Patient Satisfaction with Telerehabilitation Assessments for Wheeled Mobility and Seating

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ABSTRACT Wheeled mobility and seating assessments for individuals with mobility impairments living in rural or distant locations are problematic due to the lack of expertise and available resources. The objective of this study was to measure satisfaction based on one’s evaluation and prescription as well as comfort level when being evaluated by telerehabilitation (TR). Patient satisfaction data from real-time interactive TR clinical consultations between an expert practitioner located at least 125 miles away and four remote wheelchair clinics set up by the research team were collected and evaluated. The results revealed that there was a statistically significant difference between participants’ pre- and postevaluation scores, \( t(39) = -13.92, p < .05 \), as well as pre- and postprescription scores, \( t(39) = -13.15, p < .05 \). In addition, all mean scores were significantly higher than the scale midpoint of 3.5 on a TR survey. The study’s findings are consistent with those of previous telemedicine satisfaction studies. Overall, the results indicate a high level of patient satisfaction using TR.

KEYWORDS satisfaction, seating and mobility, telerehabilitation, wheelchair

INTRODUCTION

Remote areas often experience a shortage of professionals and technical resources crucial to the delivery of services related to specialized medical fields (Callas, Ricci, & Caputo, 2000). Rural providers are often isolated from the advancements and technologies available in larger metropolitan centers. As a result, when individuals residing in a rural area need an assessment, a specific treatment, or both, they may have to travel long distances to receive the specialized health care necessary to address their needs. Hatzakis et al. (2001) found that 20% of veterans reported that parking, distance, or transportation significantly interfered with receiving treatment. Furthermore, for individuals with limited sitting tolerance (e.g., due to spinal cord injury), prolonged sitting during travel can carry the potential risk of worsening a pressure ulcer (Sabharwal, Mezaros, & Duafenbach, 2001). For other mobility impairments such as cerebral palsy and rheumatoid
arthrits, common barriers for health care include access to the physical environment as well as to specialists (O’Day, Dautel, & Scheer, 2002). For these reasons, many individuals delay or avoid altogether the treatment they need. While issues of access are clearly magnified in rural areas, mobility restrictions and problems with accessibility have also been found to decrease the quality of health care for individuals located in urban areas (Hatzakis et al., 2003).

Telerehabilitation (TR) is the clinical application of consultative, preventative, diagnostic, and therapeutic services via a two-way interactive telecommunication technology (Wakeford, Whitman, White, & Schmeler, 2005). Two studies have shown that outcomes with TR assessments are as good as in-person outcomes (Barlow, Liu, & Sekulic, 2009; Schein et al., 2010). Barlow et al. (2009) found that 10 participants using TR had similar satisfaction ratings and were as likely to have their goals met as 10 participants seen face to face (as measured by the Quebec User Evaluation of Satisfaction with Assistive Technology outcome tool). Similarly, Schein et al. demonstrated that there were no significant differences (as measured by the Functioning Everyday with a Wheelchair outcome tool) between telerehabilitation (n = 48) and in-person assessments (n = 50).

Two systematic reviews discussed the limitations of patient satisfaction in telehealth care (Williams, May, & Esmail, 2001) and in telemedicine (Mair & Whitten, 2000). Mair and Whitten (2000) concluded that the studies reviewed used simple survey instruments to ascertain patient satisfaction. The patients found teleconsultations acceptable and noted definite advantages, particularly increased accessibility to specialist expertise, less travel required, and reduced waiting times. The studies reviewed had small sample sizes with low response rates. Williams et al. (2001) reported that patient satisfaction literature emerged as a byproduct of the growing number of trials and pilot studies. These pilot studies are useful to the extent that they provide positive and/or negative feedback about particular services. The available research on satisfaction describes a situation where patients and providers express a positive outcome with health care delivered through telemedicine.

