for access to providers). Three other technologies were reported at a similar level of Veteran use: video chat (18%), personal access to internet (18%), and tablets (17%) (See Table 1). With the exception of Veteran cell phones, all devices were described as VA owned and issued (e.g., VA-issued tablets).

#### Successful Technology Use

As shown in Table 1, most sites (62%) reported using video chat with Veterans (accessed from either a computer or tablet for access to services and/or connection with family/friends), while only 2 (5%) sites have used wearable technologies. As shown in Table 2, most sites described access to services as the most common reason for use (70%). Over a third of sites reported that technology was successfully used to connect Veterans with their community supports or to address community needs. In the open-ended questions, sites rarely described success using technology for supporting self-care or monitoring purposes.

#### Least Successful Technology Use

As shown in Table 1, over a third of sites reported that Veteran internet access has not been successful. Several sites described video chat and/or tablets as least successful. Lack of or poor Wi-Fi access was a barrier (See Table 3), with

**Table 1** Reported current, most successful, least successful, and most desired uses of veteran-facing eHealth

| Technology type                 | M (Min-Max) |
|---------------------------------|-------------|
| Percent of reported current use |             |
| VA Video connect                | 19.6 (0–98) |
| Video chat                      | 17.9 (0–75) |
| Tablets                         | 17.4 (0–60) |
| Personal access to internet     | 17.5 (0–83) |
| Apps                            | 10.3 (0–50) |
| Cell phones                     | 16.0 (0–96) |
| Wearable technologies           | 3.9 (0–50)  |
|                                 | N (%)       |
| Most successful                 |             |
| Video chat                      | 23 (62.1)   |
| Tablets                         | 19 (51.3)   |
| Computers                       | 7 (18.9)    |
| Internet Access                 | 6 (16.2)    |
| Apps                            | 4 (10.8)    |
| Cell phones                     | 3 (8.1)     |
| Wearable technologies           | 2 (5.4)     |
| Least successful                |             |
| Video Chat                      | 9 (24.3)    |
| Tablets                         | 7 (18.9)    |
| Computers                       | 2 (5.4)     |
| Internet access                 | 13 (35.1)   |
| Apps                            | 1 (2.7)     |
| Cell phones                     | 1 (2.7)     |
| Most desired                    |             |
| Video chat                      | 15 (40.5)   |
| Tablets                         | 13 (35.1)   |
| Computers                       | 5 (13.5)    |
| Internet access                 | 6 (16.2)    |
| Apps                            | 10 (27.0)   |
| Cell phones                     | 3 (8.1)     |
| Wearable technologies           | 5 (13.5)    |

a variety of other concerns mentioned in relation to least successful use.

## Desired Technology Use

When asked what types of Veteran-facing eHealth technologies respondents would like to use more on their unit, 95% (all but 2 sites) listed at least one type of technology they would like to use more. As shown in Table 1, video chat and tablets are the most desired technologies. Notably, these same two technologies were also the most successful (as well as the 2nd and 3rd least successful).

As shown in Table 4., numerous barriers were identified for desired technologies, primarily staffing and infrastructure needs. Although safety is listed as a separate category, it should be noted that many of the barriers were inter-related with safety concerns. For example, some respondents described “inability to get equipment that is compatible with [video chat] for groups and lack of staffing to monitor equipment use” and “Nursing must monitor patients who are using electronic devices and we are understaffed.” Notably, while staff and infrastructure were anticipated to be barriers for many sites (46%), only a few sites described these same barriers earlier in least successful use.

## Aim 2

### Context of Successful Video Chat and Tablet Use

A few successful sites had already established the use of video chat prior to the pandemic and had necessary equipment. In these cases, the primary use of this technology prior to the pandemic was to provide on-call or weekend psychiatry coverage. At one small, more rural site, pre-pandemic video chat for access to mental health care services was important due to many psychiatrists providing care remotely. The pandemic then heightened the need, and this site was ready to expand:

We were doing that before the pandemic hit, but we did it pretty much completely with the pandemic. And it really kind of helped us maintain our standard of care,

