

Physical Therapist Telehealth Delivery at 1 Year Into COVID-19

Telehealth 1 Year Into COVID-19

COVID-19

Original Research

Matthew J. Miller, PT, DPT, PhD^{1,*}; Sang S. Pak, DPT¹; Daniel R. Keller, DPT¹; Allison

M. Gustavson, DPT, PhD^{2,3}; Deborah E. Barnes, PhD, MPH⁴⁻⁶

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¹Department of Physical Therapy and Rehabilitation Science, University of California, San Francisco, San Francisco, California.

²Veterans Affairs Health Services Research and Development Center for Care Delivery and Outcomes Research, Minneapolis Veterans Affairs Health Care System, Minneapolis, MN, USA

³Department of Medicine, Division of General Internal Medicine, University of Minnesota, Minneapolis MN, USA

⁴Department of Psychiatry and Behavioral Sciences, University of California, San Francisco, San Francisco, CA, USA

⁵Department of Epidemiology & Biostatistics, University of California, San Francisco, San Francisco, CA, USA

⁶San Francisco Veterans Affairs Health Care System, San Francisco, CA, USA

CORRESPONDING AUTHOR*

Matthew J. Miller, PT, DPT, PhD

Email: matthew.miller4@ucsf.edu

Follow the authors [@mjmillerdpt](#)

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[H1] Abstract

Objective. The purpose of this study was to examine telehealth physical therapy utilization 1 year into the COVID-19 pandemic and to identify factors that influence physical therapists' delivery of telehealth in an urban academic medical center.

Methods. Electronic medical record data were extracted within the dates of interest (March 22, 2021 to May 15, 2021), the proportion of physical therapy sessions delivered via telehealth were identified, and patient characteristics were compared by telehealth volume (0 vs ≥ 1 session, 1 vs > 1 session). Qualitative data also were collected from physical therapists via semi-structured interviews, and a directed content analysis was conducted, informed by the Capability, Opportunity, Motivation, and Behavior (COM-B) model, to identify factors influencing telehealth delivery.

Results. Telehealth was used for 3793 of 8038 (47.2%) physical therapy sessions, and 1028 unique patients had at least 2 physical therapy sessions (without telehealth: 6.6% [n = 68], telehealth once: 39.1% [n = 402], telehealth more than once: 54.3% [n = 558]). Patients without telehealth were older, non-English speaking, had non-commercial

insurance, and had at least 1 chronic health condition. Patients with telehealth more than once had a neurologic diagnosis and lived farther from the treating clinic.

Capabilities that influenced telehealth delivery were physical therapist clinical skills and knowledge, technical proficiency, telehealth-specific interpersonal skills, and cognitive flexibility. Factors external to physical therapists—including the environment, patient equipment and technology proficiency, physical therapist equipment, clinic factors, and patient and referring provider perspectives—also influenced telehealth delivery. Finally, patient needs and telehealth as a beneficial tool guided physical therapist intention to use telehealth.

Conclusion. Sustained telehealth utilization outcomes 1 year into the COVID-19 pandemic and an interaction among physical therapist, patient, and environmental factors support the long-term potential of telehealth physical therapy in an urban academic medical center.

Impact. These findings support the long-term potential of telehealth approaches and can be used to inform telehealth physical therapy training programs and clinical implementation, future research, and health policy.

[H1] Introduction

The proportion of physical therapists using telehealth technology during the COVID-19 pandemic in the United States rose from less than 5% to nearly 50% in 1 year.¹ The urgent need for infection control, reimbursement policy changes, and the need for continued rehabilitation access likely facilitated the rapid adoption of telehealth among physical therapists.¹⁻⁴ As such, there is also growing evidence for potential benefits of telehealth physical therapy for a variety of patient populations.⁴⁻⁹

Our prior research suggested rapid telehealth physical therapy implementation in an urban academic medical center was feasible.³ During our implementation in the early stages of the COVID-19 pandemic, 85% of physical therapy sessions were delivered through telehealth and more than 90% of patients were satisfied with this approach.³ These were significant findings considering 99% of physical therapy sessions in our outpatient faculty practice were delivered using an in-person approach prior to the pandemic.³ In addition to our implementation efforts, regional factors within the San Francisco Bay Area (eg, high vaccination rates, mask-wearing adherence and mandates) likely influenced telehealth physical therapy utilization within our setting. The rapid rise and variability in telehealth physical therapy implementation paired with the ongoing nature of the COVID-19 pandemic suggests there are persistent implementation barriers that need to be identified and addressed.^{1,4,10,11}

We sought to address this knowledge gap by specifically exploring implementation perceptions of physical therapists with experience of ongoing delivery of telehealth in our healthcare system using the Capability, Opportunity, Motivation, and Behavior (COM-B) implementation science model.^{12,13} The components of the COM-B

have also been mapped to 14 behavioral domains of the Theoretical Domains Framework (TDF) to guide the identification of barriers and facilitators that should be addressed with implementation strategies to enhance adoption and sustainability of telehealth by physical therapists.¹³⁻¹⁵ Although the COM-B and TDF have been used to guide telehealth implementation efforts previously,⁵ the presence of persistent telehealth delivery barriers reinforce that further investigation is warranted.

