

Would Geriatric Patients Accept Using a Telemedicine Platform for Post ICU-Discharge Follow-Up Visits?

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Abstract

For those specialized in geriatric medicine, telemedicine innovations provide a new alternative to in-person follow-up care, allowing clinicians to connect and treat patients with more convenience. Telemedicine will likely play a vital role in reaching underserved populations in remote areas. This study investigates first impressions of a telemedicine-based delirium assessment tool. The overall response from participants is positive, supporting the theory that these types of tools will be welcome within the geriatric patient population. Feedback surrounding interactions with the interface are also positive, showing that while many elderly patients may refrain from working with tablets daily, they can successfully interact with the tool when needed for care reasons. While this study and sample size are not all-inclusive regarding the diversity of patients and distinct challenges, it serves as a preliminary step towards future research exploring the feasibility and acceptability of such tools within this specific population.

Keywords:

Telemedicine, Critical Care, Aged

Introduction

Challenges in caring for geriatric populations, individuals older than 60 years of age who are receiving care [1], persist in the US health system. Similar to other vulnerable populations, the population of geriatric patients is growing in number as the baby boomer generation ages, often bringing with them complex diagnoses requiring the cooperation of many different follow-up plans and treatment specialists [2]. Primary care has struggled to keep up with the complex nature of geriatric care, as well as the growing number of patients requiring attention [2]. This is further compounded by the increasing shortage of medical professionals specializing in geriatric medicine [3,4]. Attributes of geriatric care often hinder traditional in-person care methods. The development of telemedicine, particularly telecommunication platforms with patient-centered features, provide a possible solution to the unique challenges faced within the demand of this medical specialty. Telemedicine allows clinicians to connect and evaluate patients remotely and is ideally suited to help improve overall care outcomes within this population as well as address access issues.

A pilot study gathered preliminary evidence of geriatric patient satisfaction while using computer systems for follow-up care in the home [5]. This small pilot referred to these visits as “electronic house calls” and demonstrated that most geriatric patients are comfortable with computer-assisted follow-up care. It also revealed that patients did not believe the computer to negatively impact their clinician relationship with their physician [5,6]. While this study employed personal computers, as telemedicine

technology has advanced, it has opened opportunities for health informatics research to further study the satisfaction and feasibility of other remote tools. These remote telemedicine-focused platforms can enhance the interaction between patient and clinician, offering a “new kind of service relationship” by providing direct and personal care with more convenience [6].

Telemedicine has been incorporated into ICU patient care and education. These new technologies allow for critical care patients to be treated by health professionals remotely [7,8]. ICU telemedicine interventions have demonstrated a reduction in hospital cost, patient mortality and patient length of stay [8,9,10]. While many benefits of telemedicine in the ICU are financially related, telemedicine has most prominently allowed for more efficient care to critically ill patients. Faster response time to alarms and the capturing of performance data for review and education has helped this improvement [8]. For ICU settings in rural or underserved areas, telemedicine has been a welcome addition, helping staff to monitor patients during their stay and to provide relief to physicians and nurses, in the event of workforce shortages [11]. ICU telemedicine interventions have been instrumental in clinical improvement and this continues to be an arguing force for the adoption of telemedicine platforms in hospital ICU settings across the country [9].

As opposed to previous generations of geriatric patients, individuals currently aging into this population group now have had some exposure to telecommunication or connected devices at some point in their lifetime [12]. Videoconferencing with patients as a form of follow-up care has already shown to be successful with this population [2]. These sessions are comparable to face-to-face encounters in terms of satisfaction, reliability and usability [12]. Furthermore, telemedicine can also potentially alleviate clinical access issues for geriatric patients in rural and remote locations. Barriers related to technology, such as information overload, lack of devices and/or infrastructure, and cost, are still real concerns for geriatric patients [13]. Evidence to support telemedicine’s effective deployment and sustainability in such areas is still being researched [14]. However, there will likely be an increase in the number of jobs that focus specifically on the coordination of telemedicine technology for patient use. This will potentially assist diffusion of telemedicine practices across clinical systems and regions, especially as service areas continue to grow in scope [6]. For our study, we investigate the feasibility of using a remote telemedicine tool for follow-up post-acute care within the geriatric population.

