Original Research

Virtual Rehabilitation and COVID-19: Varied Adoption and Satisfaction Among Patients and Providers Participating in a Multi-Site Survey Study

INQUIRY: The Journal of Health Care Organization, Provision, and Financing
Volume 61: 1–11

DOI: 10.1177/00469580231222334
journals.sagepub.com/home/inq
Sage

Mindi R. Manes, PhD[1], Judith M. Burnfield, PhD, PT[2], Kelsey Boersma, MPH[3], Jason Peoples[3], Anita Davis, PT, DPT[4], Jason M. Beneciuk, PT, DPT, PhD, MPH[4,5], Joel Bialosky, PT, PhD[4,5], Katelyn Jordan, OD, FAAO[4], and Raine Osborne, PT, DPT, EdD[4,6]

Abstract

The COVID-19 pandemic compelled rapid healthcare adaptations including increased use of telehealth (TH) and virtual care (VC) to provide rehabilitation services. This multi-site cross-sectional survey study examined rehabilitation patients' and providers' experiences with service delivery during the COVID-19 pandemic, including the use of TH/VC. Patients and providers who received or provided rehabilitation services were recruited from 1 of 3 large, post-acute rehabilitation systems located in the Southeastern and Midwestern United States during the COVID-19 pandemic. Participants rated personal satisfaction with rehabilitation services received or rendered during the pandemic and willingness to use TH/VC in the future. Questions also addressed accessibility, ease of use, and perceived barriers to TH/VC use. The adoption and personal satisfaction of TH/VC for rehabilitation care varied between patients and providers. Patients reported higher levels of satisfaction compared to providers ($P < .001$). Patients who did not use TH/VC had higher satisfaction than those who did ($P < .05$). Patients were less willing than providers to use TH/VC ($P < .001$). Those who used TH/VC prior to the pandemic were more willing to use post-pandemic ($P < .001$). Patients reported TH/VC was useful in increasing health services accessibility yet were neutral as to the ability of TH/VC to improve outcomes. Patients and providers agreed that TH/VC was easy to learn and use. Medical providers found TH/VC more useful than therapy providers. Participants who used TH/VC during the pandemic are more willing to use the service again in the future. Understanding patient and provider preferences and perspectives is key to the continued use of TH/VC in rehabilitation care.

What is known about telehealth and virtual care usage for delivery of healthcare?
Previous research highlighted potential benefits of using telehealth services (eg, greater accessibility, cost-savings, comparable outcomes) compared to traditional in-clinic rehabilitation care; however, studies were often limited to specific diagnoses, a single healthcare organization, or limited disciplines.

How does research contribute to field?
This work provides a more comprehensive study of rehabilitation experiences and future willingness to use telehealth / virtual care by patients and providers who did and did not use telehealth / virtual care during the pandemic. Barriers to use are discussed.

What are your research's implications toward practice?
Given findings, rehabilitation providers may want to consider a mixed-delivery system incorporating in-clinic and TH/VC patient care visits and the use of a stratification model to identify patients who would benefit most from TH/VC services.

Introduction

The onset of the COVID-19 pandemic prompted a dramatic shift in delivery of healthcare from traditional in-person visits to telehealth (TH) and virtual care (VC) services.[1] To enable continuity of patient care and maintain physical distancing practices, the use of TH/VC increased substantially

throughout the healthcare industry.[2-5] In the United States, the Coronavirus Preparedness and Response Supplemental Appropriations Act and Section 1135 waiver allowed beneficiaries to receive services through telehealth, including those rendered by a rehabilitation provider.[6] As the Centers for Medicare and Medicaid Services (CMS) announced these modifications, other carriers followed suit paving the way for TH/VC expansion in all areas.

Despite evidence regarding the benefits of access, cost savings and comparable outcomes to in-clinic care,[7-12] TH/VC services struggled to gain a foothold in rehabilitation prior to the pandemic. Restrictions in local regulations and reimbursement policies of both CMS and commercial insurance carriers hindered the adoption of TH/VC services in the United States.[13] Technical and equipment limitations, implementation costs, and patient and provider acceptance have also been identified as challenges in the telerehabilitation literature.[14-18] As actual and perceived barriers were rapidly overcome to meet care needs during the pandemic, TH/VC services in rehabilitation widely expanded.

In general, patients and providers are satisfied with TH/VC healthcare.[19,20] Literature from the rehabilitation perspective, however, are scarce and tend to be limited to specific diagnoses or to single health care organizations.[8,21] Pre-COVID literature does speak to satisfaction in regard to decreased travel and increased communication.[19] There is also evidence of positive outcomes in select cases with "virtual physical therapy."[20,21] Data from recent literature supports positive patient and provider experiences with TH/VC during the pandemic,[1,22-24] though preference for in-person visits has been observed for both populations.[23,25]

As physical distancing restrictions have lifted[26] and clinic visits have rebounded,[27] the future of TH/VC in rehabilitation is in question. The TH/VC modality, however, affords rehabilitation providers the flexibility to provide quality care when in-person services are not the best option for a patient. A comprehensive understanding of patient and provider satisfaction coupled with the evaluation of barriers to TH/VC during the pandemic provide valuable insights into best practices for TH/VC use in the future.

Objectives

To assess patients' and providers' levels of personal satisfaction, we designed a cross-sectional survey that captured the experiences of participants who did and did not use TH/VC during the pandemic. Our objectives were to (1) assess patient and provider satisfaction with rehabilitation care during the COVID-19 pandemic; (2) compare the rehabilitation experiences and willingness to use TH/VC in the future of patients and providers who did and did not use TH/VC services during the pandemic; and (3) identify factors influencing TH/VC acceptance among rehabilitation patients and providers.