Telehealth physical therapy has been implemented within our urban academic medical center for 1 year, and the physical therapists' experience represents a valuable source of knowledge that can be leveraged to identify challenges and successes with telehealth delivery and inform optimizations for implementation. The purpose of this study was to examine telehealth physical therapy utilization 1 year post-implementation and identify factors that influence physical therapist delivery of telehealth in clinical practice. This evidence is needed to guide implementation efforts and support physical therapists' success in delivering services through telehealth technology.

[H1] Methods

[H2] Implementation Site

We previously conducted an evaluation of the initial telehealth physical therapy implementation at the University of California, San Francisco Outpatient Physical Therapy Faculty Practice during the early stages of the COVID-19 pandemic.³ We define telehealth physical therapy as services that are delivered using synchronous videoconferencing software integrated with the electronic medical record. This approach to telehealth is present at our 3 outpatient clinics within the city and county of San

Francisco. At the time of the present study, the clinical practice had 43 physical therapists serving patients with a variety of socioeconomic, educational, racial, ethnic, and geographic diversity.

[H2] Data Sources and Collection

We selected our dates of interest (March 22, 2021 to May 15, 2021) to extend the generalizability of our telehealth implementation evaluation that occurred 1 year prior.³ During this time vaccines were more readily available in the San Francisco Bay Area and relaxation of COVID-19 restrictions was beginning. We extracted electronic medical record data within our dates of interest including physical therapy session type (new, follow-up), session delivery approach (telehealth, in-person), and treating physical therapist. Our examination of patient telehealth utilization included new patients with more than 1 physical therapy session within the dates of interest to limit the potential effect of patients who only had an evaluation and patients with episodes of care that were initiated during a different stage of the pandemic. Patients under 18 years old were excluded. For included patients, we extracted demographic variables (eg, age, self-reported sex [eg, male, female], race/ethnicity), clinical characteristics (eg, referring diagnosis, comorbidity burden), address derived geocode data, and volume of telehealth utilization. Outpatient practice administrative and front-desk scheduling criteria were used to categorize referring diagnosis as orthopedic (eg, osteoarthritis, tendonitis, post-operative rehabilitation [eg, joint replacement]), neurology (eg, vestibular disorders, multiple sclerosis), pelvic health (eg, stress incontinence, perineal pain), and other (eg, amputation, oncology). Comorbidity burden was measured using

the Charlson Comorbidity Index, and categorized by scores of 0, 1–2, or more than 2.¹⁶ Socioeconomic status and distance to clinic are potential factors that influence telehealth use.^{3,17,18} Our proxy measure of socioeconomic status was the Area Deprivation Index (ADI). We identified each patient's ADI score using geocode data, where higher scores represented higher disadvantage.^{19–23} The distance between patient geocode and the treating clinic was calculated using the Network Analysis feature in ArcGIS Pro Version 2.7 (Esri Inc, Redland, California, USA). Finally, we categorized telehealth volume as 0, 1, or >1 sessions because we hypothesized that patients without telehealth and those who have telehealth beyond an initial evaluation may have unique characteristics when compared to those who had 1 telehealth session.

The first author (M.J.M.) collected qualitative data. All clinic physical therapists received 2 email messages to invite them to participate in one-time, semi-structured interviews via videoconference. Semi-structured interviews were approximately 45 minutes in duration and had 1 or 2 physical therapist participants. Interview procedures included a welcome, introductions, description of prior findings and interview goals (eg, identify factors that influence telehealth delivery in practice), a verbal consent to participation, followed by data collection. The interview guide was informed by prior research evidence, and the COM-B and TDF models.^{3,12–14} Primary semi-structured interview questions included:

- Tell me about how telehealth has changed your clinical practice?
- What are the similarities/differences of telehealth/in-person physical therapy?
- What influences your decision for telehealth or in-person physical

therapy?

- Given your experience to date, how prepared are you to succeed with telehealth?

During qualitative data collection, the lead author (M.J.M.) took extensive field notes and asked clarifying and probing questions to obtain additional detail and perspectives. Descriptive characteristics (age, self-reported sex [eg, male, female], race, ethnicity, years of practice, specialty certification, employment status) were also collected from interview participants. We also identified the participant-specific proportion of sessions delivered via telehealth within the dates of interest. We continued to interview physical therapist participants until the research team determined newly collected data were redundant of previously collected data and we had therefore attained qualitative data saturation.²⁴ The study protocol was approved by the University of California San Francisco Institutional Review Board.

