



Greater Connection Stability With Zoom Over Doxy.me in a Student-Led Free Clinic

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Abstract

Introduction: The Interprofessional Community Clinic (ICC), a student-run free clinic (SRFC), utilized telemedicine during the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic. Doxy.me was utilized early in 2021 before switching to Zoom midway through the year. This study compares two metrics between the platforms: average duration of visits and the number of times patients lost connection.

Methods: Visit lengths were extracted from the ICC's clinic manager whiteboard. De-identified Athenahealth chat logs were analyzed for instances of patient loss of connection. Independent samples t-tests were conducted to analyze the differences in these variables between Doxy.me and Zoom.

Results: Twenty-nine visits were conducted through Doxy.me, eight without an interpreter and 21 with a Spanish interpreter. Forty-three visits were conducted through Zoom, 17 without an interpreter and 26 with a Spanish interpreter. The average visit duration was 79.4 minutes for Doxy.me and 73.3 minutes for Zoom ($p=0.218$). The average visit duration without interpreters was 78.2 minutes for Doxy.me and 73.2 minutes for Zoom ($p=0.615$). The average visit duration with an interpreter was 79.8 minutes for Doxy.me and 73.3 minutes for Zoom ($p=0.262$). There were 15 instances of connection loss with Doxy.me and two for Zoom ($p<0.001$).

Conclusions: There was no statistically significant difference in average patient visit duration, even when stratified by interpreter usage. Connection loss between the platforms was statistically significant, and this was utilized as a proxy for platform stability. This difference could be attributed to the large participant volume per call. Additionally, patients often utilize mobile devices for visits, which could cause instability as Doxy.me could not run in the background upon switching apps. The ICC continues to utilize Zoom for telehealth visits due to the benefits with cost, stability, and promotion of interprofessionalism.

Introduction

Medical care in times of crisis—such as during pandemics, wars, and periods of uncertainty—is a unique challenge for patients and healthcare workers.¹ The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic brought many activities across the world to a halt beginning in March of 2020. Healthcare workers began transitioning to providing care through telehealth via online platforms in order to continue

providing care for their patients and communities.¹

One issue many providers face when switching to telehealth involves selecting which telehealth platform to use. Many larger healthcare systems are capable of utilizing the Health Insurance Portability and Accountability Act (HIPAA) compliant video visits accessible within their Electronic Medical Record (EMR) systems. Examples of this include Epic and Cerner, which are two widely used EMR systems in larger

healthcare systems. Many smaller practices and clinics during this time had to turn to stand-alone HIPAA compliant telehealth platforms, and some popular examples of this included Doxy.me, Google G Suite Hangouts Meeting, Zoom for Healthcare, GoToMeeting, InTouch Health, Mend, Mundaii, Skype for Business, and more.² Many factors should be considered when choosing a telehealth platform that works best for a system, including the patient population being served, the type of device used to conduct video calls, the total number of participants per call, prices and plans, and more.

Telehealth is a rapidly growing field but there is a crucial lack of comparison between different platforms to provide guidance to clinicians and clinics looking to choose which telehealth platform best suits their patient population. While the majority of prior studies have examined overall provider satisfaction with telehealth platforms in specific specialties, many have not looked at specific quantitative metrics between platforms.^{3,4,5} One study in particular calculated the accuracy of acoustic measures of voice between different telehealth platforms to relate it to the validity of telehealth for patients with dysphonia and other voice disorders.⁶ Otherwise, little data are currently available that compares the quantitative metrics among these different platforms.

The Interprofessional Community Clinic (ICC) is a student-run free clinic (SRFC) associated with Rosalind Franklin University of Medicine and Science (RFUMS) that provides medical, podiatric, behavioral health, and physical therapy services to uninsured patients in North Chicago, Illinois. The majority of the ICC's patient population consists of English and Spanish-speaking patients, with a small number also speaking Gujarati, Polish, and other languages. The clinic is led by health professional student volunteers from RFUMS who are overseen by volunteer faculty clinicians. Student volunteers from the medical, podiatry, psychology, physician assistant, pharmacy, and nursing schools participate and lead the operations and administration of the clinic.