Methods

Thirty (n=30) participants from an inpatient geriatric specialty unit in North Carolina were selected for this study. Daily patient schedules were reviewed to identify potential study participants. Participants were English-speaking and 65 years of age

or older. This study was completed in partnership with another observational study gathering preliminary data on a new telemedicine delirium diagnostic tool. Participants were initially evaluated to determine their baseline cognitive state [15]. Those who screened positive for dementia as defined by an abnormal Mini-Cog test or had a documented history of dementia and/or brain abnormalities, as well as those unable to give informed consent, were excluded. Participants were given a tablet and instructions to complete the new delirium assessment. Once this assessment concluded, participants completed a usability questionnaire to detail their impressions of the new tool. The usability data, detailed in this paper, will be used to support hypothesis of a positive potential feasibility and patient acceptability of remote tablet devices in care settings outside of the hospital.

To evaluate the new assessment tool, participants completed the Questionnaire for User Interface Satisfaction (QUIS), a short form survey designed to uncover useful impressions from initial participant interactions. Participants answered questions about their overall reactions, the design, terminology used, and understanding of the system - both overall and when directed to complete a task. The final section of the questionnaire, system capabilities, was not applicable to this study.

Participants' responses for each question of the QUIS were determined from a bipolar Likert scale ranging from 0 to 9. These individual data points were averaged into four overarching categories of the QUIS for each participant: overall reaction, overall screen, terminology and system information, and meaning. A one-way ANOVA was performed in order to test for significant differences in the mean scores for these four categories by age group (60-69 years, 70-79 years, and 80+ years).

Results

Of the 30 participants recruited for the study, 26 (87%) were female. 100% of the participants were white and non-Hispanic. Participants ranged from 67 to 92 years old, with an average age of 77.80 years. Four participants (13.3%) were 60-69 years old, 14 participants (46.7%) were 70-79 years old, and 12 participants (40%) were 80 years old or older.

Overall Satisfaction Results

Questions focused on four different factors of the tablet experience, which were collapsed into four average scores for each of the 30 participants. The domains were overall reaction to the software, screen, terminology and system information, and learning. Questions to which participants responded "NA" were not included in the analysis.

Participants' responses—as determined from a bipolar Likert scale ranging from 0 to 9—were averaged across the four main categories to create a mean score for each participant for each category. These individual means were then averaged into overall means for each category, which ranged from 8.16 to 8.72. See Table 1 for descriptive statistics for all four domains.

Age and Satisfaction

An alpha level of .05 was used to assess statistical significance. A one-way ANOVA was used to assess whether responses varied by age category. There was no significant difference in mean responses found in any domain by age category. See Figure 1 for the mean average scores across age categories.

The 60-69-year-old age group had the highest mean score for the Overall Reaction, with a mean value of 8.90. The 80+ year-old age group had the lowest mean score with 7.98. The 60-69 age group also had the highest mean score for the Screen domain, with a mean value of 8.94. In this domain, the 70-79-

Table 1—Summary of Mean Scores for the Four Domains of Interface Satisfaction Survey

Mean Score	N	Minimum	Maximum	Mean	SD
Overall Reaction Mean Score					
Overall Reaction Mean Score	30	6.00	9.00	8.16	1.66
Overall Screen Mean Score					
Overall Screen Mean Score	30	6.25	9.00	8.60	0.72
Terminology and System Information Mean Score					
Terminology and System Information Mean Score	30	6.66	9.00	8.58	0.85
Learning Mean Score					
Learning Mean Score	30	6.00	9.00	8.72	0.69

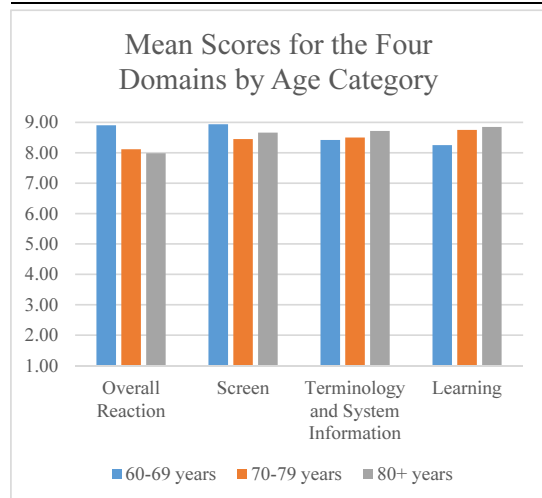


Figure 1—Mean Scores for Four Domains by Age Category

year-old age group had the lowest mean score of 8.45. Conversely, the 80+ age group had the highest mean scores for the Terminology and System Information and Learning domains, with mean values of 8.72 and 8.85, respectively. The 60-69-year-old age group had the lowest scores for these two domains, with means of 8.42 and 8.25, respectively. However, it should be noted that the range between the highest- and lowest-scoring age categories for each domain is small, ranging from 0.30 to 0.92. See Table 2 for the mean scores of the four domains by age category.