[H2] Analysis

For quantitative data analysis, we identified the proportion of total, new, and follow-up sessions delivered via telehealth within the dates of interest. We conducted 2 comparisons to test our hypothesis that patient characteristics vary by telehealth volume. First, we compared demographic variables, clinical characteristics, quartiles of ADI score, and quartiles of distance to clinic of patients with and without telehealth using the Pearson chi-square test. Second, we used the Pearson chi-square test to compare these same characteristics between patients with 1 telehealth session to those

with more than 1 telehealth session.

For qualitative data analysis, we used a rapid qualitative approach using directed content analysis to identify factors that influence physical therapist delivery of telehealth.²⁵⁻²⁷ A rapid approach was particularly important for this study given the need to efficiently develop research evidence that could be applied to physical therapist implementation of telehealth delivery during the ongoing COVID-19 pandemic.²⁶ Directed content analysis is a deductive approach where researchers use a predefined framework to guide data collection, analysis, and interpretation.²⁷ The first author led the analysis by first coding participant interview data into a matrix of predefined codes. The predefined codes were "Capability", "Opportunity", and "Motivation" from COM-B model.^{12,13} "Capability" was defined as the psychological (eg, cognitive skills, knowledge) and physical capacity to engage in telehealth physical therapy delivery. "Opportunity" comprised all the factors external to the physical therapist which made it possible for delivery of telehealth physical therapy (eg, physical, social environment). "Motivation" consists of the brain processes that guided intentions (eg, goals, emotion, decision-making) for a physical therapist to use telehealth delivery approach. The behavioral domains of the TDF, which have been previously mapped to the COM-B components, were also used as a supportive guide to increase coding and analytic clarity.^{13,14} For example, the "Capability" code included qualitative data that contained the TDF behavioral factors of knowledge, skills, memory, attention, decision processes, and behavioral regulation.¹³ A co-author (AMG) reviewed the fieldnotes and coding from the first author, and met 4 times to adjudicate differences in coding. We then developed, reviewed, and refined a summary of factors that influenced physical therapist delivery of

telehealth organized by the COM-B. The last step in our analysis culminated in authorship-team approval of the finalized results in this manuscript.

[H2] Role of the Funding Source

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[H1] Results

[H2] Telehealth Utilization 1 Year Post-Implementation

Between March 22, 2021 and May 15, 2021, a total of 8038 physical therapy sessions occurred (Tab. 1) with 1028 unique patients who had at least 2 physical therapy sessions in the outpatient faculty practice (Tab. 2). Telehealth was used for 47.2% (N = 3793) of all sessions. Physical therapy was delivered via telehealth for 88.9% (n = 1414) of new patient sessions and 36.9% (n = 2379) of follow-up sessions. Of the 1028 patients, 6.6% (n = 68) were without telehealth, 39.1% (n = 402) had telehealth once, and 54.3% (n = 558) had telehealth more than once. Compared with those who had any

telehealth, those without telehealth were older, non-English speaking, had noncommercial insurance, and had a Charlson comorbidity index score >0. Compared with patients who had 1 telehealth session, patients with telehealth more than once had a neurologic diagnosis and lived farther from their treating clinic.

[H2] Factors Influencing Physical Therapist Telehealth Delivery

We collected qualitative data from 13 physical therapist participants (Tab. 3) and identified 11 subcategories nested within 3 larger categories of factors consistent with the COM-B model (Figure): (1) Capability (4 subcategories), (2) Opportunity (5 subcategories), and (3) Motivation (2 subcategories). A thematic relationship among these categories also emerged, whereby telehealth delivery was influenced by an interaction among physical therapist, patient, and environmental factors. Representative excerpts from field notes of participant interviews that support each subcategory are presented in Table 4.

[H3] Capability

Capability of delivering telehealth physical therapy was described within the context of: (1) clinical skills and knowledge; (2) technical proficiency; (3) telehealth-specific interpersonal skills; and (4) cognitive flexibility. All participants reported an ongoing process of developing, refining, and expanding their capability to deliver telehealth physical therapy through experiential and peer learning.

[H4] Clinical Skills and Knowledge

Participants consistently described how their didactic and experiential clinical knowledge were instrumental in translating their physical therapy practice into telehealth delivery. Clinical skills reported as critical to telehealth delivery included home exercise prescription and progression, patient and caregiver education, self-management training, skilled observation, home and safety evaluations, and positioning assessments (eg, sleep, ergonomics). Participants also reported that telehealth physical therapist delivery required skills for assessment of car transfers, stair mobility training, or functional tasks within patients' own environments. Nearly all participants described how their clinical knowledge was needed to safely deliver telehealth physical therapy. Additionally, participants reported that there was limited research to guide their translation of in-person clinical skills to telehealth delivery for specialty populations or diagnoses (eg, neurology, stroke).

