

The Impact of Inpatient Telemedicine on Personal Protective Equipment Savings during the COVID-19 Pandemic: Cross-sectional Study

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The Impact of Inpatient Telemedicine on Personal Protective Equipment Savings during the COVID-19 Pandemic: Cross-sectional Study

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Abstract

Background: With the emergence of the COVID-19 pandemic, many hospitals implemented inpatient telemedicine measures to ensure operational readiness and worker safety in preparation for a possible outbreak. Sustainability of inpatient telemedicine remains to be addressed

Objective: This study evaluated the use of a rapidly deployed inpatient telemedicine workflow at a large academic medical center.

Methods: In early 2020, video conferencing software was installed on patient bedside iPads at two academic medical center teaching hospitals. An internal website allowed providers to initiate video calls with patients in any patient room with an activated iPad. Patients were encouraged to utilize this technology to connect with loved ones via native apps or video conferencing software. We tracked usage of this technology by monitoring traffic to the internal website beginning in May 2020.

Results: Between July 22, 2020 and January 24, 2021, the "IP Video Visits" website recorded 125 events, including 69 meetings initiated by patients, 10 meetings initiated by providers, and 36 emails, including meeting links sent by patients. The total number of unique active users was 815.

Conclusions: There was a low level of adoption of inpatient telehealth and virtual patient visitations by providers and patients, respectively. With sufficient availability of PPE, providers did not find a frequent need to use the bedside tablet technology for inpatient telehealth, despite a high census of COVID-19 patients. Patients in isolation appeared to prefer to use their personal smart devices to connect with loved ones.

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Original Manuscript

The Impact of Inpatient Telemedicine on Personal Protective Equipment Savings during the COVID-19 Pandemic: Cross-sectional Study

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Abstract

With the emergence of the COVID-19 pandemic and shortage of adequate Personal Protective Equipment (PPE), hospitals implemented inpatient telemedicine measures to ensure operational readiness and a safe working environment for clinicians. The utility and sustainability of inpatient telemedicine initiatives need to be evaluated as the number of COVID-19 inpatients is expected to continue declining. In this viewpoint, we describe the utilization of a rapidly deployed inpatient telemedicine workflow at a large academic medical center and discuss the potential impact on PPE savings.

In early 2020, video conferencing software was installed on patient bedside iPads at two academic medical center teaching hospitals. An internal website allowed providers to initiate video calls with patients in any patient room with an activated iPad, including both COVID-19 and non-COVID patients. Patients were encouraged to utilize telemedicine technology to connect with loved ones via native apps or video conferencing software. We evaluated the usage of telemedicine technology on patients' bedside iPads by monitoring traffic to the internal website.

Between May 2020 and March 2021, there were a total of 1240 active users of the video visits website (mean 112.7 (SD 49.0) connection events per month). Of these, 133 (11%) connections were made. Patients initiated 63 (47%) video calls with family or friends and sent 37 emails with video conference connection instructions (28%). Providers initiated a total of 33 video calls (25%) with the majority of calls initiated in August (n=22, 67%).

There was a low level of adoption of inpatient telemedicine capability by providers and patients. With sufficient availability of PPE, inpatient providers did not find a frequent need to use the bedside telemedicine technology, despite a high census of COVID-19 patients. Compared to providers, patients used video conferencing capabilities more frequently in September and October of 2020. We did not find savings of PPE associated with usage of inpatient telemedicine.

Keywords

Telehealth; inpatient telemedicine; bedside iPad; video visits; personal protective equipment; COVID-19; virtual visits