Methods

Sample Population

Participants in this cross-sectional survey study included adult patients and healthcare providers who received or provided inpatient or outpatient rehabilitation services in 1 of 3 large, post-acute rehabilitation systems located in the Southeastern and Midwestern United States during the COVID-19 pandemic (March 11th, 2020 to September 30th, 2020). Each institution invited participation via an email containing a link to the anonymous survey from their respective patients and providers who satisfied the above criteria. Participants consented to study participation via the link before completing the survey. The study protocol was approved by the Advarra IRB (Pro00044614).

Survey Design

The survey was specifically designed to achieve the objectives of this study. The research team reviewed existing surveys related to TH/VC, technology acceptance, and patient satisfaction as well as consulted with clinical and administrative leaders from participating sites to develop and refine questions. Two separate but similar versions of the survey were developed, one for patients and one for providers. Logic rules were embedded in each version to customize question wording based on use or non-use of TH/VC during

[1]Brooks Rehabilitation, Brooks Center for Research Analytics and Outcomes, Jacksonville, FL, USA
[2]Madonna Rehabilitation Hospitals, Institute for Rehabilitation Science and Engineering, Lincoln, NE, USA
[3]Mary Free Bed Rehabilitation Hospital, Grand Rapids, MI, USA
[4]Brooks Rehabilitation, Brooks Clinical Research Center, Jacksonville, FL, USA
[5]University of Florida, Department of Physical Therapy, Gainesville, FL, USA
[6]University of North Florida, Department of Physical Therapy, Jacksonville, FL, USA

Received 12 January 2023; revised 20 November 2023; revised manuscript accepted 27 November 2023

Corresponding Author:
Mindi R. Manes, Brooks Rehabilitation, 3599 University Blvd S., Suite 1101, Jacksonville, FL 32216, USA.
Email: mindi.manes@brooksrehab.org

the pandemic as indicated by participants' response to an introductory question. All survey versions were structured into the following sections:

Participant characteristics. The survey asked about participant demographics, use of TH/VC during the COVID-19 pandemic, use of TH/VC prior to the pandemic, and use of internet-based communication. Provider participants also identified their discipline and if they had ever used TH/VC as a patient.

Satisfaction. Participants rated their level of agreement (0 = completely disagree, 100 = completely agree) to their personal satisfaction with rehabilitation services received (patients) or rendered (providers) during the pandemic. Patient participants who used TH/VC to receive rehabilitation services were asked about their satisfaction with TH/VC services. Patients who did not use TH/VC were asked if they thought they would be as satisfied using TH/VC for rehabilitation services as they would be with in-person visits. Providers who rendered services using TH/VC were asked if they were equally satisfied using TH/VC as compared to traditional in-person visits, while providers who did not use TH/VC were asked if they thought they would be equally satisfied using TH/VC.

Future use of TH/VC for rehabilitation. All participants were asked to rate their level of agreement (0 = completely disagree, 100 = completely agree) with a statement indicating willingness to use TH/VC in the future once COVID-19 is no longer a threat to receiving in-person rehabilitation care.

Technology acceptance. Patients and providers who used TH/VC during the pandemic rated their level of agreement with statements indicating enhanced quality, enhanced efficiency, and improved outcomes associated with the use of TH/VC.[28] Patient TH/VC users were also asked about increased health services accessibility while providers were asked about the validity of information and enhanced clinical decision-making associated with use of TH/VC. Patient and provider TH/VC users were asked about the ease of learning to use TH/VC.

Challenges to TH/VC. All participants were asked to select experienced or expected barriers to the use of TH/VC. Participants could select more than one barrier.

Analysis

Participant characteristics and history of telehealth use were summarized using descriptive statistics for the survey respondents overall and for each of the 4 analysis groups: (1) patients with telehealth use, (2) patients without telehealth use, (3) providers with telehealth use, and (4) providers without telehealth use. Group assignment was based on responses to two introductory questions regarding status as a patient or provider and use of TH/VC. Group differences between telehealth users and telehealth non-users were assessed for both patients and providers using independent *t*-tests for continuous variables and Chi-square tests for categorical variables. Satisfaction questions were tested for normality using the Shapiro-Wilk test and the Mann-Whitney *U* test was used to examine group differences between telehealth users and non-users and between patients and providers. Participants' decision to respond to each survey item was voluntary. Data were analyzed using IBM SPSS (version 26).

Results

Participants

Survey responses were received from 877 participants of whom 608 (69.3%) were eligible and contained sufficient data for inclusion in the analysis. Of the 441 patients and 167 rehabilitation providers included in the final analysis (Table 1), respondents were primarily female (55.9%) and White (76.3%). Patient responders were significantly ($P < .001$) older than provider respondents with a mean age of 46.1 years (SD 11.6) and 30.6 years (SD 9.3) respectively. Due to relatively small counts for some professions, provider data were aggregated into 2 groups: medical (n = 75, 44.9%) including physician, physician assistant, nurse practitioner, nurse, nursing assistant, and psychologist, and therapy (n = 92, 55.1%) including occupational therapist, physical therapist, speech language pathologist, occupational therapist assistant, physical therapist assistant, and other. Physical therapist represented the largest proportion of respondents across all groups.

Telehealth/Virtual Care Utilization

Prior to the COVID-19 pandemic, only 69 (11.3%) of the respondents had experience using TH/VC while 258 (42.4%) used TH/VC during the pandemic (Table 1). Patient respondents who were younger, White, and used TH/VC prior to the pandemic were significantly ($P < .05$) more likely to use TH/VC during the pandemic compared to their older, non-white, and no prior TH/VC use counterparts. For providers, only pre-pandemic TH/VC use as a provider or as a patient had a significant ($P < .05$) and positive association with TH/VC use during the pandemic. Neither gender nor frequency of internet-based telecommunications use was associated with TH/VC use during the pandemic for patients or providers.

Satisfaction

Personal satisfaction with services. Regardless of TH/VC use, patients reported significantly greater satisfaction with the rehabilitation services received during the COVID-19 pandemic as compared to providers' reported satisfaction with the services they provided ($P < .001$); Table 2). Within-group comparisons demonstrated higher satisfaction among

Table 1. Patient and Provider Characteristics by Group.