[H4] Technical Proficiency

Participants stated that telehealth required greater technical proficiency than in-person physical therapy. During telehealth delivery, participants reported completion of patient care tasks through computer-based systems including subjective interviewing, observation, home exercise development, note-taking and documentation. In addition, participants needed to instruct patients in camera setup for visualizing specific body parts, troubleshoot hardware and software difficulties, and provide education on the anticipated telehealth physical therapy plan of care. Finally, nearly all administrative aspects of clinic operations were converted to remote, computer-based systems that required additional data input from physical therapists (eg, patient scheduling, digital

exercise instructions). Participants reported these additional administrative tasks, complex computer-based systems, and the repeated need to assist patients with technology were ongoing challenges to telehealth physical therapist delivery.

[H4] Telehealth-Specific Interpersonal Skills

Almost all participants discussed using communication skills tailored to telehealth physical therapy. For example, participants described using active listening to guide subjective interviewing that generated and refined clinical hypotheses and supported clinical decision-making when hands-on assessment and objective measurement was limited. Additionally, participants stated that they used simplified instruction for movement and exercise to accommodate for the absence of tactile cues or hands-on facilitation. Participants not only described how telehealth-specific communication skills were enhanced by their clinical knowledge and skills, but also that these skills were useful in overcoming the challenges of developing rapport with patients through telehealth delivery.

[H4] Cognitive Flexibility

Participants consistently described cognitive flexibility as a skill to leverage and adapt clinical knowledge, patient-reported data, and observation for telehealth delivery. For example, participants adapted their practice to include familiar, new, or modified objective measures within telehealth sessions (eg, 5 Time Sit-To-Stand, single item from a standardized battery). Participants also described adjusting their telehealth practice because of the absence of clinic-based resources by leveraging patient-

reported data and environmental factors. For example, participants stated using exercise equipment, social support, and in-home furniture to safely support progress towards physical therapy goals. Despite using cognitive flexibility, all participants reported a need for greater knowledge, research, and experience to guide telehealth physical therapist delivery.

[H3] Opportunity

Opportunity for telehealth delivery were those factors external to physical therapists and included: (1) environment; (2) patient equipment and technology proficiency; (3) physical therapist equipment; (4) clinic factors; and (5) patient and referring provider perspectives.

[H4] Environment

Participants reported conducting telehealth sessions from the clinic or their home, where patients logged into telehealth sessions from residential settings (eg, bedroom, office, kitchen), workspaces, or public settings. Participants consistently stated the importance of having a semi-private space to demonstrate, practice, and visualize patient movement. Physical therapist and patient environments that were open and semi-private provided more intervention options for telehealth delivery. For example, there was greater potential to adjust and/or progress a walking balance exercise and address sensitive topics with the physical therapist in a large treatment room and the patient in an open living room when compared to sessions with environmental restrictions (eg, small kitchen, cubicle). Finally, participants discussed how semi-private

spaces could be used to address potentially sensitive topics and have social support assist with low patient technology proficiency.

[H4] Patient Equipment and Technology Proficiency

Participants consistently reported that appropriate patient equipment (eg, smart phone, tablet computer, desktop) with a stable broadband internet connection was necessary to see, be seen, hear, and communicate effectively during telehealth sessions. Telehealth sessions were described as a complex task that required substantial patient technology proficiency in navigating the electronic medical record, initiating the telehealth session, positioning the telehealth camera for movement visualization, troubleshooting emergent problems, and establishing and maintaining internet, microphone, and audio connection. Participants consistently reported that patients' ongoing challenges with equipment and technology proficiency were barriers to telehealth physical therapist delivery.

[H4] Physical Therapist Equipment

Participants also reported a need for physical therapist equipment to facilitate exercise demonstration, self- and patient-visualization, complete documentation, and other clinic-related tasks during telehealth delivery. Participants had variable descriptions of optimal technology setup ranging from dual computer monitors with external camera and lighting equipment to a single monitor computer, camera, ergonomic desk, and chair.

Beyond technology equipment, participants reported that most telehealth sessions required basic exercise equipment (eg, exercise bands, mats, foam rollers) and supplies found in patients' homes (eg, pillows, towels). Participant report of using other exercise

equipment (eg, exercise balls) was less common. Finally, participants stated they experienced barriers in accessing funds to acquire equipment that could facilitate their telehealth delivery.

[H4] Clinic Factors

The influence of clinic factors (eg, policy, scheduling, work processes) on telehealth delivery were common. The first clinic factor was a standing policy for all new patients to be scheduled for their initial visit through a telehealth session, although this policy could be bypassed via request from a referring provider, patient, or physical therapist. Physical therapist schedule templates, which held specific times for telehealth or in-person sessions, were another clinic factor influencing telehealth delivery. Scheduling templates were variable and based on multiple factors including physical therapist preference and work schedule, specialist team telehealth recommendations (eg, neurologic treatment team approximately 40% telehealth), clinical leadership anticipated needs (eg, space allocation), and organizational policies (eg, social distancing). Participants frequently described shorter patient wait times for telehealth follow-up sessions when compared to in-person sessions; and patients commonly preferred the shorter wait time. Finally, participant-reported clinic barriers to telehealth included complex work processes, challenges incorporating interpreters for non-English speaking patients, and infeasible data entry or administration of tests (eg, step count, self-report questionnaires) through the electronic medical record.