Expansion of Telemedicine and Patient iPad Program

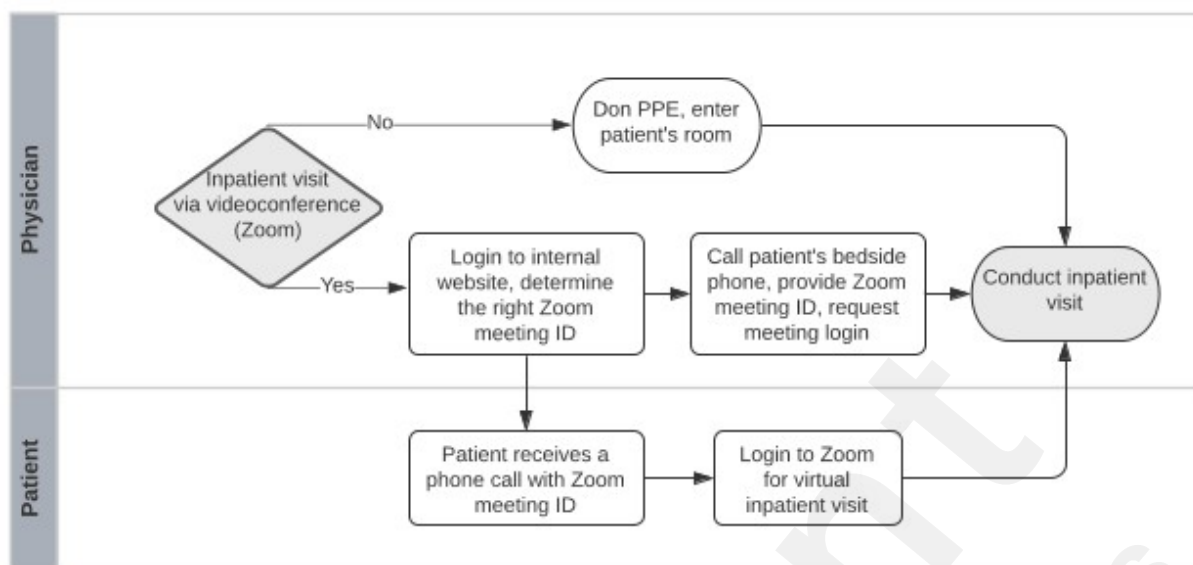
In response to the COVID-19 pandemic, health care organizations rapidly implemented telemedicine protocols to protect healthcare workers and patients [1-3]. The anticipated surge in patients and shortage in personal protective equipment (PPE) were key drivers for the implementation of virtual visits and medical screening exams in the inpatient settings and emergency departments [4]. Some authors referred to the inpatient telemedicine as “electronic PPE” [4] and a few studies saw a decrease in patient contact resulting in PPE savings [5,6]. One study among emergency department patients found telemedicine to be associated with significant reduction in PPE usage, without anticipated increase in anxiety and dissatisfaction among patients [6]. Overcoming operational barriers, such as privacy, device availability and functionality may enable organizations to conserve PPE while providing excellent patient care [7]. Although a few studies described the deployment of hospital tablets for inpatient telemedicine, the extent of long-term continuous use of this technology has not been extensively evaluated [8,9].

University of California (UC) San Diego Health is an academic medical center with multiple outpatient ambulatory sites and two hospital campuses with 808 licensed inpatient beds. Bedside iPads were implemented at one affiliated teaching hospital in 2016 followed by expansion in 2019 to include the entire inpatient population [10]. The original intent of the bedside iPads was to allow patients access to their inpatient electronic health record portal (Epic MyChart Bedside, Verona, WI), hospitality (ordering food), comfort (controlling ambient lights and room temperature), and entertainment (streaming services) [10]. As the COVID-19 pandemic evolved and more patients required isolation precautions, hospitals limited visitations by family members. Bedside iPads, therefore, appeared to be a natural solution to connect patients with their loved ones and to conserve PPE by allowing clinicians to interact with patients remotely. The objective of this viewpoint was to describe the utilization of a rapidly deployed inpatient telemedicine workflow at a large academic medical center and discuss technology’s potential impact on PPE usage.

Inpatient Telemedicine Process Implementation

A videoconferencing tool (Zoom, San Jose, CA) was implemented with healthcare security protocols in 2019 prior to the COVID-19 pandemic. Native Zoom app was installed on all the bedside iPads to allow patients to connect with their families using video calls. Inpatient providers could also initiate Zoom calls with patients. At the beginning of the pandemic, providers could call the patient’s bedside telephone to provide them with a meeting ID to join a Zoom video conference. The patient would then join the meeting initiated by the provider (Figure 1).

Figure 1. Process flow for inpatient video call at an academic medical center, San Diego, CA.