**Table 2** Reasons for using the successful technology

| Reason for use             | Reason description and sample quote(s)  | N (%)     |
|----------------------------|---|-----------|
| Access to services         | Using technology to provide clinical services when in-person care is not possible, more difficult, or less safe otherwise. This may include continuation of previously available services or expansion to new services. | 26 (70.2) |
| Community connection       | Using technology to connect Veterans with community supports such as family and friends or take care of personal affairs (e.g., pay bills).   | 13 (35.1) |
| Coping and self-management | Using “healthy apps,” practicing health coping (e.g., listening to music), or using apps that facilitate use of skills learned from services.   | 6 (16.2)  |
| Monitor veterans           | Using technology to monitor Veteran behaviors (e.g., safety monitoring, physical activity).   | 1 (2.7)   |

**Table 3** Types of barriers contributing to least successful use

| Barrier                       | Description and sample quote(s)   | N (%)    |
|-------------------------------|---|----------|
| Wi-Fi access                  | Difficulty obtaining Wi-Fi access for the unit  | 9 (24.3) |
| Veteran factors               | Difficulty obtaining “buy-in” from Veterans, limited technology skills from Veterans  | 5 (13.5) |
| Infrastructure                | Need for more equipment, funding to support technology use, unit space, or integration with pre-existing VA systems (e.g., VA firewall) | 4 (10.8) |
| Limited staffing              | Inadequate staffing to support the technology or to monitor use   | 3 (8.1)  |
| Safety                        | Technologies represent a risk to Veterans and staff   | 2 (5.4)  |
| Staff Knowledge and Attitudes | Difficulty obtaining “buy-in” from staff/leadership, staff’s willingness to facilitate use, or staff’s limited knowledge of technology  | 2 (5.4)  |
| Protocols and regulations     | Interpretation of national or local protocols/standard operating procedures that limit technology use feasibility                       | 1 (2.7)  |
| Privacy                       | Concerns about PHI or sensitive information being shared inappropriately  | 0 (0.0)  |

**Table 4.** Anticipated barriers to veteran-facing ehealth technologies

| Barrier                   | N (%)     |
|---------------------------|-----------|
| Limited staffing          | 17 (45.9) |
| Infrastructure            | 17 (45.9) |
| Safety                    | 10 (27.0) |
| Staff Knowledge/attitudes | 9 (24.3)  |
| Wi-Fi access              | 8 (21.6)  |
| Protocols/regulations     | 6 (16.2)  |
| Veteran factors           | 6 (16.2)  |
| Privacy                   | 5 (13.5)  |

and getting patients seen, getting the orders in, getting the assessment.

Conversely, a larger setting with psychiatry residents viewed video as a back-up, before and during the pandemic: “It’s very much a secondary modality. The vast majority of my staff have come to work in person every day. However, we have had some staff who’ve had to quarantine for various reasons.” Other sites did not start using video chat until the COVID-19 pandemic, when it became clear that alternate means (e.g., video chat for visits with providers) were needed to reduce risk of exposure for Veterans.

The pandemic also led to staffing shortages. One site described a staffing shortage of psychiatrists in the area (during the pandemic) that resulted in both “a hire made under duress” for someone who needed to work remotely, as well as the support of temporary remote psychiatry providers. Although this site reported video chat for telehealth appointments as a success, they eventually found it difficult to coordinate psychiatric services via video chat across multiple teams and units. Because of these difficulties and the extra burden to staff, they have limited video chat to one psychiatry provider and to facilitate treatment team meetings with patients and a few limited other examples (e.g., assessment for potential post-discharge services). Other services,

like family video chats are not facilitated “primarily because of staffing.”

The other successful sites have access to a variety of technology on the unit for Veterans outside of video chat for psychiatry, including video chat with other providers and family, with court systems, to accommodate staff preferences or health requirements, to facilitate team meetings, and for staffing patients. One successful site described that “When COVID started, they issued us all tablets. And we used them in a variety of ways and then they took most of them back. But I lobbied to keep mine, and I was able to do so.” The provider then went on to describe a variety of clinical applications of using the tablet for accessing self-care and stress-management tools during group therapy, taking Veterans on virtual tours of post-discharge facilities, and video chat with family members. Another site described not only using video chat, but also personal cell phones and laptops because these can provide therapeutic teaching opportunities.