[H4] Patient and Referring Provider Preferences

Participants reported that most patients had been satisfied, experienced benefit, and would continue to use telehealth physical therapy. This was particularly true for patients who preferred telehealth and/or resisted in-person sessions due to potential exposure to COVID-19. In contrast, participants also described patients who strongly opposed telehealth delivery, opting for solely in-person physical therapy. Participants also stated that specific referring providers (eg, primary care physicians, surgeons) had frequently requested only in-person sessions for their patients. These patient and referring provider perspectives were a participant-reported barrier to telehealth physical therapist delivery and in-person requests were accommodated for as scheduling templates allowed.

[H3] Motivation

Motivation included factors that guided physical therapist intentions for telehealth physical therapist delivery included: (1) patient needs; and (2) beneficial tool.

[H4] Patient Needs

Patient needs that could be addressed through telehealth were described in the context of patient diagnoses (eg, post-surgical, neurology, pelvic health), health status (eg, medical frailty), intervention needs (eg, joint mobilization, patient education), clinical progress, and patient preference. Common examples of patient needs addressed through telehealth delivery included individualized patient and caregiver education, progression of home exercise programs or self-management (eg, pain, exercise), and home safety evaluations. Participants also described that their clinic-based

recommendations were refined and tailored to patient-specific needs that were observed during telehealth delivered sessions (eg, office setup, car transfer, sleeping position). Further, participants commonly reported telehealth delivery emphasized a patient's active engagement and adherence to recommendations to self-manage their needs. In contrast, participants reported telehealth delivery was less ideal for "hands-on" patient needs that included assessment of passive/accessory movement, applying special tests, assisting or maintaining safety with movement (eg, exercise, transfer, balance activity), or collecting clinically meaningful data (eg, vital signs, objective performance data). Further, participants described how patient needs that required clinic-based equipment (eg, exercise equipment, durable medical equipment [eg, wheelchair, ankle foot orthosis]) could not be used via telehealth. Finally, participants occasionally questioned the effectiveness and safety of exercise mode, dose, intensity, or frequency with telehealth delivery, especially among patients at increased risk of adverse events (eg, fall, medical complication).

[H4] Beneficial Tool

All participants described telehealth as beneficial tool for use in practice for wide range of patient populations. Participant-reported benefits also included ease of adjustment or progression of home exercise programs based on observed environmental factors, improved access and continuity of care in the setting of patient-specific barriers (eg, distance, travel cost, time to follow-up, risk of COVID exposure), and patient-reported improvement and satisfaction.

Additionally, participants stated that telehealth and remote work resulted in

professional and personal benefits. Professional benefits included developing and refining clinical skills (eg, motivational interviewing techniques) and more opportunity for professional and career development because of scheduling flexibility. Reported personal benefits included lower commute burden (eg, time, fuel cost, parking/toll fees) and more time with family.

These potential benefits were tempered by participants' descriptions of potentially less efficient clinical data collection, synthesis, and decision making with solely telehealth delivery. The benefits were further minimized by the physical consequences of increased computer use (eg, eye strain, sedentary behaviors, physical tension). Despite these challenges, participants strongly reinforced a beneficial role of telehealth delivery as a synergistic tool that compliments in-person physical therapy sessions.

[H1] Discussion

We examined telehealth physical therapy utilization 1 year into the COVID-19 pandemic and identified that 47% of physical therapy sessions were delivered via telehealth. We also found that telehealth physical therapy volume varied by demographic and clinical characteristics like age, English speaking status, and referral diagnosis. Further, our qualitative findings suggest an interaction among physical therapists, patients, and environmental factors likely influence physical therapists' delivery of telehealth within clinical practice.

These 1 year post-implementation findings reinforce the long-term potential for telehealth physical therapist delivery within an urban academic medical center. Nearly half of our physical therapy sessions were delivered via telehealth 1 year post-

implementation, demonstrating sustained telehealth use beyond the initial COVID-19 pandemic stages. Our total number of physical therapy sessions 1 year into the pandemic, delivered with a hybrid approach of both telehealth and in-person, was smaller than our in-person only pre pandemic levels in 2019 (2021 = 8038 vs 2019 = 9255).³ In an effort to further realize the potential of our hybrid service delivery model, our data suggest the outpatient faculty practice would likely benefit from ongoing improvement efforts as COVID-19 restrictions are removed and in-person activities resume. We also add to growing evidence of patient characteristics that are associated with telehealth use.²⁸ For example, we identified that telehealth use was less common among non-English speaking than English speaking patients (83% vs 94%) or among those with insurance coverage by Medi-Cal, California's Medicaid program, than those with commercial insurance (85% vs 96%). While our study was not designed to quantify the underlying mechanisms of these potential disparities, future research will further explore disparities in telehealth access and utilization to determine approaches for equitable telehealth physical therapist delivery (eg, use of medical language translators, incentives for copays and waivers, access to affordable technology).