The objective of this study was to measure satisfaction with TR among participants with mobility impairments based on their evaluation and prescription as well as comfort level. The specific hypotheses were as follows:

1. There would be no difference in satisfaction in the evaluation and prescription of participants’ TR assessments from previous procurements.
2. There would be no difference in comfort level on individual items from the Telerehabilitation Survey measured at the scale midpoint of 3.5.

METHODS
Sample

The 48 participants involved in this study met the inclusion criteria of 18 years of age or older, current manual/power wheelchair or scooter user seeking a new mobility device, difficulty or inconvenience traveling to the Center for Assistive Technology (CAT) in Pittsburgh, and not previously evaluated at the CAT. At the time when potential participants had their clinical appointment, they were made aware of this research study and asked if they were interested in participating. The data were collected at four remote sites, all of which were set up by the clinical research team and were at least 100 miles away from Pittsburgh: DuBois Regional Medical Center in DuBois, PA; Charles Cole Memorial Hospital in Coudersport, PA; Meadville Medical Center in Meadville, PA; and Elk Regional Health Center in Saint Mary’s, PA. None of the study participants had previously received a wheeled mobility and seating assessment from an expert practitioner. Each of the remote sites was selected because its occupational or physical therapists expressed an interest in the area of wheeled mobility and seating and assisting with the research project.

Instruments

The Telerehabilitation Survey consisted of seven items rated on a 6-point scale (1 = completely disagree, 6 = completely agree). Since there were no validated instruments to be used in the TR satisfaction literature, a similar survey created by Malagodi et al. (1998) was used and expanded to meet the present needs. The expanded items were created by an occupational therapist and rehabilitation engineers with specific expertise in TR. The survey’s seven items were as follows:
1. You were comfortable being evaluated through this means.
2. The results of the evaluation through the televideo conference would be as accurate as an evaluation being completed in person by a certified practitioner.
3. All areas of your lifestyle were considered with this process.
4. The technology did not interfere with the assessment.
5. The quality and clarity of the video and audio was acceptable.
6. Consulting with an expert clinician through televideo conferencing saved you monetary expenses (i.e., travel time, gas, taking off of work, family, etc.).
7. You would use this televideo evaluation process again.

The Demographic Data Form-Pre used a 5-point scale to assess how the evaluation and prescription process worked in procuring participants’ current wheeled mobility and seating (WMS) device. The Demographic Data Form-Pre was also used to gather information on the participants’ current WMS device status as well as basic demographics such as age, gender, race, and primary diagnosis. The Demographic Data Form-Post allowed participants to score their evaluation and prescription process on a 5-point scale using the teleconsultation model via TR. The Demographic Data Form-Post also allowed the researchers to track what type of WMS device the study participant received.

FIGURE 1 Demographic Data Form-Pre.

Procedure

Prior to commencing data collection, institutional review board approval was obtained at each of the sites. In-service training was conducted at each of the respective hospitals to explain the service delivery protocol (Schein, Schmeler, Brienza, Saptono, & Parmanto, 2008). The participants who fulfilled the criteria set forth above were explained the study procedures and invited to take part. No participants were involved in the study without giving their informed consent, which was obtained by the therapists at each of the remote sites.

On the day of their appointments, either a physical or occupational therapy assistant asked the participants to report how satisfied they were with the evaluation and prescription process of their current mobility device before entering the clinic to meet the interdisciplinary team. The evaluation refers to the participant’s assessment of the mobility device, and the prescription refers to the actual mobility device being used. Responses were recorded on the Demographic Data Form-Pre on a Likert scale from 1 (very dissatisfied) to 5 (very satisfied) (see Figure 1). The participants were then asked again to score the evaluation and prescription process during the delivery of their new mobility device on the Demographic Data Form-Post by the same physical or occupational therapy assistant after leaving the clinic (see Figure 2). Upon the delivery appointment, participants filled out the Telerehabilitation Survey with a physical or occupational...
Data Analysis

SPSS Version 14.0 was used to analyze the data. A paired-samples t test was carried out between preevaluation and postevaluation scores as well as between preprescription and postprescription scores. In an effort to evaluate participants’ comfort level with the Telerehabilitation Survey, independent t tests were used to compare item means with the scale midpoint of 3.5. Because the use of repeated t tests increases the chance of a Type I error (finding significant differences by chance alone), a Bonferroni correction was also used in the data analysis (desired alpha/number of comparisons = alpha needed for desired alpha, or .05/7 = p = .007) (Huck & Cormier, 1996; Portney & Watkins, 2000).