	Patients		Providers	
Characteristic	TH/VC	Non-TH/VC	TH/VC	Non-TH/VC
Subgroup sample size: n (% of total)	158 (26.0)	283 (46.5)	100 (16.5)	67 (11.0)
Mean age (years): mean (SD)	43.7 (11.7)	47.3 (11.4)	31.1 (9.9)	30.0 (8.3)
Age groups (years): n (%)				
18-29	21 (13.3)	25 (8.8)	39 (39.0)	30 (44.8)
30-39	24 (15.2)	32 (11.3)	22 (22.0)	18 (26.9)
40-49	39 (24.7)	78 (27.6)	11 (11.0)	9 (13.4)
50-59	39 (24.7)	94 (33.2)	3 (3.0)	0 (0.0)
60+	8 (5.0)	31 (11.0)	1 (1.0)	0 (0.0)
Missing	27 (17.1)	23 (8.1)	24 (24.0)	10 (14.9)
Gender: n (%)				
Male	49 (31.0)	109 (38.5)	19 (19.0)	12 (17.9)
Female	82 (51.9)	154 (54.4)	58 (58.0)	46 (68.7)
Missing	27 (17.1)	20 (7.1)	23 (23.0)	9 (13.4)
Race: n (%)				
White	122 (77.2)	224 (79.2)*	67 (67.0)	51 (76.1)
Non-White	10 (6.3)	40 (14.1)	9 (9.0)	7 (10.4)
Missing	26 (16.5)	19 (6.7)	24 (24.0)	9 (13.4)
Non-healthcare internet telecommunication use: n (%)				
<Daily	62 (39.2)	113 (39.9)	34 (34.0)	25 (37.3)
Daily or more	71 (44.9)	150 (53.0)	45 (45.0)	33 (49.3)
Missing	25 (15.8)	20 (7.1)	21 (21.0)	9 (13.4)
Pre-pandemic TH/VC Use: n (%)				
No	114 (72.2)	252 (89.0)*	52 (52.0)	54 (80.6)*
Yes	22 (13.9)	15 (5.3)	27 (27.0)	5 (7.5)
Missing	22 (13.9)	16 (5.7)	21 (21.0)	8 (11.9)
During pandemic TH/VC use: n (%)				
0 times	0 (0.0)	-	-	-
1-2 times	43 (27.2)	-	-	-
3-5 times	46 (29.1)	-	-	-
6 or more times	45 (28.5)	-	-	-
Missing	24 (15.2)	-	-	-
Reason for receiving TH/VC: n (%)				
Musculoskeletal	70 (44.3)	-	-	-
Neurologic	41 (25.9)	-	-	-
Other	21 (13.3)	-	-	-
Missing	26 (16.5)	-	-	-
Prior TH/VC use as a patient: n (%)				
No	-	-	39 (39.0)	40 (59.7)*
Yes	-	-	39 (39.0)	18 (26.9)
Missing	-	-	22 (22.0)	9 (13.4)
Provider type: n (%)				
Physician	-	-	9 (9.0)	1 (1.5)
PA	-	-	1 (1.0)	0 (0.0)
ARNP	-	-	1 (1.0)	1 (1.5)
Nurse	-	-	7 (7.0)	7 (10.4)
CNA	-	-	1 (1.0)	2 (3.0)
Psychologist	-	-	8 (8.0)	0 (0.0)
OT	-	-	9 (9.0)	7 (10.4)
PT	-	-	26 (26.0)	29 (43.3)
SLP	-	-	6 (6.0)	1 (1.5)
COTA	-	-	0 (0.0)	2 (3.0)
PTA	-	-	0 (0.0)	8 (11.9)
Other	-	-	7 (7.0)	1 (1.5)
Missing	-	-	25 (25.0)	8 (11.9)

Note. Blanks represent questions not asked of the respective group.
TH/VC = telehealth/virtual care; PA = physician assistant; ARNP = nurse practitioner; CNA = nurse assistant; OT = occupational therapist; PT = physical therapist; SLP = speech language pathologist; COTA = occupational therapist assistant; PTA = physical therapist assistant.
*$P < .05$.

patients who did not use TH/VC compared to those who did ($P < .05$), while satisfaction among providers who did and did not use TH/VC during the pandemic did not differ significantly.

Personal satisfaction with TH/VC. Patients who used TH/VC during the pandemic reported a generally positive experience with receiving rehabilitation services through this delivery mode [mean = 75.7 (SD 39.7); median = 93]. In comparison, patients who did not use TH/VC reported a low expectation for being equally satisfied using TH/VC versus in-person services [mean = 21.4 (SD 27.9); median = 10]. Providers who used TH/VC during the pandemic reported a significantly higher level of equal satisfaction for TH/VC versus traditional in-person care compared to the perceived level of equal satisfaction for TH/VC versus traditional in-person care reported by providers who did not use TH/VC ($P < .001$).

Future Telehealth/Virtual Care Use

Patients reported significantly less willingness to use TH/VC post-pandemic as compared to providers ($P < .001$; Table 2). Within-group comparisons show a similar pattern for both patients and providers, with those who used TH/VC during the pandemic being significantly more willing to use TH/VC post-pandemic ($P < .001$).