During the SARS-CoV-2 pandemic in 2020, the ICC implemented telehealth visits for medicine, physical therapy, and psychology appointments in order for patients to continue receiving care. From 2020-2021, the medical clinic was seeing up

to three patients per week on Thursday nights via telehealth. The ICC's patient population and organizational structure are unique compared to other organizations such as hospitals and physician practices. Each virtual medicine visit is 60 minutes long and has a minimum of nine participants per call: the patient, the clinician, an advanced student from the physician assistant or medicine programs, a clinic manager, a front desk volunteer, a pharmacist, a second-year medical student shadowing the clinicians, a care coordinator, and a scribe. Various pilot studies were implemented at the beginning of the pandemic that found utility in telehealth for medical management and continuing medical education.^{7,8} One study found, however, limitations included dropped calls and patient overall access to technology.⁷

In 2020 during the early rise of the pandemic, the ICC utilized Doxy.me as its telehealth platform because it did not require an application download and offered a discounted plan. In June of 2021, the ICC switched to Zoom to align with RFUMS operations, as Zoom was the preferred application being utilized during classroom lectures and organizational meetings. This paper seeks to analyze the ICC's average duration of telehealth patient encounters and number of times a participant was unintentionally "dropped" from a call or experienced connection loss from the two telehealth platforms: Doxy.me and Zoom. We hypothesize that switching from Doxy.me to Zoom will result in fewer dropped calls and shorter appointment durations. This is because Zoom was widely used throughout our university during the pandemic, allowing students and clinicians to become more familiar with the platform. Zoom was also capable of accommodating large numbers of participants during lectures with minimal losses in connection and stability, and we theorized that this would also benefit the large volume of volunteers in the ICC.

Our study is unique because it is the first to analyze quantitative metrics between different telehealth platforms in the setting of an interprofessional SRFC, which requires a large number of participants per call, and the first to analyze this data in the setting of an uninsured and marginalized patient population, a group which faces

many barriers to access of healthcare resources.^{7,8,9} Telehealth helps to bridge these barriers by eliminating the need to travel to an appointment, thereby allowing patients to save time and costs related to travel and seeking childcare.^{7,8} We believe a comparison of different quality metrics is important in helping other clinics choose a suitable telehealth platform for their workflow, operations, and overall patient care and satisfaction.

Methods

This study was approved by the Rosalind Franklin University Institutional Review Board (IRB#: NHS22-056.). All patient visits in our study were conducted through telehealth at the ICC from January through December 2021. All visits were conducted with either English-speaking patients or Spanish-speaking patients with the aid of an interpreter. Each patient visit was conducted either through Doxy.me or Zoom, with a similar composition of team members in each visit. Doxy.me is a web-based platform that incorporates updates daily and the ICC utilized the platform from January 2021 to June 2021 for this study. Zoom is both web-based and application based, and the clinic utilized Version 5.7.X (Zoom Video Communications, Inc., San Jose, CA) from July 2021 to December 2021 during this study.

The ICC clinic manager “whiteboard” is a document which records information such as patient check-in and check-out times, whether the patient is a new or returning patient, and the names of the interprofessional healthcare team members who will be participating in each patient visit. The whiteboard data are collected by ICC clinic managers on all patients on Google Sheets (2021, Google, Mountain View, CA), and patient check-in and check-out data were extracted to calculate the average duration of patient visits both with and without the use of interpreters on each telehealth platform. The average duration of virtual appointment times was used as a proxy for overall patient and provider comfort with the platform as well as ease and efficiency of use.