Although this process was adopted by many inpatient services, providers reported difficulties with retrieving telephone numbers for inpatient rooms. As a result, an internal website was created to display all available active patient iPads. From this website, providers could initiate a video call with a patient using a “Meet Now” button. The bedside iPad would then produce an audible ping alerting the patient of an incoming Zoom call. Upon discharge, the bedside iPad and Zoom ID were reset to ensure patient data privacy.

To evaluate utilization of video calls in inpatient services and estimate the potential impact on PPE savings, we obtained data from the internal web server logs and Google analytics. Data from video calls to patients hospitalized for COVID-19 and other conditions were included. All available traffic data from the internal website were collected using internal servers between May and June 2020, before switching to using Google Analytics in July 2020.

We used Google Analytics to track user engagement events on patients’ iPads. Engagement events included clicking on the Start Meeting, Send Email, and Meet Now links. The Start Meeting button allowed a patient to initiate a video call with their family members or a provider and was used as an indicator for a patient-initiated video call. The Send Email button allowed a patient to email video call instructions to their family members and was used as another indicator of a patient-initiated call. The Meet Now button allowed a physician to initiate a video call with patient and was used as an indicator for provider-initiated video calls.

It was not technically feasible to track the volume of telephone calls from providers to patient rooms to determine the frequency of phone or video visits during the initial stage of Zoom implementation. It was also not feasible to track Zoom meetings conducted through the native Zoom app due to UC San Diego Health cybersecurity protocols.

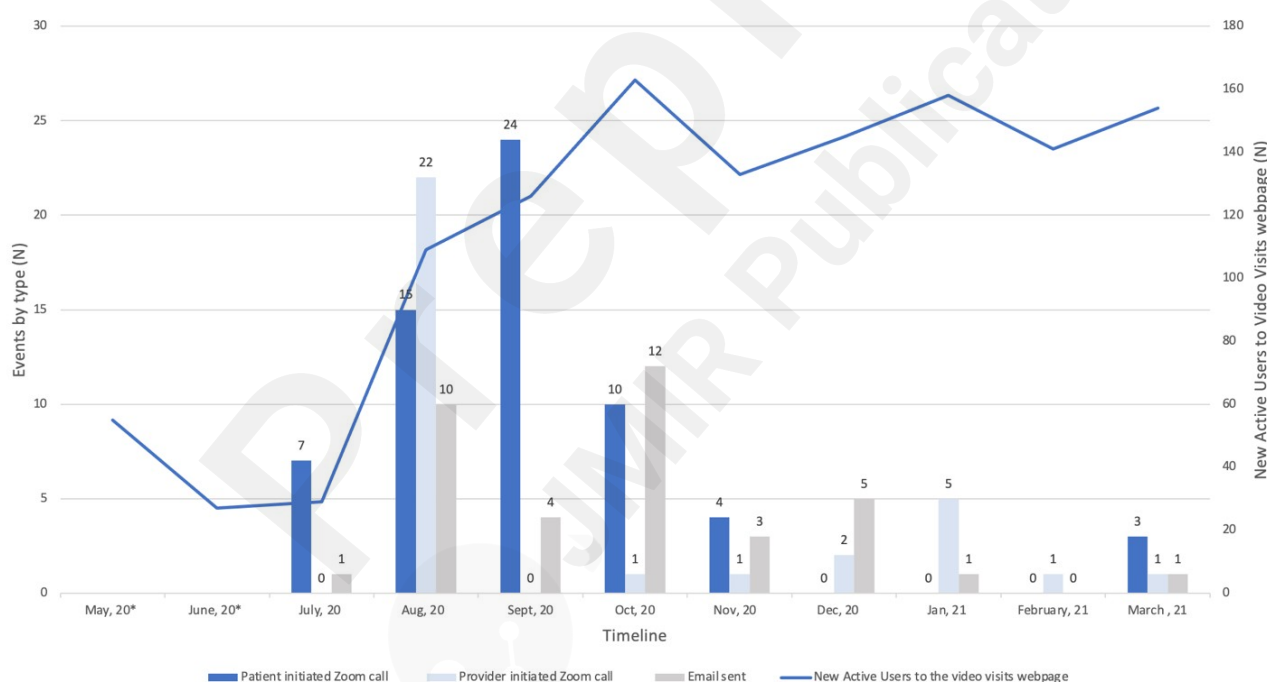
We did not collect any patient identifying information and followed all data safety protocols. We relied on server and Google analytics data to determine whether patients used the bedside iPads to participate in a video call or to send an email, not the duration or content of such engagements.