Technology Acceptance

Usefulness. Patient TH/VC users had the highest level of agreement that TH/VC was useful for increasing health services accessibility [mean = 72.2 (SD 34.5); median = 88] followed by enhancing the efficiency of care [mean = 58.5 (SD 35.6); median = 66]. Patient users were relatively neutral about the ability of TH/VC to improve outcomes (such as ability to improve daily activities) [mean = 44.9 (SD 35.0); median = 50]) and tended toward disagreement that TH/VC enhanced the quality of health care [mean = 38.9 (SD 33.2); median = 40]. Provider TH/VC users only indicated agreement that TH/VC provided valid information about patients [mean = 65.2 (SD 26.5); median = 70]. The TH/VC providers were neutral about TH/VC's ability to enhance patient monitoring [mean = 50.1 (SD 30.4); median = 50] and improve outcomes [mean = 44.3 (SD 30.0); median = 50.0]. Providers tended toward disagreement that TH/VC enhanced quality [mean = 41.5 (SD 30.9); median = 40.0], efficiency [mean = 44.0 (SD 30.6); median = 42.5], and clinical decision-making [mean = 44.6 (SD 29.2); median = 45.0]. Medical rehabilitation providers who used TH/VC reported higher levels of agreement for all technology usefulness questions when compared to therapy rehabilitation who also used TH/VC (Table 3).

Ease of use. There was general agreement that TH/VC was easy to learn by both patient TH/VC users [mean = 73.1 (SD 32.8); median = 90.0] and provider TH/VC users [mean = 74.2 (SD 27.9); median = 80.0]. Patient users agreed that TH/VC was easy to use independently [mean = 69.3 (SD 35.7); median = 90.0] while provider users agreed that TH/VC was easy to include as part of patient care [mean = 69.3 (SD 28.6); median = 80.0]. Medical providers reported greater agreement that TH/VC was easy to use as a part of patient care [mean = 80.7 (SD 22.8); median = 87.0] compared to TH/VC therapy providers ([mean = 37.6 (SD 24.9); median = 40.0]. Providers also agreed that TH/VC was easy to explain to patients [mean = 68.2 (SD 28.6); 74.0].

Barriers to Telehealth/Virtual Care Use

Patients who did not use TH/VC most frequently reported lack of interest (52.3%) as a barrier to using TH/VC, whereas lack of knowledge (43.3%) and lack of reimbursement (31.3%) were most frequently reported among providers who did not use TH/VC (Table 4).

Discussion

As the nation's healthcare system responded to the realities of COVID-19, providers sought effective strategies to meet the ongoing needs of individuals rehabilitating from injuries, illnesses and surgeries. TH/VC offered an opportunity for patients to receive care from rehabilitation professionals while mitigating the risk of exposure to COVID-19. The aim of this multi-site cross-sectional study was to assess the experiences of rehabilitation patients and providers who did and did not use TH/VC during the pandemic with a goal of identifying factors that should be addressed to promote greater success using TH/VC in the future.

In this survey, the percentage of patients receiving rehabilitation care via TH/VC increased 4-fold during the pandemic. Despite this substantial increase, nearly 65% reported no TH/VC use at the time of the study. Patients who did not use TH/VC were older and had less experience with telerehabilitation compared to the adopter group. Lower telehealth use among older adults has been described previously,[29,30] and may be attributable to a lesser familiarity with telehealth technology.[31-33] Relatedly, we found lack of interest to be an important barrier to TH/VC use for a majority of the non-adopter group. A recent study evaluating the success of home telehealth visits among older adults discussed the difficulty recruiting uninterested patients, despite their access to and confidence in the technology.[34] These results speak to the importance of motivational engagement strategies when implementing telehealth initiatives, which have shown some success.[31] With regard to future use, patients who utilized TH/VC services during the pandemic reported greater willingness to use TH/VC again post-pandemic when compared to their non-TH/VC counterparts. These results align with data from a national assessment of post-pandemic telehealth preferences for general healthcare.[25] With regard to post-acute

Table 2. Comparison of Patient and Provider TH/VC Users Versus Non-TH/VC Users.

	Between group						Within group—patient						Within group—provider					
	All patients			All providers			TH/VC patients			Non-TH/VC patients			TH/VC providers			Non-TH/VC providers		
Characteristic	n	Mean (SD)	median	n	Mean (SD)	median	n	Mean (SD)	median	n	Mean (SD)	median	n	Mean (SD)	median	n	Mean (SD)	median
Satisfaction with care during pandemic	431	89.4 (21.2)	100	159	74.7 (24.0)	80*	157	84.1 (26.2)	98	274	92.4 (17.1)	100*	95	76.6 (20.8)	80	64	71.9 (27.9)	80
Satisfaction with use of TH/VC	-	-	-	-	-	-	158	75.7 (39.7)	93	-	-	-	-	-	-	-	-	-
Equal satisfaction TH/VC vs traditional	-	-	-	-	-	-	-	-	-	245	21.4 (27.9)	10	96	49.3 (32.8)	50	59	32.0 (24.7)	25*
Would use TH/VC in the future	383	36.8 (38.0)	20	158	59.0 (33.6)	66*	137	61.8 (37.0)	75	246	22.0 (30.7)	6*	92	68.7 (33.0)	80	58	43.4 (29.0)	50*
Usefulness																		
Enhanced quality	-	-	-	-	-	-	109	38.9 (33.2)	40	-	-	-	70	41.5 (30.9)	40	-	-	-
Enhanced efficiency	-	-	-	-	-	-	117	58.5 (35.6)	66	-	-	-	70	44.0 (30.6)	42.5*	-	-	-
Improved outcomes	-	-	-	-	-	-	116	44.9 (35.0)	50	-	-	-	67	44.3 (30.0)	50	-	-	-
Increased access to care	-	-	-	-	-	-	123	72.2 (34.5)	88				-	-	-	-	-	-
Provides valid information	-	-	-	-	-	-	-	-	-	-	-	-	70	65.2 (26.5)	70	-	-	-
Enhanced ability to monitor	-	-	-	-	-	-	-	-	-	-	-	-	63	50.1 (30.4)	50	-	-	-
Enhanced clinical decision-making	-	-	-	-	-	-	-	-	-	-	-	-	65	44.6 (29.2)	45	-	-	-
Ease of use																		
Easy to learn	-	-	-	-	-	-	119	73.1 (32.8)	90	-	-	-	71	74.2 (27.9)	80	-	-	-
Easy to use independently	-	-	-	-	-	-	119	69.3 (35.7)	90	-	-	-	-	-	-	-	-	-
Easy to include as part of patient care	-	-	-	-	-	-	-	-	-	-	-	-	70	69.3 (28.6)	80	-	-	-
Easy to explain to patients	-	-	-	-	-	-	-	-	-	-	-	-	68	68.2 (28.6)	74	-	-	-

Note. Blanks represent questions not asked of the respective group; TH/VC = telehealth/virtual care. *$P < .05$.