Relative to national trends, our telehealth physical therapy utilization may be unique. Werneke et al. conducted an analysis of data from a national survey and identified that 37% of physical therapists were delivering telehealth services and only 6% of patients had experienced telehealth physical therapy between May and June of 2020.¹⁰ These findings contrast our data where 100% of physical therapists within our 3 outpatient clinics delivered synchronous telehealth sessions and more than 90% of our patients having at least 1 telehealth physical therapy session. Regional and clinic

variability may partially explain our utilization differences. Specifically, the San Francisco Bay area relaxed COVID-19 policies at a slower rate than other geographic regions and the faculty practice leadership continued to recommend all new patient physical therapy sessions to be conducted via telehealth in 2021. Our strategic implementation of telehealth physical therapy was similar to other urban academic health systems and may also contribute to our relatively high utilization. For example, the Hospital for Special Surgery Rehabilitation department developed new work processes and policies, provided physical therapists with basic technology training, and targeted training to improve telehealth delivery.⁴ About 6 months into the pandemic, 20% to 25% of Hospital for Special Surgery physical therapy sessions were being delivered via telehealth.⁴ Additional research is needed to guide complex telehealth implementation across diverse regional and clinical contexts.

We identified specialized skills and knowledge are required for successful telehealth physical therapist delivery. For example, physical therapists need skills in movement observation, technology troubleshooting, camera positioning, subjective interviewing, and simplified instruction. Our findings also suggest the patient's environment, ability and access to use technology, and perceptions are likely to influence telehealth physical therapist delivery. Although many of these factors have been previously documented,^{4,5} our qualitative approach revealed novel insights. Specifically, physical therapists may need targeted training to optimize cognitive flexibility, leverage environmental factors, and adapt in-person skills to telehealth delivery. Our qualitative findings also indicated telehealth are perceived as a beneficial tool for practice, where physical therapists can provide education, progress exercise

prescription, and tailor recommendations to a patient's environments. It is reasonable to believe that these qualitative findings are not unique to our urban academic medical center, and could be used to guide implementation efforts and the development of training programs to address ongoing barriers to telehealth physical therapist delivery across a variety of contexts.

Finally, we used existing informatics infrastructure within our Learning Health System to conduct this study. The strength of this approach is that we leveraged data within our local context to examine evolving trends of patient outcomes, telehealth physical therapy utilization, and access patterns. Using a Learning Health System approach, we can use these findings to inform future optimization of telehealth physical therapy.^{29,30} For example, we can optimize the integration of patient-reported and objective data collection into the electronic medical record system to improve tracking outcomes over time. Additionally, we could use geocode data to examine potential access pattern disparities among communities served.^{31,32}

[H2] Limitations

This cross-sectional study at a single site potentially may not translate to other clinical settings, thus limiting the generalizability of our findings. Although the number of participants in our study could be considered small and we did not conduct a member check of our interpretive findings, we promoted trustworthiness by enrolling physical therapists with a variety of experience and characteristics, collecting data until data saturation was achieved, and using an iterative team-based analytic approach. We also did not prospectively collect patient characteristics beyond those available in the

electronic medical record, and may not have identified all characteristics that influence delivery of telehealth physical therapy. Finally, we did not include the perspectives of patients or other external stakeholders. Therefore, we may not have identified all factors that influence delivery of telehealth physical therapy.

[H1] Conclusions

One year into the COVID-19 pandemic, nearly half of physical therapy sessions in our urban, academic medical center continue to be delivered via telehealth. Further, a complex interaction among physical therapist, patient, and environmental factors influence physical therapists' delivery of telehealth. These findings suggest that telehealth physical therapy can be maintained beyond the initial phase of the COVID-19 pandemic and support long-term potential use of telehealth approaches. We also identified barriers and facilitators to telehealth physical therapist delivery that can be used to inform future clinical implementation, research, and health policy.

Author Contributions

Concept/idea/research design: M.J. Miller, S.S. Pak, A.M. Gustavson, D.E. Barnes

Writing: M.J. Miller, S.S. Pak, A.M. Gustavson

Data collection: M.J. Miller, S.S. Pak, D.R. Keller

Data analysis: M.J. Miller, S.S. Pak, A.M. Gustavson

Project management: M.J. Miller

Providing participants: D.R. Keller

Providing institutional liaisons: D.R. Keller

Consultation (including review of manuscript before submitting): D.R. Keller, A.M.