It was helpful sometimes to have in vivo experience to facilitate learning, right. So, playing a video game, is this really actually helping you feel less anxious? Or is this more of an instance of distraction and avoidance strategy that you’re using. We could use that in the milieu, in group, and in individual therapy to work on building awareness and actually helping people start testing their experience more accurately and realistically. ‘Cause, I agree, they leave. They pick up their phone. Like being on the unit doesn’t necessarily stop life from happening around them.

One site stands out as a unique example of technology driven by the pandemic. During the early part of the pandemic, this site transitioned into a specialty unit dedicated to serving COVID positive patients with acute psychiatric needs (later referred to as the “COVID-specific unit”). Their use of technology was designed to fulfill specific purposes of safely treating patients in an inpatient setting, who needed to be quarantined from each other and staff. With the use of

individual tablets, capable of video content and streaming, the site worked with IT to set up a mesh network which “allowed more bandwidth, be able to run video operations... if [Veterans] wanted to watch a movie during down time, potentially they all could be doing that and not have interruptions with that.” Finally, this site set up e-mail accounts for each Veteran so that they could use the video chat system on the tablets to participate in unit programming. Although the site is not currently a COVID-specific unit, they have continued allowing tablet use, with supervision, on a sign-out basis mainly for access to health care services.

### Safety and Privacy Concerns

All interview participants discussed safety concerns related to using technology on units designated for people in acute psychiatric need. Most of the units include patients on involuntary admission, who may have been legally deemed a risk to the safety of themselves or others. Even in one site that mentioned explicitly being a voluntary unit, the high acuity of patients necessitates careful consideration. For example, one site summarized succinctly:

I think it’s mostly for safety precautions because, you know, the iPad like mine has a screen, like it could break, or somebody could use it to harm themselves. I think that is the main concern. But also, I think that there’s video technology, you know, take pictures and videos of other patients. So, I think that those are the 2 main [concerns]... safety and then privacy. Even for currently stable patients, one respondent feared “In a hot second, they could be very agitated.”

Respondents voiced concern that devices could become projectiles: “They might be irritated and then throw that thing across the room or something, you know.” They differed in their response to this risk, though. For instance, one respondent stated that when a patient is using a device:

You are now placed on a one-to-one [supervision] on that [device]. And we have to do a time limit, your conversation will be 8 min long. And I am your shadow. And I’m sorry if that’s uncomfortable for you to have somebody listening in to your conversation, but it’s for the safety of everyone.

In contrast, another respondent downplayed the threat of projectiles:

But we have books on the unit too, and we have chairs on the unit. It’s like, so, where do you draw the line? You know if this is going to provide tons of therapeutic benefit. I think the risk is really low for veterans to use it as a weapon.

### What Happens When Safety or Privacy Is Breached?

Notably, safety and privacy violations do occur. Not all sites described these critical incidents, but two may be particularly informative. One site that successfully uses a variety of technology, including personal phones and laptops, shared the following:

Every once in a while, someone would use it inappropriately. And we would get a call about someone making calls to the police...[or]... threatening a family member, whatever, in which case then we would discuss it with the treatment team, and limit their access, or facilitate the access more closely. Again, part of the thought process [is] taking it away from someone completely ... doesn’t really teach them how to be using it more appropriately.

For this site, instead of making a general rule limiting access for all patients, the response was individualized and incorporated into treatment. Later in the same interview, the respondent described a system for mitigating risk of recording “we would put stickers, like our code stickers, ... over the cameras ‘cause they’re easy to see from the nursing station.”

This example is in stark contrast to a site reporting unsuccessful use of technology. This site already had restrictive policies regarding use of technology (e.g., cell phones could only be checked out and used under supervision). But after a critical incident, the site established a new rule where no one has access, except in “rare” cases approved by the psychiatrist.

We actually had a very sick patient who recorded a Facebook live video on the unit, a full 45-minute video and posted it. And that was the end of the cell phones on the unit. (laughter)...so, now we tell patients at admission, you need to get whatever phone numbers you need cause the cell phone will be locked up until discharge. And that’s worked out well.