Additionally, we broke down the four domains into their various indicators. Though a one-way ANOVA of the indicators by age group found no significant differences in score by age category, the mean scores for the different indicators in each domain are highlighted in the rest of this section to note overall trends between age categories.

The Overall Reaction domain was broken down into its indicators, which can be seen in Table 3. Overall Reaction scores were high, ranging from 7.67 to 9.00. For most of the indicators, the 60-69-year-old age group scored the highest, followed by the 70-79 group and then the 80+ group. The "Rigid or Flexible" indicator is the only one which does not follow this pattern, with the 80+ group having a higher mean score than the 70-79 group, with mean scores of 8.08 and 7.79, respectively.

Table 2—Summary of Mean Scores for the Four Domains of Interface Satisfaction Survey by Age Group

Domain	60-69 Years Mean Score	70-79 Years Mean Score	80+ Years Mean Score
Overall Reaction	8.90	8.11	7.98
Overall Screen	8.94	8.45	8.66
Terminology and System Information	8.42	8.50	8.72
Learning	8.25	8.75	8.85

Table 3—Summary of Mean Scores for Overall Reaction Domain by Age Group

Domain	60-69 Years Mean Score	70-79 Years Mean Score	80+ Years Mean Score
Terrible or Wonderful	8.50	8.07	7.83
Difficult or Easy	9.00	8.36	7.67
Frustrating or Satisfying	9.00	8.14	8.17
Inadequate or Adequate	9.00	8.21	8.17
Rigid or Flexible	9.00	7.79	8.08

The Overall Screen domain was broken down into its indicators, which can be seen in Table 4. Scores for these indicators mirrored those in the Overall Reaction domain, ranging from 7.86 to 9.00. Contrary to the Overall Reaction domain, while the 60-69 group scored the highest across all indicators, here the 80+ group scored higher than the 70-79 group. The exception to this is the “Reading Characters on Screen” indicator, where the 70-79 group scored higher than the 80+.

Table 4—Summary of Mean Scores for Overall Screen Domain by Age Group

Domain	60-69 Years Mean Score	70-79 Years Mean Score	80+ Years Mean Score
Reading Characters on Screen	9.00	8.90	8.83
Organization of Information	8.67	8.54	8.73
Sequence of Screens	9.00	8.54	9.00
Help Messages on the Screen	9.00	7.86	8.17

The Terminology and System Information domain was broken down into its indicators, which can be seen in Table 5. For three of these indicators—Use of Terms Throughout the System, Position of Messages on Screen, and Prompts for Input—again the 60-69 age group scores the highest. However, for Error Messages and Information Accessibility, this group scored the lowest. This is mostly due to the small N for the 60-69 group for these indicators (N = 3), with most respondents in this age category choosing “Not Applicable”. One participant rated the

system a 2 for both of these indicators, decreasing the respective mean scores significantly. For the other indicators, the 60-69 group is followed by the 80+ group and then the 70-79, mirroring that of the Overall Screen domain.

Table 5—Summary of Mean Scores for Terminology and System Information Domain by Age Group

Domain	60-69 Years Mean Score	70-79 Years Mean Score	80+ Years Mean Score
Use of Terms Throughout the System	9.00	8.78	9.00
Position of Messages on Screen	9.00	8.78	8.89
Prompts for Input	9.00	8.31	8.64
Error Messages	5.50	8.20	8.33
Information Accessibility	7.25	8.50	8.83

The Learning Domain was broken down into its indicators, which can be seen in Table 6. Analyses of this domain were hindered by the high number of participants who gave a “Not Applicable” rating for various indicators, most notably the Exploring New Features by Trial and Error and Reference Materials. This is likely because many participants did not opt to explore features on the telemedicine tool and were not instructed to by researchers. Additionally, reference materials were not readily provided for participants. For the other indicators, Remembering Commands and Straightforwardness of Tasks were scored the highest by the 60-69 group followed by the 70-79 group and then the 80+ group. Most notably, Learning to Operate the System exhibited the opposite pattern, with the 80+ group rating this the highest and the 60-69 group rating it the lowest, with mean scores of 9.00 and 8.50, respectively.