Gustavson, D.E. Barnes

Ethics Approval

This study protocol was approved by the University of California, San Francisco Institutional Review Board.

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Disclosures and Presentations

The authors completed the ICMJE Form for Disclosure of Potential Conflicts of Interest and reported no conflicts of interest.

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The views expressed in this article are those of the authors and do not necessarily reflect the position or policy of the Department of Veterans Affairs or the United States Government, AHRQ, PCORI, or Minnesota Learning Health System Mentored Career Development Program (MN-LHS).

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TABLES

Table 1. Distribution of Total, New Patient, and Follow-up Sessions Delivered via Telehealth or In-Person Between March 22, 2021 and May 15, 2021

Sessions	Telehealth n (%)	In-Person n (%)
Total	3793 (47.2)	4245 (52.8)
New patient	1414 (88.9)	177 (11.1)
Follow-up	2379 (36.9)	4068 (63.1)

Table 2. Comparisons of patients with and without telehealth sessions, and those with telehealth once and more than once.

Table 2. Comparisons of Patients With and Without Telehealth Sessions and Those With Telehealth Once and More Than presented as N (%).

Characteristics	Without Telehealth N = 68	<i>P</i> ^a	Telehealth Once N = 402	Telehealth More Than Once N = 558	<i>P</i> ^b
Age (y), n (%)					
<45	16 (23.5)	.02 ^c	175 (43.5)	203 (36.4)	.06
45-65	24 (35.3)		129 (32.1)	189 (33.9)	
>65	28 (41.2)		98 (24.4)	166 (29.8)	
Sex, ^d n (%)					
Female	36 (52.9)	.18	243 (60.5)	370 (66.3)	.05
Male	32 (47.1)		157 (39.1)	188 (33.7)	
Primary Language, n (%)					
English	62 (91.2)	.01 ^c	390 (97.0)	541 (97.0)	.96
Non-English	6 (8.8)		12 (3.0)	17 (3.1)	
Race, n (%)					
Asian	14 (20.6)	.08	76 (18.9)	107 (19.2)	.18
Black/African American	6 (8.8)		24 (6.0)	17 (3.1)	
White	31 (45.6)		232 (57.7)	335 (60.0)	
Other	17 (25.0)		70 (17.4)	99 (17.7)	
Ethnicity, n (%)					
Hispanic / Latino	11 (16.2)	.06	33 (8.2)	58 (10.4)	.47
Non-Hispanic / Latino	52 (76.5)		355 (88.3)	478 (85.7)	
Insurance Type, n (%)					
Commercial	28 (41.2)	<.001 ^c	279 (69.4)	357 (63.4)	.23
Medi-Cal	12 (17.7)		30 (7.5)	39 (7.0)	
Medicare	28 (41.2)		92 (22.9)	161 (28.9)	
Other	0 (0)		1 (0.3)	1 (0.2)	
Charlson Comorbidity Index score, n (%)					
0	33 (48.5)	<.001 ^c	293 (72.9)	413 (74.0)	.80
1 or 2	25 (36.8)		64 (15.9)	90 (16.1)	
>2	10 (14.7)		45 (11.2)	55 (9.9)	
Diagnostic group, n (%)					
General	3 (4.4)	.06	32 (8.0)	27 (4.8)	.01 ^c
Neurologic	5 (7.4)		25 (6.2)	64 (11.5)	
Orthopedic	60 (88.2)		313 (77.9)	419 (75.1)	
Pelvic	0 (0)		32 (8.0)	48 (8.6)	
National Area Deprivation Index score, n (%)					
1-2	14 (20.6)	.09	116 (28.9)	162 (29.0)	.14
3-14	20 (29.4)		155 (38.6)	180 (32.3)	
15-21	17 (25.0)		52 (12.9)	94 (16.9)	
22-45	17 (25.0)		79 (19.7)	122 (21.9)	
Miles from clinic, n (%)					
< 1.7	19 (28.4)	.28	108 (27.0)	128 (23.1)	.04 ^c
1.7-3.1	19 (28.4)		94 (23.5)	143 (25.8)	
3.1-7.1	19 (28.4)		111 (27.8)	126 (22.7)	
> 7.1	10 (14.9)		87 (21.8)	158 (28.5)	

^aComparison of patients with and without telehealth.

^bComparison of patients with 1 or more than 1 telehealth session.

^c*P* < 0.05.

^dSelf-reported (eg, male, female)

Table 3. Physical Therapist Semi-structured Interview Participant Characteristics^a

Characteristics	N (%)
Sex ^b	
Female	9 (69)
Male	4 (31)
Race	
White	9 (69)
Asian	3 (23)
Other	1 (8)
Ethnicity	
Hispanic or Latino	4 (31)
Board-certified specialist	
No specialist certification	3 (23)
Neurology	3 (23)
Orthopedics	7 (46)
Geriatrics	1 (8)
Employment Status	
Full time	10 (77)
	Median (IQR)
Age (y)	36 (IQR = 32–42)
Years of practice	6 (IQR = 4–16)
Caseload telehealth	49.3 (IQR = 44.7–60.5)

^aIQR = interquartile range.