### How Do They Do It? Safety of Equipment Determines Need for Supervision

Across successful sites, there was no magic formula for implementing new technology. As with many innovations, necessity was the driver – even for the sites implementing video chat prior to the pandemic. Sites varied in accessibility to equipment – some had computer terminals built into the wall in a designated space, others repurposed existing space and technology, and others bought new equipment. The type and level of supervision depended on all these factors, as well as the site’s availability of staffing, their willingness and knowledge, and the local calculation of risk. Safety is still

important at these successful sites, but the benefits are worth it, if they have the staffing and equipment to do it safely. “So, I think being flexible and communicating with your team is really important and using technology to improve and support your standard of care but not at the exclusion of safety.”

One site had equipment already built into the wall that they used for telehealth, but also maintained portable equipment (e.g., computer on wheels) for backup when the Veteran could not come to the room. This site as well as another site also had a nurse present while the patient used the computer for telehealth. In both cases, the nurse was considered an important part of the process, beyond ensuring safety. They facilitated use of equipment, “serve[d] as somewhat of a translator to the patient if they couldn’t hear the provider, or whatever, and reinforce whatever was being said,” and were able to be on the “same page” clinically. Another site talked about the benefits for staff during facilitation:

But when we do have the staff do it, they’re loving it because they get a chance to ... be a part of making sure that they’re doing something to help out the Veteran. And so, I think that that’s the piece. And then they see the benefit of the Veteran being able to utilize that apparatus. They see the benefit of it, and I think that that’s helpful.

For sites that use hand-held devices, like tablets, personal phones, or laptops for a variety of purposes (e.g., allowing Veterans to manage personal affairs, speak with friends/family, access to health care services), the environment allowed for supervision, sometimes without one-to-one supervision. For example, having nursing stations with panoramic visibility can facilitate shared supervision:

We had chairs right outside the nursing station where we would have patients sit with their electronics, basically. So, that they were in eyesight of anybody that’s in the nursing station. So, basically, anybody that’s in there is responsible for kind of keeping an eye on the patients. But no one person was responsible.

Another site has open visibility from the nursing station to a group room, but still requires that an individual take responsibility for the supervision from afar:

If a Veteran wanted to do a visit with the tablet, they can go in the group room because then the nursing staff can still see them. And they can have privacy. And then it really kind of depends on if there’s a staff member like available and willing to take ownership of supervising that. Same with social work, if they time to like make that arrangement to set up the iPad so that

they can do that. So, that’s been, that’s always a barrier of being short staffed, for sure.

Still, some sites do not have the physical space (or type of equipment) that allows for distance supervision. In these cases, some directly assign or “detail” a staff person, while another uses a rotational system where staff floor duties rotate every hour so that one staff member is not detailed to monitor computer use all day.

At least one respondent was not sure that direct supervision would be necessary during video chat with other providers, stating that:

I would say it’s probably a little bit of over kill. I mean obviously the clinician is with them the whole time. And they could, you know, alert the nurses immediately if something was going on. And also, the patients are on camera from the nursing station.

Even in the site that became a COVID-specific unit where patients had access to tablets in their own rooms, there were limits. “We had set up privacy, we set them up with privacy restrictions, so, that they could, make sure that they couldn’t access anything that wouldn’t be beneficial for their treatment.”

### Champion to Lead the Technology Advances

Successful sites had at least one champion, or someone willing to persevere and “fight” for this. Sites often had to overcome multiple challenges regarding obtaining and installing equipment safely, checking with legal supports, and working with IT and engineering departments of the hospital. These sites may experience roadblocks but keep trying. For example, a provider at one site explained:

But I think I may have been the only one who was really hard core I want to keep [the tablet]... you know, I use it... They make it hard to have, you know. So, I think that there’s just a lot of red tape when it comes to having the technology and keeping the technology.

Having a positive outlook is important. One site noted, “It’s a challenge. Bet you that. Like it’s definitely a challenge. For some reason, we figure it out.” The respondent emphasized the importance of the can-do attitude:

So, I guess we do enjoy that in-person piece. But as always with the video transfer piece, we thrive in everything that we do. So, when you start doing video, you don’t be like, oh, woe is me. I really want to go back to in-person. I’m just going to do everything I can to make the video piece work as well.