Providers and Patients Underutilized Inpatient Telemedicine

The number of Video Visits website active users was determined from the internal server data for May-June 2020 and from Google Analytics for July 2020 to March 2021. There were a total of 1240 events collected from both data sources. On average, between May 2020 and March 2021, there were 112.73 connection events per month (SD 49.0) (Figure 2). As expected, usage increased between July (n=29) and March (n=154). The lowest usage was recorded in June (n=27) and the highest in October (n=163) followed by January 2021 with 158 users (Figure 2, line).

While the number of visitors to the Video Visits site was low, the actual engagement with the system was even lower with 133 connections (11%). Patients initiated 63 (47%) video calls with family or friends and sent 37 (28%) emails with connection instructions. The highest number of calls occurred in September (n=24, 38%) and the largest number of emails were sent in October (n=12, 32%). Provider usage was even lower, with providers initiating a total of 33 (52%) video calls with patients. The majority of calls were initiated in August (n=22, 67%) perhaps due to an internal awareness campaign of the available capability. Because the servers filter out automatic page refreshes, these numbers may underestimate the total number of video calls.

Figure 2. Video visits webpage users and engagement events (patient- and provider-initiated calls, emails), May 2020 - March 2021, San Diego, CA.



* The number of Video Visits website active users was determined from the internal server data for May-June 2020 and from Google Analytics for July 2020-March 2021.

Inpatient Telemedicine Could be Used to Conserve PPE

Although we implemented convenient workflows for clinicians to contact patients virtually to reduce the risk for infection, save PPE, and potentially save time to don and doff PPE, we saw minimal adoption of inpatient telemedicine. There appeared to be some seasonal variation in usage and during our study patients initiated higher number of calls than providers (63 vs. 33). The majority of our provider calls occurred in one month (August 2020) possibly due to an internal awareness campaign in response to a COVID-19 wave occurring at the time. Usage declined to 0 – 5 calls in subsequent months, however. Our results are different from those of previous studies that found high inpatient

telemedicine utilization and subsequent savings of PPE [4-6,8].

No technical issues with iPads or Zoom were reported, yet the vast majority of providers saw patients in-person. Inpatient physicians may prefer to see patients in-person, regardless of availability and convenience of technology or potential saving of PPE. Fortunately, our academic medical center has not experienced the PPE shortages faced by our colleagues in other parts of the country [11]. As such, there was never a significant impetus to conserve PPE using all available means including inpatient telemedicine capability.

Our study had several limitations including small sample size and limited scope. Although most clinicians were comfortable with Zoom, it is possible that some were not, which would reduce technology usage for inpatient visits. Patients have various comfort levels with technology, which could reduce the potential usability of inpatient telemedicine. Also, we did not evaluate the utility of inpatient telemedicine for other healthcare providers such as nurses and technicians.

With the COVID-19 pandemic, telemedicine capacity was rapidly implemented in ambulatory settings [1-3]. Emergency departments also found multiple use cases for telemedicine including patient triage and expedited care for stable patients, reduced potential provider exposure to COVID-19, decreased usage of PPE, reducing patient isolation, and allowing quarantined physicians to continue practicing, among others [4-6,12,13].

The utility of telemedicine in inpatient settings and its potential impact on PPE savings, however, remains to be addressed. A few studies that found inpatient telemedicine to be useful for patient care and PPE savings also reported operational barriers, such as privacy and security, as well as limited functionality and device availability [7-9]. The availability of the technology by itself was inadequate to encourage usage while PPE supplies were sufficient and additional studies are needed to evaluate the utility of inpatient telemedicine for healthcare providers.