RESULTS

The average age of the participants in the study was 55 years old (range: 22–89); 89.6% were Caucasian, 62.5% were female, and 52.1% used a manual wheelchair. Since the participants had various primary diagnoses such as spina bifida, multiple sclerosis, muscular dystrophy, amputations, and cerebrovascular accident to name a few, diagnostic categories were collapsed and placed within five groups: progressive (25.0%), spinal cord injury (10.4%), orthopedic (17%), cardiovascular (31%), and central nervous system (17%) (see Table 1).

Of the 48 participants recruited, 40 received a new WMS device where both the evaluation and prescription methods were analyzed. These numbers were based on power calculations and allowed for dropouts...
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(\(n = 8\)) during the study (Schein et al., 2008). The typical wheelchair used at the initial assessment was a 49.3-month-old manual wheelchair with no seating functions. At posttest, the majority of participants had been prescribed power wheelchairs (82.5%) with various power seat functions such as power tilt-in-space, recline, seat elevator, elevating legrests, or a combination of at least two of these functions. The results revealed that there was a statistically significant difference between preevaluation and postevaluation scores, \(t(39) = -13.92, p < .05\) (Figure 3). The mean rating of postevaluation scores (\(M = 4.98, SD = 0.16\)) was higher than the mean rating of preevaluation scores (\(M = 2.73, SD = 0.98\)). The results also revealed that there was a statistically significant difference between preprescription and postprescription scores, \(t(39) = -13.15, p < .05\). The mean rating of postprescription scores (\(M = 4.98, SD = 0.16\)) was higher than the mean rating of preprescription scores (\(M = 2.81, SD = 0.99\)). The wheeled mobility and seating assessment using a TR consultation model had a significant effect on participants’ evaluation and prescription satisfaction.

The average duration of the telerehabilitation consultation was 88 minutes (range: 74 to 117 minutes). Based on the Demographic Data Form-Post, researchers were able to calculate the number of days from the participant’s initial assessment to fitting and delivery, and on average it was 112 days (\(SD = 68.3\)). These numbers contributed to the satisfaction scores for the evaluation and prescription, as participants were provided high-end custom wheeled mobility and seating devices in a short time period. Of the 48 participants, 5 were scheduled to be reassessed before determining an appropriate WMS device due to outdated paperwork or for follow-up regarding their seating needs. The interdisciplinary team was unable to submit all of the necessary documents to the insurance company in a timely manner; therefore, the participants agreed to come back in and update their paperwork. For the individuals who were seen for follow-up regarding their seating needs, the interdisciplinary team either recommended a custom molded seat or remounted their existing seat to where this could not be done during the initial assessment. In addition, 4 of the participants were denied their new mobility device, and an appeal letter was written on behalf of these participants or a peer-to-peer conference call was held with their respective insurance companies. Eventually the new mobility device was approved and delivered to the participant after going through the appeal process.

Analysis of the Telerehabilitation Survey showed that 46 of the 48 participants recruited responded (approximately 96%). All mean scores were significantly higher than the scale midpoint of 3.5, suggesting participant satisfaction with the wheeled mobility and seating assessment via TR (see Table 2).