These technology champions took risks, found workarounds, and at times, led their own way, especially during the early stages of the pandemic. In the case of converting to a COVID-specific mental health inpatient unit, it took a variety of factors working together to make it happen. For example, this site worked with engineering IT for mesh network set up, volunteer services for funding and setting up Netflix accounts, and leadership and staff to set up tablets and emails for telehealth appointments. This clearly takes dedication, perseverance, and teamwork.

In contrast, all four of the sites who reported not being successful described their attempts in more passive terms. For example:

We did request for iPads for that purpose. But again, with the COVID hitting us so hard that I think, and I'm not 100% sure, because I'm not the business manager, if that money went to, you know, PPEs or building the tent outside the hospital. I don't know where it went. We never got it.

In addition, at least two of these sites described a hesitancy to push too hard. For example:

I just know, that just from my own leadership steps, I feel that, and again, it could be COVID and the stress of everybody. I don't have a, I have an acting chief, and that acting chief has been there for a year. I don't know what's happening to our leadership at this time. And I don't want to rock the boat.

### Overcoming Staff Burden Concerns

Nursing staff are often needed to provide supervision for technology use and not surprisingly, burden to staff, particularly nursing, frequently arose in the interviews. Some sites reported that nursing staff did not want to be involved or “tasked to set up the computer and make sure it's working. And you know, troubleshoot any issues. We've had zero cooperation from nursing when we brought it up with them.” One respondent did not feel that sitting with Veterans to help facilitate technology use was a good use of staff time. Others anticipated that technology might not be well-received, particularly by nursing staff, because of their existing workload, or perhaps because it would not be fair due to their inability to telework compared to other staff members.

In contrast, the successful sites described positive interactions between disciplines, for example, “We could coordinate the best time for the provider to call and do their visit, so that it's not co-occurring with like Med Pass or something like that where everybody's doing different tasks.” Another site anticipated difficulties but seemed surprised not to find complaints:

I was worried that the nurses were going to, that it was going to be a burden for them to be, to kind of be telehealth facilitators. (laughter) And I was wondering, do we need to hire more people for this or like. But it hasn't. I've checked like regularly about this. And there's just been nothing...I've literally had no complaints or issues about it.

Some sites discussed positive potential impacts for nursing, for example:

I think we can use the device too for other reasons, for nursing reasons such as doing the constant watches and the continuous rounding. If we had a device like that instead of still using old forms, a paper form of counting each patient, and checking on them, and doing a paper form. I think we should be getting into the 21st century on that, on that side. So, I think that would also benefit us.

## Discussion

Research assessing eHealth use for mental health has primarily focused on outpatient services (Barnett et al., 2021; Hailey et al., 2008; Hilty et al., 2013). Although little is known about the use of eHealth on acute mental health inpatient units, patient-facing technologies may serve as an important tool to model key principles from recovery-oriented care (e.g., maintaining community support; SAMHSA, 2012) and to enhance therapeutic programming when in-person visits are not possible (e.g., decreased programming due to COVID-19 pandemic; McGuire et al., 2021). The current quality improvement report is the first to systematically examine current eHealth use, barriers to use, and implementation processes on acute mental health inpatient units; findings provide insight into the current state of inpatient eHealth across the largest integrated health system in the United States and guide recommendations for successful implementation of patient-facing eHealth technologies.

### Current State of eHealth Use on Inpatient Units

Overall, the use of patient-facing eHealth on inpatient mental health units is in its infancy—20% or less of Veterans were using any type of eHealth technology while on the unit, with the highest use being VA Video Connect (i.e., video chat). Additionally, most sites indicated access to services (e.g., telehealth visits with providers off the unit) as their main reason for successful technology use with only a third discussing eHealth use for accessing community support or addressing community needs, and even less for self-care. This finding may reflect the growing need to create alternative ways to access care off the unit in the context of

the COVID-19 pandemic, while also showing that eHealth may not be reaching its full potential to enhance recovery-oriented care on the unit (e.g., maintaining community connection). Interestingly, while sites indicated video chat and tablets as the most desired type of technology, these were simultaneously ranked as the *most* successfully implemented as well as the second and third *least* successfully implemented technology across units. Given these findings, video chat and tablet use seem to be eHealth technologies that many sites have tried to implement to varying degrees of success. Barriers to use of these technologies were primarily due to staffing (e.g., limited staff availability to supervise use) and infrastructure needs (e.g., missing necessary equipment). Additionally, safety concerns were interwoven throughout responses from the survey as well as interviews (e.g., device used as possible projectile), and this is consistent with previous literature assessing staff's perceived barriers for use of personal electronic devices (O'Connor et al., 2018) and internet access (Morris, 2018) on inpatient units.