The electronic chat system on the Athenahealth EMR system from January through December 2021 was used to identify instances of patient connection loss from each telehealth

platform. During telehealth visits, student and faculty volunteers communicated to each other via the chat system regarding the patient’s location, next steps in the appointment, connection issues, and more. Examples of loss of connection include interpreters or clinic managers notifying the team of attempts to re-contact the patient, team members inquiring whether the patient was lost, overt statements that the patient was lost, notifications that the patient had returned, and other similar occurrences. Instances of patient connection loss were used as a proxy for telehealth platform stability.

Independent samples t-tests were conducted on SPSS Statistics Software (v29.0.1.0, IBM, Armonk, NY). Independent samples t-test was used with the assumption that the two populations being analyzed are separate from each other. The independent variable in this project is the telehealth platform type: Zoom versus Doxy.me. Since we are examining different metrics of the two platforms’ performance, two different dependent variables were studied: the average length of time per visit and the number of connection losses via each telehealth platform from January to December 2021. The first analysis examined any differences in the average duration of patient encounters between Doxy.me and Zoom. The second analysis examined any differences in the average duration of patient encounters between Doxy.me and Zoom with the use of an interpreter, and the third analysis examined this duration without the use of interpreters. The final analysis examined any differences between the number of patient “drops” or losses of connection throughout telehealth visits on Doxy.me and Zoom during this period.

Results

Patient check-in and check-out time was extracted from a total of 29 visits conducted on Doxy.me and 43 visits through Zoom. Eight of the 29 Doxy.me visits were conducted without an interpreter while the other 21 visits utilized a Spanish interpreter. For Zoom, 17 of the 43 Zoom visits were conducted without an interpreter while the other 26 visits utilized a Spanish interpreter.

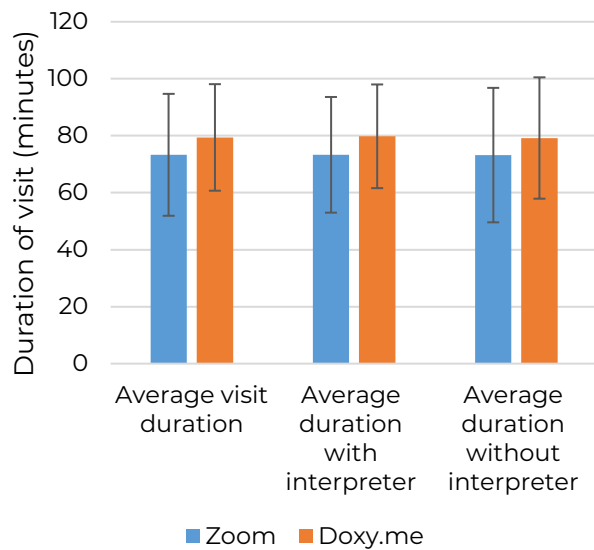
We found no statistically significant differences in average duration of patient visits

Table 1. Zoom vs Doxy.me metric data

| Variable | Zoom | Doxy.me | p-value | t-value |
|--|------------------|------------------|---------|---------|
| Average visit duration, minutes (SD; SE) | 73.3 (21.4; 3.3) | 79.4 (18.7; 3.4) | 0.218 | -1.243 |
| With interpreter | 73.3 (20.3; 3.9) | 79.8 (18.2; 3.9) | 0.262 | -1.136 |
| Without interpreter | 73.2 (23.6; 5.7) | 78.2 (21.3; 7.5) | 0.615 | -0.510 |
| Total instances of lost connection, n | 2 | 15 | <0.001 | -3.564 |

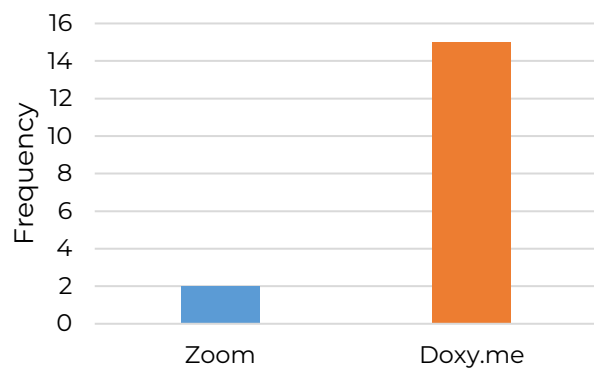
SD: standard deviation; SE: standard error.