^bSelf-reported (eg, male, female).

Table 4. Representative Excerpts From Field Notes of Physical Therapist (PT) Interviews With Corresponding Categories and Subcategories

Category	Subcategory	Representative Field Note Excerpt
Capability	Clinical skills and knowledge	I can get a history [from patients] and get an idea of their work environment. A lot of people work from home, their work setup, especially with sitting for prolonged periods of time, sleeping positions if they are comfortable with showing. (PT6)
	Technical proficiency	I've figured out how to give tips for "tip your camera down" or "your phone is too close". (PT3)
	Telehealth-specific interpersonal skills	I've had to figure out how to explain things differently. When you can't show them, my explanations have changed over virtual medium. Simpler instruction. (PT1)
	Cognitive flexibility	I used to set goals using [in-clinic] measures, but if I can't measure that, those goals don't happen. I'm leaning more towards steps per day [for patients using telehealth]. (PT2)
Opportunity	Environment	[Telehealth works well] with patients who are familiar with technology, good camera setup, able to see me okay, have a good space available for them...Holding a handheld device without a place to put it with a good angle, people around, not enough floor space to do the movement, makes it harder to instruct and show them. (PT5)
	Patient equipment and technology proficiency	Most initial evaluations are telehealth, then we decide [whether to follow-up] in-person or continue with video. I had someone on [the other day]; totally could not see her, she couldn't get the video to work without extensive work. [The session] without video and not being able to touch made it impossible. If not tech savvy, then it becomes less tolerable. I'm not tech savvy, so, if it doesn't work, I bring them in. (PT4)
	Physical therapist equipment	It would be nice to have a better ergonomics or standardized setup. A lot of people have their own iPad to do ZOOM or another monitor, that would make a big difference. I'm not going to buy my own for work. I was working from another therapist's house one day, and had another monitor at eye level. Wow, it was nice! Those do make a big difference, my home setup is very spartan, it's very small and don't have a lot of gear. (PT4)
	Clinical factors	There isn't a lot of external support for administrative tasks. Outcome measures and scheduling used to be done by the front desk, it takes time. Keeping tabs on patients because the scheduling is more complex; looking at availability, clinician decides in-person/tele and identifies dates/times for that. (PT8)
	Patient and referring provider perspectives	The other big barrier is patient beliefs. If they don't want to do it, don't think it works, or they can't compute, then they're not fully in it. Just like if they came in and don't believe in [physical therapy]. (PT3)
Motivation	Patient needs addressed using telehealth	Sometimes it's helpful for convenience, I can see someone in-person, then transition them from manual therapy to more guided therapeutic exercise that they can do from their home. They don't need fancy equipment. It's almost helpful if they have the right environment, I can tell them to hook this on that door and do your exercises over there. (PT4)

Beneficial tool in practice	Generally, I would say patients are still getting benefit from telehealth. I have more that come to mind for [telehealth] really works for me than “this never works”. I have a lot of people where traveling for a 30-minute session is not worth it, and I get to see them in their own environment. It’s a net positive. (PT1)
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Figure Captions

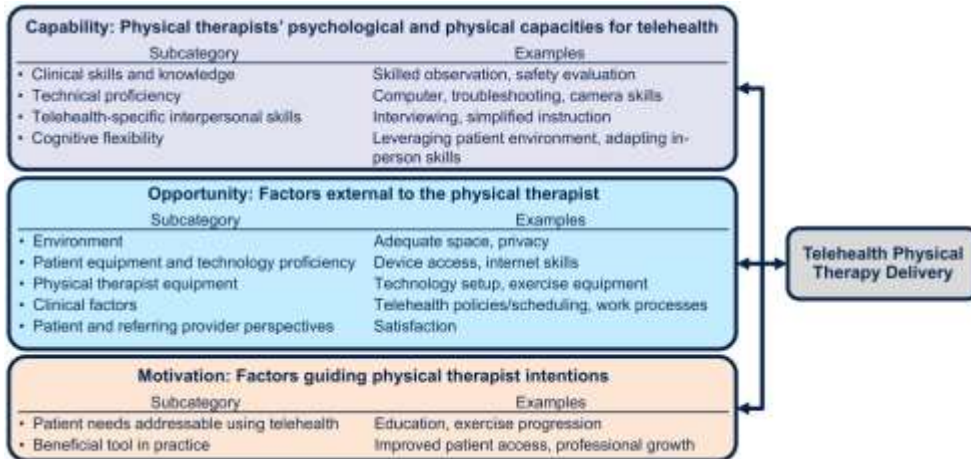


Figure. Capability, opportunity, and motivation categories and subcategories, with examples of factors that influence physical therapist delivery of telehealth.