### Implementation Processes and Recommendations

The compatibility of recovery-oriented practices in an environment that also must ensure patient and community safety has long been a topic of discussion within recovery-oriented care (Meehan et al., 2008; Wyder et al., 2017) and eHealth technology literature (Graham et al., 2020). One of the main differences between sites that were successfully able to implement eHealth technologies and sites that struggled was their risk tolerance. Some successful sites specifically mentioned the importance of recovery orientation and viewing patients as adults with autonomy. In accord with these beliefs, successful sites tended to view safety or privacy breaches caused by eHealth use as exceptions rather than inevitable outcomes and as such, these sites tended to handle safety and privacy concerns on a case-by-case basis. On the other hand, less successful sites were quick to put in limits, viewing the acuity of patients or the mission of inpatient care as necessitating restriction. It may be that implementation of eHealth is most successful when unit staff perceive eHealth benefits to be worth the overall risk of using eHealth on the unit, motivating them to find “work arounds” to maintain this service for most Veterans, even when safety or privacy concerns arise. For many sites, the COVID-19 pandemic may have altered the risk-benefit ratio such that sites were willing to accept the risks of using technology to protect the physical health and wellbeing of Veterans and staff.

When reflecting on the implementation process, all four less successful sites that were interviewed reported some attempt to implement video chat but had given up. Common barriers reported were unclear roles related to eHealth implementation (e.g., not within their current job description, hesitancy to take on a greater role) and dwindling

implementation support (e.g., changes in leadership, turnover, lack of funding, pandemic). Additionally, although the history of these sites and their past attempts to implement new procedures is unknown, large systems such as the VHA often have the reputation of requiring excessive work (paperwork, red tape, bureaucracy; Rosenheck, 1986), and this belief often stopped staff from trying to create new ways of doing things. Many of these barriers are also found in literature on implementation of technology use in outpatient mental health care or health care in general (e.g., belief that technology was beyond provider's scope of practice, lack of funding/support, failure to iteratively adapt technology in concordance with setting changes; Connolly, Kuhn, Possemato, & Torous, 2021; Graham et al., 2020; Greenhalgh et al., 2017; Ramsey et al., 2016). Conversely, successful sites often had champions of technology (i.e., internal facilitators; Stetler et al., 2006), who were proactive and persevered despite barriers. Champions may have personal qualities, such as confidence in taking risks, finding workarounds, or pushing for change (e.g., Harvey & Kitson; 2015; Howell & Higgins, 1990).

Due to challenges in facilitation mentioned above, implementation supports with external facilitation, both from implementation experts who could assist with motivation and change management (e.g., “expert” facilitators; Harvey & Kitson; 2015), as well as from peers who have had success may be helpful in increasing eHealth use on inpatient units as noted by some participants. External facilitation has been proven an effective implementation strategy in a variety of healthcare settings (Bidassie et al., 2015; Ritchie et al., 2017; Stetler et al., 2006). Additionally, given the different demands for the different professions on the treatment team, it may be beneficial to pair peers from the same practice field (e.g., nurse managers could be paired with other nurse managers, Medical Director with Medical Director).

In addition, the lower success sites frequently expressed ambivalence, reporting both the desire to try more, but also a variety of barriers. Research indicates that buy-in from staff and providers is a critical component in implementation of an intervention in health care (Damschroder et al., 2009) as well as implementation of technology in mental health care (Connolly et al., 2021). As such, employing external facilitators who are also skilled in motivational interviewing and educating sites on the benefits of Veteran-facing eHealth use might help sites move from contemplating the change to active implementation. Further, as with dissemination of other innovations, sustained use requires attention, proactive planning, and on-going support from leadership and resourcing both on the unit and within the larger organization (Damschroder et al., 2009; Harvey & Kitson, 2015; Howell & Higgins, 1990; Ogden & Fixsen, 2014; Stetler et al., 2006).