Figure 1. Average duration of telehealth visits



Error bars represent standard deviation.

Figure 2. Loss of connection during telehealth visits



between either telehealth platform (Table 1). The average visit duration on Doxy.me was 79.4 minutes while the average visit duration on Zoom was 73.3 minutes ($p=0.218$). When analyzed by interpreter use, there was also no statistically significant difference seen. For visits with the aid

of a Spanish interpreter, the average duration on Doxy.me was 79.8 minutes and the average duration on Zoom was 73.3 minutes ($p=0.262$). For visits without the use of interpreters, the average duration for Doxy.me was 78.2 minutes and for Zoom was 73.2 minutes ($p=0.615$) (Figure 1).

A statistically significant difference was seen when analyzing de-identified tally results for instances of patient loss of connection (Table 1). Patients lost connection a total of 15 times throughout 29 visits on Doxy.me, while Zoom saw a total of two instances of patient connection loss throughout 43 visits ($p<0.001$) (Figure 2).

Discussion

This is the first study to measure and compare various quantitative metrics between different telehealth platforms in the setting of an interprofessional SRFC and the first conducted in an uninsured and marginalized patient population, a community that faces many barriers in accessing healthcare resources.^{7,8,9} Despite these difficulties, an SRFC in San Diego, California, found that the majority of their patients reported being satisfied with their telehealth visit and would likely continue utilizing this model of healthcare in future.¹⁰

There was no statistically significant difference between the average duration per visit across the Doxy.me or Zoom platforms. When stratified by interpreter usage to account for possible confounding variables, the results still did not show a statistically significant difference in average duration of visits. This finding is consistent with prior studies which also found that there were no statistically significant differences in total appointment times with and without hospital interpreters at two hospitals.^{11,12}

The loss of connection was statistically significant between Doxy.me and Zoom, and this was

viewed as a proxy for telehealth platform stability in our community clinic's setting. The data show that while utilizing Doxy.me, there was approximately one participant dropped every two clinic visits. While utilizing Zoom, there was approximately one participant dropped every 21 clinic visits.

While the clinic's use of Zoom had significantly fewer losses of connection per visit during the time period studied, this could be attributed to a variety of factors related to the ICC's clinic flow and patient population, and these factors are important to take into consideration when selecting a telehealth platform. Since the ICC is an SRFC, there can be large numbers of volunteers per call. At least nine participants are included in each virtual visit, with some visits even having 15 or more participants when new volunteers are trained during transition periods. This volume affected the ICC's experience with Doxy.me, as many participants were required to turn off their camera to maintain platform stability, and some clinic volunteers had to leave the visit. A separate SRFC which utilized Doxy.me reported decreased audio and video quality which correlated with increasing numbers of participants, limiting the ability of first-and-second-year medical students to participate in virtual telehealth visits.⁸ This issue was not encountered by our clinic when using Zoom, where every participant was able to keep their camera on throughout the duration of the visit. Thus, it is important to consider that other clinics with fewer participants per call (such as clinics whose appointments only include the clinician and patient) may encounter a different experience.

While telehealth platforms can be accessed through other devices such as desktops and laptops, many patients at the ICC were known to access their telehealth visits using their mobile devices. Some commonly cited reasons for this include discomfort using a computer and lack of access to a private space for telehealth visits.¹³ This is especially relevant because it was noted by many ICC patients and care coordinators that Doxy.me was unable to continue running in the background of mobile devices if patients needed to switch to another app, which they were occasionally required to do in order to fill out a questionnaire or to look up medication details during

the visit. This issue was not seen with Zoom, which allowed patients to switch between applications on their mobile devices without a loss of connection.