Table 3. Comparison of TH/VC Users by Patient and Provider Type.

	Between group—patient types									Between group—provider types					
	Neurological			Musculoskeletal			Other			Medical			Therapy		
Characteristic	n	Mean (SD)	Median	n	Mean (SD)	Median	n	Mean (SD)	Median	n	Mean (SD)	Median	n	Mean (SD)	Median
Satisfaction with care during pandemic	41	77.6 (26.6)	90	70	86.1 (27.8)	100	21	81.9 (26.7)	91*	42	76.7 (23.3)	81.5	87	72.3 (25.1)	80
Satisfaction with use of TH/VC	40	74.8 (28.2)	81.5	70	82.0 (29.3)	100	20	78.4 (30.4)	91	-	-	-	-	-	-
Equal satisfaction TH/VC vs traditional	-	-	-	-	-	-	-	-	-	39	59.4 (32.9)	70	86	35.8 (27.8)	25**
Would use TH/VC in the future	35	62.1 (36.1)	75	63	62.4 (36.7)	75	19	53.5 (38.4)	50	37	72.8 (29.6)	84	86	51.0 (33.7)	50*
Usefulness															
Enhanced quality	30	32.9 (31.7)	30	58	43.1 (35.7)	49	16	31.8 (24.6)	33	27	54.4 (34.1)	61	39	30.9 (24.7)	30*
Enhanced efficiency	34	53.1 (35.9)	50	60	61.1 (36.5)	75	17	62.2 (32.8)	50	26	61.5 (30.8)	62.5	40	30.6 (23.9)	26.5**
Improved outcomes	34	40.0 (32.4)	41.5	56	48.9 (38.5)	50	19	42.3 (30.8)	50	26	58.8 (31.1)	60	37	33.6 (26.1)	38*
Increased access to care	38	73.3 (33.1)	84.5	62	71.6 (36.6)	93	18	74.7 (34.1)	94.5	-	-	-	-	-	-
Provides valid information	-	-	-	-	-	-	-	-	-	26	68.1 (27.4)	69	40	61.8 (26.0)	66.5
Enhanced ability to monitor	-	-	-	-	-	-	-	-	-	22	68.3 (30.3)	74.5	37	37.6 (24.9)	40**
Enhanced clinical decision-making	-	-	-	-	-	-	-	-	-	24	58.1 (32.1)	64	37	35.1 (23.5)	40*
Ease of use															
Easy to learn	33	65.5 (35.9)	74	63	80.2 (30.1)	95	18	68.3 (32.6)	80	26	79.2 (26.1)	86	41	70.8 (29.6)	80
Easy to use independently	36	60.9 (38.3)	70	62	74.8 (33.9)	96.5	17	71.6 (33.3)	94	-	-	-	-	-	-
Easy to include as part of patient care	-	-	-	-	-	-	-	-	-	26	80.7 (22.8)	87	40	61.4 (30.4)	61*
Easy to explain to patients	-	-	-	-	-	-	-	-	-	24	76.4 (28.1)	90	40	63.3 (28.7)	70*

Note. Blanks represent questions not asked of the respective group; TH/VC = telehealth/virtual care; Neurological = stroke, spinal cord injury, concussion, traumatic brain injury, other neurologic condition; Musculoskeletal = musculoskeletal, post-surgical orthopedic, chronic pain, amputee; Other = other, oncology; Medical = nurse, nurse practitioner, certified nursing assistant, physician, physician assistant, and psychologist; Non-medical = occupational therapist, physical therapists, occupational and physical therapists assistants, speech language pathologists, and other non-medical providers (eg, recreational therapists). *$P < .05$; **$P < .001$.

Table 4. Barriers to Telehealth/Virtual Care by Group.

	Patients		Providers		TH/VC patients			TH/VC providers	
	TH/VC (n = 158)	Non-TH/VC (n = 283)	TH/VC (n = 100)	Non-TH/VC (n = 67)	Neurologic (n = 41)	MSK (n = 70)	Other (n = 21)	Medical (n = 38)	Therapy (n = 96)
Barrier	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Internet access	15 (9.5)	34 (12.0)	27 (27.0)	21 (31.3)	0 (0.0)	10 (14.3)	2 (9.5)	13 (34.2)	11 (11.5)
Access to connected device	9 (5.7)	15 (5.3)	9 (9.0)	14 (20.9)	0 (0.0)	4 (5.7)	2 (9.5)	5 (13.2)	3 (3.1)
Access to quality device	16 (10.1)	27 (9.5)	26 (26.0)	15 (22.4)	3 (7.3)	9 (12.9)	2 (9.5)	11 (29.0)	12 (12.5)
Privacy concerns	8 (5.1)	34 (12.0)	15 (15.0)	14 (20.9)	4 (9.8)	4 (5.7)	0 (0.0)	7 (18.4)	5 (5.2)
Lack of interest	16 (10.1)	148 (52.3)*	7 (7.0)	11 (16.4)	6 (14.6)	7 (10.0)	2 (9.5)	1 (2.6)	5 (5.2)
Physical disability	15 (9.5)	21 (7.4)*	-	-	7 (17.1)	4 (5.7)	1 (5.8)	-	-
Lack of space	-	-	18 (18.0)	13 (19.4)	-	-	-	5 (13.2)	10 (10.4)
Lack of time	-	-	14 (14.0)	9 (13.4)	-	-	-	0 (0.0)	12 (12.5)
Lack of reimbursement	-	-	15 (15.0)	21 (31.3)*	-	-	-	5 (13.2)	7 (7.3)
Lack of knowledge	-	-	12 (12.0)	29 (43.3)*	-	-	-	4 (10.5)	7 (7.3)
Other	41 (25.9)	61 (21.6)*	33 (33.0)	21 (31.3)	17 (41.5)	18 (25.7)	4 (19.1)	13 (34.2)	16 (17.7)