Either after the fitting of the new mobility device or during follow-up, participants were asked to complete the Telerehabilitation Survey, measuring their satisfaction based on their experience using this telerehabilitation consultation model. Participants rated each of the items at a very high satisfaction level (strongly agree or mostly agree) except for Item 5. This particular question had the most variation in the different ratings—slightly disagree (2.2%), slightly agree (6.5%), mostly agree (43.5%), and strongly agree (47.8%)—making this the only item that did not have a majority
response for strongly agree. Within the survey, space was provided for qualitative feedback, and participants’ comments were generally positive (see Table 3).

Descriptive statistics were recorded for distance (miles) and time (minutes) traveled to and from the remote site, as compared with that which would have occurred if the participant had traveled to CAT. As expected, the average travel distance to the remote site was less than the average travel distance would have been to CAT, 21.5 ($SD = 16.21$) miles versus 122.0 ($SD = 36.66$) miles. Likewise, the average total travel time to the remote site was less than the average total travel time would have been to CAT, 33.6 ($SD = 20.92$) minutes versus 145.4 ($SD = 45.32$) minutes.

**DISCUSSION**

The purpose of this study was twofold: first, to measure participants’ satisfaction with their previous evaluation and prescription procurement with their current TR evaluation and prescription, and, second, to measure participants’ comfort level with using TR. The results indicate that individuals were generally satisfied with the TR assessments. This is in agreement with literature suggesting that patient satisfaction with “tele”-activity is high (Mair & Whitten, 2000; Whitten & Love, 2005; Williams et al., 2001). Study findings indicated that there were significant pre- and postevaluation and pre- and postprescription differences ($p < .001$) and a high degree of satisfaction, with a significant difference ($p < .001$) for each of the items measured at the midpoint scale of 3.5. Even though the constructs of evaluation and prescription were almost statistically identical, they represent two distinct measures for wheeled mobility and seating assessments. The service delivery protocol at each of the remote sites was a factor in satisfaction and comfort level scores. During the TR assessment, the participant had close and constant contact with the generalist practitioners and suppliers while having the undivided attention of all parties, including the expert practitioner via TR. All researchers involved in the study were members of professional associations and follow a code of ethics to ensure quality to their respective clients. The inconsistency of responses for the item “The quality and clarity of the video and audio was acceptable” was due to the fact that one of the remote sites was connected through an unstable wireless connection.

Of the 48 participants recruited, only 40 reported their postevaluation and postprescription satisfaction after receiving their new mobility device. Eight were withdrawn for the following reasons:

- died before receipt of new mobility device ($n = 1$)
- requirement to be evaluated at Veterans Affairs clinic due to veterans’ insurance ($n = 1$)
- lost to follow-up ($n = 2$)
- determined not to be safe while driving a power wheelchair and scooter ($n = 1$)
- declined recommended WMS device ($n = 1$)
- current power wheelchair repaired ($n = 1$)
- could not afford to pay the 20% co-insurance ($n = 1$)

**TABLE 2** Results of independent t tests for telerehabilitation survey testing midpoint (3.5)

<table>
<thead>
<tr>
<th>Item</th>
<th>$M (SD)$</th>
<th>95% CI of the Difference</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item 1</td>
<td>5.89 (0.32)</td>
<td>2.30–2.48</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Item 2</td>
<td>5.67 (0.47)</td>
<td>2.03–2.31</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Item 3</td>
<td>5.93 (0.25)</td>
<td>2.36–2.51</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Item 4</td>
<td>5.50 (0.51)</td>
<td>1.85–2.15</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Item 5</td>
<td>5.37 (0.71)</td>
<td>1.66–2.08</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Item 6</td>
<td>5.57 (0.54)</td>
<td>1.90–2.33</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Item 7</td>
<td>5.93 (0.25)</td>
<td>2.36–2.51</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