It is important to note that this study specifically analyzed the ICC's experience with both platforms in 2021, but there have been many system updates for both platforms since the start of this study. This is important as there is inherent bias associated with utilizing one platform prior to the other. In this case, the ICC utilized Doxy.me in the first half of 2021 and switched to Zoom for the second half of the year. As with any software or product, changes and improvements are made as time goes on. The six-month difference in time between our usage of Doxy.me and Zoom could have allowed enough time for one platform to update its system to improve the user experience, especially during the pandemic, which was a period of rapid technological change.

Other factors to consider when comparing telehealth platforms and deciding which to use for a clinic setting include the plan purchased and the overall cost. For Doxy.me, the ICC purchased the clinic package, which included a main room to see patients and a set unit price per additional patient room. This resulted in the ICC paying \$75 per month, or \$900 annually, for a main waiting room and 18 patient rooms. For Zoom, RFUMS had obtained an educational license which was HIPAA compatible and was able to accommodate up to 3,007 users, with additional charges for a large meeting license and additional cloud storage, for a total annual cost of \$31,000. Since the ICC is affiliated with RFUMS, the clinic was able to utilize the same license the university was already paying for and incurred no overt costs upon switching telehealth platforms halfway through the 2021 calendar year. However, some hidden costs of the switch included drafting training documents, training of personnel, and establishing a technical support team. Since the ICC was paying for Doxy.me using nonprofit funds, the switch to Zoom was a better financial decision because the university had already funded the license, which could thus be used with no additional charges to the ICC. If the ICC were unable to utilize the educational license that RFUMS purchased for Zoom, it is likely an alternative platform would have been considered.

One of the most important aspects of this study was determining whether the switch from Doxy.me to Zoom was beneficial for the ICC in terms of ease of use, cost, and volunteer participation. Our study demonstrates that, in the context of a student-run clinic in North Chicago and given the number of participants per call, Zoom had statistically significant fewer connection lapses per visit. For other clinics that have similar models to ours in terms volume of participants per visit, Zoom might be the preferred choice. However, in a smaller clinic setting where there are less participants per call, Doxy.me might be the preferred choice given the significantly lower price. Per our findings, the ICC will continue to use Zoom to conduct telehealth visits as it suits our clinic's mission for promotion of interprofessionalism and ease of patient care. While clinics should consider total participants needed per visit, cost, and device utilized to log in when making the decision of which telehealth platform to use, this study also shows the importance of examining quantitative variables such as total visit duration and number of drops per visit, as these are all variables in long-term patient and clinician satisfaction.

Based on this study's findings, it is recommended that SRFCs with many volunteers per visit or larger clinics use Zoom as their telehealth platform considering its overall platform stability and general widespread use, but other aspects such as total cost burden on the clinic should be factored in as well. SRFCs can also consider utilizing the telehealth platform which is adopted by their current university or program to save on costs and to increase ease of use through familiarity with the platform.

One of the limitations of our study is the small sample size, which may limit the generalizability of our data to other clinics. The analysis was also limited based on what data was readily available in the ICC. Future research should expand on this data by stratifying based on clinic type, including behavioral health, women's health, dermatology, and others, and also by complexity of visits. Data should also be collected over several years in order to analyze whether any variables change over time. Additionally, research in this area is sparse, and there are currently no published data concerning the prevalence of either telehealth

platform in SRFCs, as well as comparing telehealth with video compared to audio-only visits, as multiple SRFCs found that their patients preferred using participating in telehealth without a video component.^{7,8,10} It's important to continue assessing several different telehealth platforms each year to ensure that patient and clinic needs continue to be met, as telehealth software continues to be updated with new improvements over time. Given the rise of telehealth usage since the start of the pandemic, it is important to continue studying patient and clinician experiences with telehealth to have a better understanding of factors to consider when choosing an appropriate telehealth platform and to continue to improve overall patient and clinician satisfaction in the future.

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Disclosures

The authors have no conflicts of interest to disclose.

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