Lastly, the availability of staff to monitor eHealth use was often mentioned as a barrier to implementation. Nurses

were often “tasked with” or “detailed” to serve as technology facilitators and watch guard while other providers on the treatment team were able to use telehealth or work from home (particularly in the context of the COVID-19 pandemic). It may be particularly difficult for staff to prioritize support of technology when there are other more pressing clinical needs, or in times of short staffing. Indeed, previous research suggests that high workloads and number of administrative tasks are barriers to nurses delivering recovery-oriented care on acute mental health inpatient units (Wyder et al., 2017). Yet, some of the successful sites described working well with nurses to coordinate this work. It may be important to highlight the important role of nursing staff in implementation of eHealth and describe benefits of eHealth use to nursing staff. Additionally, implementation research on eHealth technology in outpatient mental health care suggests the use of a “digital navigator” who may simultaneously assist educating patients and providers on how to use technology and trouble shoot any technological issues that may arise during implementation (Connolly et al., 2021). While hiring a new position may be difficult for inpatient units, Connolly et al. (2021) suggests the possibility of peers assisting in this role (e.g., peer support specialists within the VA).

## Limitations

The VHA is the largest integrated health system in the United States and staff may have different perceptions than those in community-based hospitals. Research in this area should investigate community inpatient units to gain a broader perspective of the use and implementation process of eHealth technology on inpatient units. Further, survey responses captured roughly 30% of all inpatient units within the VA. Self-selected site responses could differ from sites that chose not to participate (e.g., respondents may have held a special interest in eHealth or had more time to complete the survey). Additionally, it is possible that perspectives on patient-facing eHealth technology vary by discipline. Gathering perspectives from multiple disciplines across units in future research may clarify the role that each discipline serves in the implementation process of eHealth technology. Further, the accuracy of reported current use of Veteran-facing eHealth technology in this project may vary because this information was collected as an estimate from the providers’ perspective. Future research would be needed to measure the precise usage of eHealth on acute mental health inpatient units. Finally, future research should examine the patient perspective on eHealth technology for inpatient units within the United States to fully elucidate which technologies they consider crucial to their care.

## Conclusion

Patient-facing eHealth technologies on acute mental health inpatient units have the potential to maintain comprehensive unit programming for patients in the context of the COVID-19 pandemic while also promoting recovery-oriented care on the unit. Despite benefits and desired use by staff, eHealth technology is not implemented regularly or systematically across inpatient units, and units face several barriers (e.g., safety concerns, limited staffing, lack of necessary equipment). Successful use of patient-facing eHealth technology may require a champion (i.e., internal facilitator) to lead the charge in implementation, support and resourcing from leadership, guidance from external supports with experience in successful eHealth use, working closely with nursing staff to ensure workload balance, and an overall perspective shift in the benefits to eHealth technology versus the risks. Future research should incorporate a broader range of stakeholder perspectives to further understand successful eHealth implementation for acute mental health care.

*Note.* Wearable Technologies is not included for least successful because no sites reported their use for this question. Because many survey respondents used the term VA Video Connect and video chat interchangeably, this was collapsed into the video chat category for most successful, least successful, and most desired use.

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## Declarations

**Conflict of interest** The authors declare they have no conflict of interest.

**Ethical Approval** This quality improvement activity was confirmed to be non-research by the Veterans Affairs National Director of Inpatient Mental Health Services and no ethics approval is required. The project was designed to inform the quality improvement efforts that are part of ongoing inpatient mental health policy reviews.

**Consent to Participate** All survey and interview respondents were informed of the voluntary and confidential nature as well as the purpose of the quality improvement project prior to their participation.

**Standards of Reporting** The study design and reporting were guided by the SQUIRE checklist for quality improvement projects. However, no intervention was implemented in this project. The SRQR guidelines were followed for design and reporting of qualitative data. However,

because this project is considered non-research, ethics approval is not required.

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