*Note. df = 45.*

**TABLE 3** Examples of participant feedback from the telerehabilitation survey

- “Very thorough assessment.”
- “We didn’t even notice the cameras.”
- “I don’t think my mother would have been able to be in a car for six hours to get to Pittsburgh. We were very pleased that a clinic was only a half hour way and still be able to meet with experts in the field.”
- “I would love to see this technology expanded into different areas.”
- “They evaluated me and not my disability.”
- “We were very pleased with the assessment and how knowledgeable everyone was.”
- “If it was up to me, I would do this for all of my health care needs instead of making arrangements to travel all over to see my doctors.”
- “There was some feedback but it went away in a matter of minutes.”
- “I could not understand what the gentlemen were saying during certain parts of the assessment.”
As a follow-up to the participant who was not safe driving within and around the clinic, this was noted during the assessment among the clinicians involved and the family members who were present, and it was confirmed by the supplier who performed a home assessment. The participant who declined the recommended WMS device trialed four different devices during the assessment and reported being content with the current device. The specific model of the mobility device was discontinued, with part repair only as necessary. The reasons identified above were not directly related to using TR. They were, however, real-life situations that arise in clinical service delivery.

The study had certain limitations. First and foremost was the pre-post experimental design, which is not able to discern cause and effect as the participant’s satisfaction of evaluation and prescription was measured at that moment in time. The nature of current insurance practices is that an individual receives a wheelchair every 3–5 years. This is an inherent problem with the delivery of this service; therefore, comparing equipment satisfaction years after delivery to immediately after delivery is another major limitation. This does not allow for a fair comparison due to changes in health or functional status and a variety of issues such as repair or maintenance, differences in clinician expertise, and experiences with everyday use. Although the before and after comparisons between participants’ wheeled mobility and seating devices seem disparate, each participant had unique factors that had to be considered during the assessment, and these factors yielded the most appropriate device as determined by the team at the remote site along with the expert practitioner via TR. A more powerful experimental design is needed to compare the three service delivery models in question: TR (as described), travel to a specialty clinic, and service at a rural facility using current staff. The assessment using TR had a significant effect on participants’ evaluation and prescription satisfaction.

A second limitation was the ceiling effect whereby the majority of scores were at or near the maximum possible for the Telerehabilitation Survey. To eliminate possible study bias or ceiling effects, future studies should look at flipping the “strongly disagree” and “strongly agree” categories so that half of the participants have data sheets that read “strongly disagree” first and the other half have “strongly agree” first. It is often the case that when response alternatives are given, the order in which they are given results in biased responses. A more traditional outcome measure (e.g., the Quebec User Evaluation of Satisfaction) could have been used to examine participants’ satisfaction with both the wheeled mobility and seating device and the service provision around the dispensing of the device.

A third limitation was that the study used only one expert practitioner to consult on all 48 participant evaluations via TR. The expert practitioner provided the following to the generalist practitioners during TR assessment: advice on seating system frames, bases, and accessories; knowledge of policy implications and funding mechanisms; and education on how physical impairments and medical necessities relate to decisions about wheeled mobility and seating options. A second or third expert may have had a different opinion as to other alternative recommendations and/or accessories. With that being said, the participants still had very high postevaluation and postprescription satisfaction scores as well as high scores on the individual survey items.

Finally, the last limitation was that patient satisfaction was only measured at one time. Satisfaction should have been measured for all of the rehabilitation professionals, for instance, the generalist practitioners and suppliers in this study who were involved in the assessment process. Satisfaction should also be measured over time to see if similar results are obtained. If not, the participant can return to the clinic to be reassessed, and modifications can be made to make sure that the wheeled mobility and seating device is meeting the participant’s functional needs satisfactorily.

**CONCLUSION**

This study provided valuable feedback on satisfaction with a telerehabilitation consultation model evaluating individuals for a new wheeled mobility and seating device. The impetus behind the development of TR services was the desire to provide equitable access to rehabilitation services for individuals who were remote from rehabilitation specialists. Patient acceptance of TR is an integral part of the future success of incorporating technology into clinical service delivery. Overall, the results indicate a high level of patient satisfaction according to postevaluation and postprescription ratings as well as the TR survey items.
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REFERENCES