Table 6—Summary of Mean Scores for Learning Domain by Age Group

Domain	60-69 Years Mean Score	70-79 Years Mean Score	80+ Years Mean Score
Learning to Operate the System	8.50	8.75	9.00
Exploring New Features by Trial and Error	N/A	7.67	8.33
Remembering Commands	9.00	8.61	8.58
Straightforwardness of Tasks	9.00	8.85	8.83
Reference Materials	N/A	8.20	8.50

Discussion

Overall, participants were very satisfied with the interface, with an overall reaction mean score of 8.16. The other three domains exhibited similarly high scores, ranging from means of 8.58 to 8.72. A one-way ANOVA failed to find a statistically significant difference in scores by age category, suggesting that even the eldest of this geriatric population did not react differently

from the youngest age category. We demonstrate that for three of the four domains, the domain means actually increased between the 60-69 group and the 80+ group. Together, these results suggest that geriatric populations are highly satisfied with the telemedicine software, indicating that it could be feasible and acceptable for this population to use.

The development of telemedicine, particularly telecommunication platforms with patient-centered features, provide a possible solution to some of the challenges associated with providing geriatric care, especially as the proportion of the population who are older grows. Telemedicine platforms can be utilized to improve primary care by allowing providers to follow-up with their geriatric patients in a time and place that is most convenient for both groups. This could be especially convenient for scheduling follow-ups with rural patients or for those without access to reliable transportation to and from their appointments. Though these individuals have generally had some exposure to connected devices [12], previous studies found that older participants exhibited a lower overall reaction mean score. Though this study did not focus on patients and instead solicited results from community members [16].

Our study contradicts some of the results from a previous study that found that older participants were less satisfied with telemedicine platforms. However, this is the first study to look at the experience of in-patient geriatric populations in relation to telemedicine platforms [16]. Future research is needed to truly assess the acceptability and feasibility of telemedicine platforms for the geriatric population. Most ICU specific research regarding telemedicine interventions detail support for adoption of these platforms via financial incentives [9,10]. While many show greater contribution margins once this technology is implemented within ICU processes, other research demonstrates better clinical outcomes, such as decreased mortality, as a result of more acute monitoring and intensivist involvement via telemedicine platforms [8]. Conversely, our study looks at the patient side of telemedicine in the ICU. Our preliminary findings show that from a patient perspective, telemedicine is a welcome and useful tool during their treatment.

Over time, rural counties have received a net influx of people over the age of 50, suggesting that many geriatric people are opting to move into rural locations [17]. In light of this, future studies are needed to focus on the satisfaction and feasibility of telemedicine software for rural, geriatric populations who may face different barriers than their peers in urban areas. As this is a potentially vulnerable population, researchers must ensure that the usage of telemedicine software as a form of follow-up care does not also interfere with medical comprehension.

At this time, this research suggests that telemedicine software is a viable solution to overcoming barriers to reaching geriatric populations. As the population of the United States ages and this population tends to require more medical care, telemedicine allows primary care physicians the ability to follow-up with these patients in a manner that is convenient for both parties. Offering telemedicine platforms as an option for geriatric populations can reduce the burden on the patient and the physician and provide greater access to patients who may otherwise have difficulty traveling to appointments.

Limitations

The main limitation of this study is the sample size of 30 participants, all of whom are English speakers. Participants did vary in age, however all participants were white and not Hispanic/Latino. Additionally, the vast majority of patients were women. As this group is not representative of the demographics of the area, it is likely that this is not a representative sample. Finally, patients who had tested positive for dementia or had a documented history of dementia and/or brain abnormalities

were excluded, so our sample is not representative of the entire geriatric population.

Conclusions

Telemedicine can potentially alleviate access and availability issues for geriatric patients. However, previous research found that older populations were less likely to be satisfied with telemedicine software [5]. This study focused on how geriatric patients reacted to the telemedicine software in terms of receiving follow-up care outside of the hospital setting.

Results found that telemedicine software is an effective tool for receiving follow-up care, with no differences in mean satisfaction between age categories. Future research is needed to study how rural geriatric patients respond to telemedicine software.

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