Note. Blanks represent questions not asked of the respective group.
MSK = musculoskeletal.
*$P < .05$.

rehabilitation, it is unknown if exposure to and training in telerehabilitation while in an inpatient care setting (eg, inpatient rehabilitation hospital or skilled nursing facility) affects the likelihood of patient adoption of TH/VC upon returning home. Future research should examine the extent to which telerehabilitation exposure acts as a catalyst to further use and should consider the possibility of self-selection bias with predisposed individuals opting to use telehealth technology.

Overall, the patients in our study were satisfied with the rehabilitation care they received during the pandemic, regardless of their use of TC/VC services. Similar findings have been reported for patients receiving rehabilitation therapy in the Northeastern United States.[22,35] The achievement of positive patient satisfaction, despite obstacles brought on by the pandemic is testament to the resilient efforts of healthcare providers.[36] Although generally satisfied, the TH/VC adopters reported lower satisfaction with their rehabilitation care compared to non-adopters. These findings are contrary to a recent study where no difference in satisfaction was observed for patients receiving physical therapy in-person or through video visits.[22] Inconsistent results between these studies may be explained by the broader rehabilitation services explored in our study, differing telehealth acceptance by geographical location, or potentially by a difference in sensitivity of the rating scales used to measure satisfaction.[37] Lower satisfaction with care among the TH/VC adopters in our study may reflect preference for traditional in-person visits, especially as a majority of the TH/VC adopters were satisfied with their TH/VC services and reported the technology to be easy to learn. Patient preference for in-clinic care has been discussed previously.[23,25] In-person therapy provides an opportunity for specified, personal treatment by rehabilitation providers and for patients to connect with others at similar points in their recovery.

Similar to patients, few participating providers utilized rehabilitation care through a TH/VC modality prior to the pandemic. This limited usage is likely due in large part to reimbursement regulations excluding telerehabilitation.[13] Despite payment coverage during the pandemic, the lack of reimbursement was reported among providers as a barrier to TH/VC utilization. This perceived rather than actual barrier suggests the lack of awareness to current payment policies among providers. Our results are consistent with data from the American Physical Therapy Association (APTA) where a majority of physical therapists reported being unsure about which insurance carriers were reimbursing TH/VC and their rates of reimbursement during the pandemic.[5] Such uncertainty narrows options for providers to select the best service modality for their patients. Future use of TH/VC in rehabilitation is unclear, but will be dependent upon telehealth regulation to incorporate TH/VC and efforts to raise awareness regarding TH/VC reimbursement coverage.

Regardless of care modality, providers' satisfaction with care rendered was considerably lower than that of patients' satisfaction for care received. These findings are not surprising considering the strain on healthcare providers during the pandemic. The ability to deliver high quality patient care was impacted by a multitude of factors, such

as staffing shortages, limited personal protective equipment, and the potential for exposure to the virus while in-clinic.[38] As telerehabilitation alleviated many of these challenges, a majority of the providers incorporated TH/VC into their practice at the time of the study. Medical rehabilitation providers more readily adopted TH/VC than did therapists. Medical providers who utilized TH/VC reported greater agreement to the usefulness and ease of use in patient care when compared to the therapy providers. Due to the nature of therapy relying heavily on direct, hands-on patient care, TH/VC use may have been more challenging for therapists than for physicians and nurses. These results align with a qualitative assessment of barriers to telerehabilitation implementation where therapists, chiropractors and kinesiologists were hesitant to adopt telerehabilitation due to difficulty translating manual therapies into telerehabilitation.[14] Despite barriers related to therapeutic relationships, providers in this study reported obtaining valid patient information while using TH/VC, and most would likely continue TH/VC use in the future. A systematic review of the physical examination components adapted for telemedicine conducted by Lu et al. found that virtual assessments yielded comparable results to in-person physical examinations across various clinical domains, including musculoskeletal examinations.[39]

A mixed-delivery system is an option that could allow providers to transition to increased use of TH/VC moving forward. Initial comprehensive evaluations could be completed in-person with follow-up care delivered through TH/VC. In addition, rehabilitation systems may consider the following three strategies to encourage directed TH/VC use among therapy providers: (1) actively stratifying patients (e.g., based on patient interest and factors indicating limited health services accessibility, such as living in rural areas, limited transportation, and/or mobility impairments that make travel difficult) to facilitate identification of patients most likely to benefit from TH/VC services; (2) incorporating therapy-specific accommodations to improve patient-provider interaction through TH/VC. Such provisions may include provider access to a high-quality video-conference device (shown to be a barrier among providers in our study) to capture whole body movement and modifications to at-home therapy equipment to facilitate TH/VC interaction; and (3) providing current and accurate information on telerehabilitation policy and reimbursement to alleviate confusion in a changing telehealth regulatory landscape.

Study Limitations

This study has some limitations. The survey was developed for this study and has not been tested for reliability or validity. In addition, an a priori power analysis was not performed due to unknown accuracy of patient contact information, provider turnover, and unknown number of deceased patients. The survey was administered at the peak of the COVID-19 pandemic when physical distancing was mandated. TH/VC adoption and personal satisfaction may be considerably different under post-pandemic circumstances. Although this work was completed through three participating sites throughout the US, survey completion was lower than expected. Low response rates, especially among providers, may be attributable to the nature of the pandemic and the fluidity of resources and personnel to accommodate changes in patient census. Given the geographic location of participating rehabilitation sites, minority and vulnerable populations may not be comparably represented based on the population as a whole. As this was a survey study and TH/VC services were not confirmed through EMR records, misclassification based on self-report could introduce bias.