Conclusions

Similar to outpatient clinics and emergency departments, telemedicine capability could have a positive impact in inpatient settings including PPE savings. Our study found low adoption levels of inpatient telemedicine among patients and providers. Despite a high census of COVID-19 patients, our providers saw patients in-person rather than relying on telemedicine. Patients' usage of bedside iPads appeared to be limited for telemedicine and should continue to be evaluated to improve patient experience.

Increasing awareness of telemedicine in inpatient settings for providers and patients could help increase utilization for patient care. Going forward, implementation of telemedicine across all levels of care may help reduce potential provider exposure to COVID-19 and increase provider capacity.

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Abbreviations

PPE Personal protective equipment

Author Contributions

LL and CAL designed the study. RH, GS, MS obtained primary data. All authors contributed to data interpretation. RH and LL wrote the manuscript. All authors critically reviewed the manuscript for important intellectual content and approved the final manuscript.

Conflicts of Interest

The authors declare no conflicts of interest.

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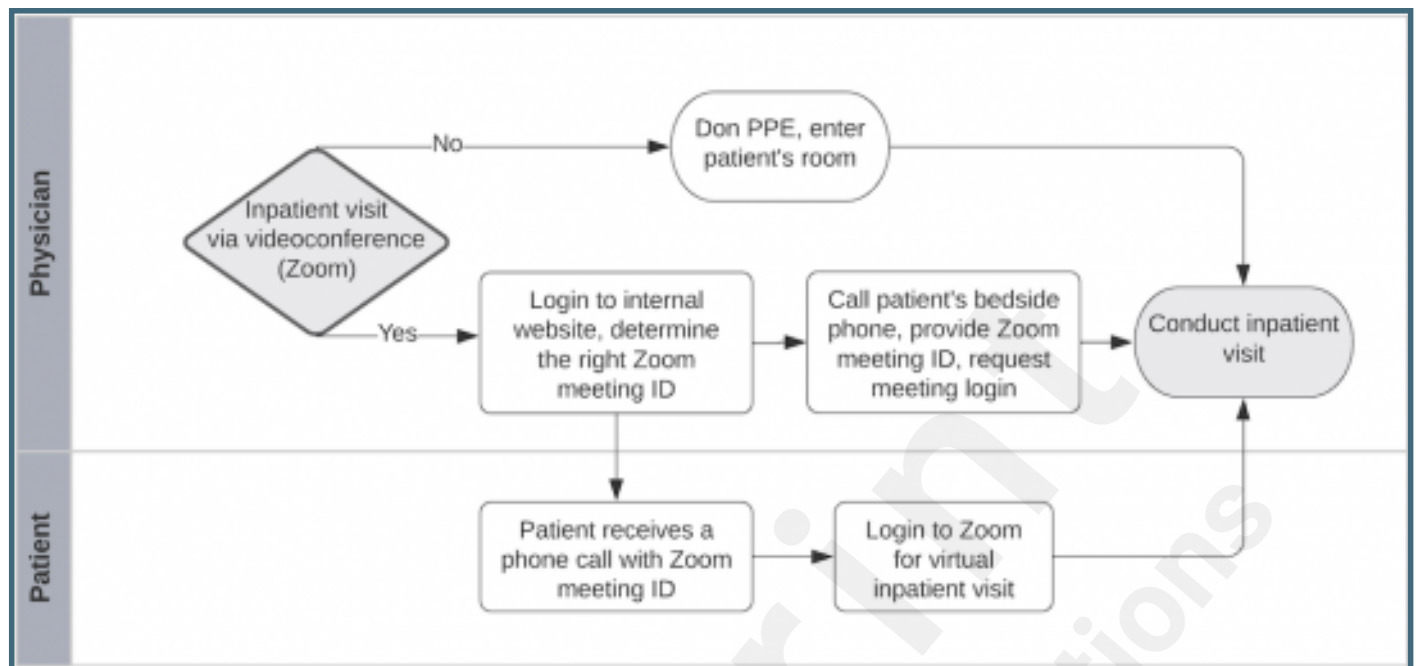
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Supplementary Files

Figures

Process flow for inpatient video call at an academic medical center, San Diego, CA.



Video visits webpage users and engagement events (patient- and provider-initiated calls, emails), May 2020 - March 2021, San Diego, CA.