Conclusions

This multi-site survey study examined TH/VC use and personal satisfaction of rehabilitation patients and providers during the COVID-19 pandemic. Providers adopted the use of TH/VC more readily than patients. Regardless of care modality, patients reported greater satisfaction with the care they received than providers did with the care they rendered. However, patients with in-clinic services had higher satisfaction than those using TH/VC. Medical rehabilitation providers adopted TH/VC technology and found it easier to use than did therapy providers. Patients and providers who used TH/VC during the pandemic reported being more likely to use TH/VC in the future when compared to non-adopters. Rehabilitation providers may consider a mixed-delivery system incorporating in-clinic and TH/VC patient care visits and the use of a stratification model to identify patients who would benefit most from TH/VC services.

Authors' Note

Material Presentation: Burnfield, J., Boersma, K., Peoples, J., Manes, M.R., Osborne, R. "Virtual Rehabilitation and COVID-19: A multi-site survey of patients' and providers' satisfaction with care during a pandemic." Brooks Rehabilitation Research Connection Webinar: Recent and Ongoing Projects with Aligned Partners, Virtual, March, 2022.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

Ethical Approval

Our study was reviewed and approved by the Advarra Institutional Review Board (Pro00044614).

ORCID iDs

Mindi R. Manes https://orcid.org/0000-0002-3065-0317
Judith M. Burnfield https://orcid.org/0000-0001-6184-5179

Supplemental Material

Supplemental material for this article is available online.

References

1. Garfan S, Alamoodi AH, Zaidan BB, et al. Telehealth utilization during the covid-19 pandemic: a systematic review. *Comput Biol Med*. 2021;138:104878. doi:10.1016/j.compbiomed.2021.104878
2. Koonin LM, Hoots B, Tsang CA, et al. Trends in the use of telehealth during the emergence of the COVID-19 pandemic - United States, January-March 2020. *MMWR Morb Mortal Wkly Rep*. 2020;69:1595-1599. Erratum in: MMWR Morb Mortal Wkly Rep. 2020 Nov 13;69(45):1711.
3. Monaghesh E, Hajizadeh A. The role of telehealth during COVID-19 outbreak: a systematic review based on current evidence. *BMC Public Health*. 2020;20:1193. doi:10.1186/s12889-020-09301-4
4. Punia V, Nasr G, Zagorski V, et al. Evidence of a rapid shift in outpatient practice during the COVID-19 pandemic using telemedicine. *Telemed J E Health*. 2020;26:1301-1303. doi:10.1089/tmj.2020.0150
5. Impact of COVID-19 on the physical therapy profession. American Physical Therapy Association. 2021. Accessed January 12, 2022. https://aptac.memberclicks.net/assets/APTA_impact-of-covid-19-on-physical-therapy-profession.pdf
6. COVID-19 Emergency declaration blanket waivers for health care providers. Centers for Medicare and Medicaid Services. 2021. Accessed November 8, 2021. https://www.cms.gov/files/document/summary-covid-19-emergency-declaration-waivers.pdf
7. Prvu Bettger J, Green CL, Holmes DN, et al. Effects of virtual exercise rehabilitation in-home therapy compared with traditional care after total knee arthroplasty: VERITAS, a randomized controlled trial. *J Bone Joint Surg Am*. 2020;102:101-109. doi:10.2106/JBJS.19.00695
8. Caughlin S, Mehta S, Corriveau H, et al. Implementing telerehabilitation after stroke: lessons learned from Canadian trials. *Telemed J E Health*. 2020;26:710-719. doi:10.1089/tmj.2019.0097
9. de Rooij IJ, van de Port IG, Meijer JG. Effect of virtual reality training on balance and gait ability in patients with stroke: systematic review and meta-analysis. *Phys Ther*. 2016;96:1905-1918. doi:10.2522/ptj.20160054
10. Gumaa M, Rehan Youssef A. Is virtual reality effective in orthopedic rehabilitation? A systematic review and meta-analysis. *Phys Ther*. 2019;99:1304-1325. doi:10.1093/ptj/pzz093
11. Cramer SC, Dodakian L, Le V, et al. Efficacy of home-based telerehabilitation vs in-clinic therapy for adults after stroke: a randomized clinical trial. *JAMA Neurol*. 2019;76:1079-1087. doi:10.1001/jamaneurol.2019.1604
12. Seron P, Oliveros MJ, Gutierrez-Arias R, et al. Effectiveness of telerehabilitation in physical therapy: a rapid overview. *Phys Ther*. 2021;101(6):pzab053. doi:10.1093/ptj/pzab053
13. Bierman RT, Kwong MW, Calouro C. State occupational and physical therapy telehealth laws and regulations: a 50-state survey. *Int J Telerehabil*. 2018;10:3-54. doi:10.5195/ijt.2018.6269
14. Snoswell CL, Taylor ML, Comans TA, et al. Determining if telehealth can reduce health system costs: scoping review. *J Med Internet Res*. 2020;22(10):e17298. doi:10.2196/17298
15. Annaswamy TM, Verduzco-Gutierrez M, Frieden L. Telemedicine barriers and challenges for persons with disabilities: COVID-19 and beyond. *Disabil Health J*. 2020;13(4):100973. doi:10.1016/j.dhjo.2020.100973
16. Hale-Gallardo JL, Kreider CM, Jia H, et al. Telerehabilitation for rural veterans: a qualitative assessment of barriers and facilitators to implementation. *J Multidiscip Healthc*. 2020;13:559-570. doi:10.2147/JMDH.S247267
17. Lieneck C, Weaver E, Maryon T. Outpatient telehealth implementation in the United States during the COVID-19 global pandemic: a systematic review. *Medicina*. 2021;57:462. doi:10.3390/medicina57050462
18. Rabanifar N, Abdi K. Barriers and challenges of implementing telerehabilitation: a systematic review. *Iran Rehabil J*. 2021;19:121-128. doi:10.32598/irj.19.2.1404.1
19. Bate NJ, Xu SC, Pacilli M, et al. Effect of the COVID-19 induced phase of massive telehealth uptake on end-user satisfaction. *Intern Med J*. 2021;51:206-214. doi:10.1111/imj.15222
20. Kruse CS, Krowski N, Rodriguez B, et al. Telehealth and patient satisfaction: a systematic review and narrative analysis. *BMJ Open*. 2017;7(8):e016242. doi:10.1136/bmjopen-2017-016242
21. Moffet H, Tousignant M, Nadeau S, et al. Patient satisfaction with in-home telerehabilitation after total knee arthroplasty: results from a randomized controlled trial. *Telemed J E Health*. 2017;23:80-87. doi:10.1089/tmj.2016.0060
22. Eannucci EF, Hazel K, Grundstein MJ, Nguyen JT, Gallegro J. Patient satisfaction for telehealth physical therapy services was comparable to that of in-person services during the COVID-19 pandemic. *HSS J*. 2020;16:10-16. doi:10.1007/s11420-020-09800-5
23. Chang PJ, Jay GM, Kalpakjian C, Andrews C, Smith S. Patient and provider-reported satisfaction of cancer rehabilitation telemedicine visits during the COVID-19 pandemic. *PM R*. 2021;13:1362-1368. doi:10.1002/pmrj.12552
24. Miller MJ, Pak SS, Keller DR, Barnes DE. Evaluation of pragmatic telehealth physical therapy implementation during the COVID-19 pandemic. *Phys Ther*. 2021;101(1):pzaa193. doi:10.1093/ptj/pzaa193
25. Predmore ZS, Roth E, Breslau J, Fischer SH, Uscher-Pines L. Assessment of patient preferences for telehealth in post-COVID-19 pandemic health care. *JAMA Netw Open*. 2021;4:e2136405. doi:10.1001/jamanetworkopen.2021.36405
26. Centers for Medicare and Medicaid Services. Centers for Medicare and Medicaid Services (CMS) recommendations for re-opening facilities to provide non-emergent non-CONVI-19 healthcare. Centers for Medicare and Medicaid Services. 2020. Accessed November 8, 2021. https://www.cms.gov/files/document/covid-recommendations-reopening-facilities-provide-non-emergent-care.pdf
27. Mehrotra A, Chernew ME, Linetsky D, et al. The Commonwealth Fund. The impact of COVID-19 on outpatient visits in 2020: visits remained stable, despite a late surge in cases. 2021.Accessed November 8, 2021. https://www.commonwealthfund.org/publications/2021/feb/impact-covid-19-outpatient-visits-2020-visits-stable-despite-late-surge
28. Davis FD. User acceptance of information technology: system characteristics, user perceptions and behavioral impacts. *Int J Mach Stud*. 1993;38:475-487.

29. Alexander GC, Tajanlangit M, Heyward J, et al. Use and content of primary care office-based vs telemedicine care visits during the COVID-19 pandemic in the US. *JAMA Netw Open*. 2020;3:e2021476. doi:10.1001/jamanetworkopen.2020.21476
30. Kochar B, Ufere NN, Nipp R, et al. Video-based telehealth visits decrease with increasing age. *Am J Gastroenterol*. 2021;116:431-432. doi:10.14309/ajg.0000000000000961
31. Dewar S, Lee PG, Suh TT, Min L. Uptake of virtual visits in A geriatric primary care clinic during the COVID-19 pandemic. *J Am Geriatr Soc*. 2020;68:1392-1394. doi:10.1111/jgs.16534
32. Lam K, Lu AD, Shi Y, Covinsky KE. Assessing telemedicine unreadiness among older adults in the United States during the COVID-19 pandemic. *JAMA Intern Med*. 2020;180:1389-1391. doi:10.1001/jamainternmed.2020.2671
33. Haimi M, Gesser-Edelsburg A. Application and implementation of telehealth services designed for the elderly population during the COVID-19 pandemic: a systematic review. *Health Informatics J*. 2022;28(1):14604582221075561. doi:10.1177/14604582221075561
34. Hawley CE, Genovese N, Owsiany MT, et al. Rapid integration of home telehealth visits amidst COVID-19: What do older adults need to succeed? *J Am Geriatr Soc*. 2020;68:2431-2439. doi:10.1111/jgs.16845
35. Tenforde AS, Borgstrom H, Polich G, et al. Outpatient physical, occupational, and speech therapy synchronous telemedicine: a survey study of patient satisfaction with virtual visits during the COVID-19 pandemic. *Am J Phys Med Rehabil*. 2020;99:977-981. doi:10.1097/PHM.0000000000001571
36. Baskin RG, Bartlett R. Healthcare worker resilience during the COVID-19 pandemic: an integrative review. *J Nurs Manag*. 2021;29:2329-2342. doi:10.1111/jonm.13395
37. Svensson E. Comparison of the quality of assessments using continuous and discrete ordinal rating scales. *Biom J*. 2000;42:417-434. doi:10.1002/1521-4036(200008)42:4<417::aid-bimj417>3.0.co;2-z
38. Parsons Leigh J, Kemp LG, de Grood C, et al. A qualitative study of physician perceptions and experiences of caring for critically ill patients in the context of resource strain during the first wave of the COVID-19 pandemic. *BMC Health Serv Res*. 2021;21:374. doi:10.1186/s12913-021-06393-5
39. Lu AD, Veet CA, Aljundi O, et al. A systematic review of physical examination components adapted for telemedicine. *Telemed J Heal*. 2022;28:1764-1785. doi:10.1089/tmj.2021.0602