**Title: Exploratory Analysis of Physical Therapy Process of Care and Psychosocial Impact of the COVID-19 Pandemic on Physical Therapists**

Authors: Devashish Tiwari[1], DPT, PhD, NCS; Keshrie Naidoo[2], PT, DPT, EdD, OCS; Naseem Chatiwala[3], PT, DPT, MS, NCS; Pamela L. Bartlo[4], PT, DPT, CCS; Allison Triola[2]; Brandon Ong[2]; Shweta Gore[2], PT, DPT, PhD, GCS

1. Simmons University *Boston, MA*
2. MGH Institute of Health Professions *Boston, MA*
3. Emerson Hospital *Boston, MA*
4. D'Youville College *Grand Island, NY*

**Corresponding author mail/email address:**

Shweta Gore PT, DPT, PhD
Board Certified Geriatric Clinical Specialist, American Board of Physical Therapy Specialties
Physical Therapy Department
MGH Institute of Health Professions
36, 1st Ave
Boston, MA-02129
@shwetagore81
Email: sgore@mghihp.edu

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**Abstract**

**Objective.** The purpose of this study was to investigate the physical therapy process of care, clinical practices, and the self-reported psychosocial impact of working during the 2020 pandemic on physical therapists and physical therapist assistants.

**Methods**. An electronic survey including both closed and open-ended questions was distributed to physical therapists employed in a range of health care settings across the United States.

**Results.** Physical therapy utilization and process of care varied across settings. Feasibility of performing an assessment was the main driver for selection of outcome measures. Interventions were mainly geared toward improving respiratory function and deconditioning. Prone patient positioning, now commonplace, was used infrequently by therapists in acute care prior to COVID-19. Similarly, outpatient and home care settings noted an increase in the use of respiratory driven interventions such as incentive spirometry and breathing exercises. Qualitative data analysis revealed both physical barriers (personal protective equipment [PPE]) and social barriers to care. Therapists noted challenges in discharge planning and patient/family education due to the impact of social isolation. They also noted difficulty maintaining productivity standards due to additional time spent in changing PPE and following safety measures.

Participants dealt with rapid changes in their role, changing productivity standards, and needing to increase their knowledge in a short amount of time.

**Conclusion.** Physical therapy utilization varied widely across settings. Despite some concern for personal health, respondents felt that the COVID-19 pandemic increased a sense of togetherness among team members and promoted greater appreciation for life and work.

**Impact.** This exploration of the process of care and current clinical practices across settings provides important knowledge about the role of physical therapists and physical therapist assistants in the care of patients with COVID-19. Gaining an understanding of the psychosocial impact of the pandemic among therapists could assist in creating solutions to better support clinicians' well-being.

In March 2020, the World Health Organization declared the coronavirus outbreak as a pandemic and a public health emergency due to its widespread community transmission.[1,2] As of July 2020, the Centers for Disease Control and Prevention reported 2,982,900 cases of coronavirus diseases 2019 (COVID-19) and 131,065 resulting deaths across the United States (U.S.).[3]

COVID-19 symptoms range from mild symptoms and mild pneumonia (81%) to severe hypoxia and critical respiratory failure (19%) requiring intensive medical care.[3,4] Preliminary reports have described a myriad of physical impairments including intensive care unit (ICU) acquired weakness and neuropathy among survivors of COVID-19, a pattern similar to previous viral infections such as the Middle Eastern Respiratory Syndrome, and Severe Acute Respiratory Syndrome.[1,5-11] Physical impairments can have a long-lasting negative impact on function, mobility, and social participation.[1]

There is consensus within the U.S. health care community regarding the importance of physical therapy for patients with severe respiratory symptoms of COVID-19.[12] Physical therapy intervention has been demonstrated to be safe, feasible, and beneficial for patients requiring mechanical ventilation to lessen the effects of intensive care unit (ICU) acquired weakness.[13-15] Similarly, in postacute settings, physical therapy could play an important role in overcoming the effects of deconditioning, improving cardiovascular and muscular endurance, muscle strength, and overall functional mobility and participation. International physical therapist experts jointly

developed clinical recommendations to guide physical therapists working in ICU settings with patients affected by COVID-19.[12]

Despite these efforts, the extent of physical therapy utilization for patients with COVID-19 in different health care settings is currently unknown. Because the focus of care for people with COVID-19 is geared toward survival when they are first admitted to acute care, it is unclear if recommendations for physical therapy go beyond ICU settings, and whether referrals to therapy are provided at hospital discharge. In postacute settings, there is even less evidence on the characterization of patient impairments, and the type of examination and intervention strategies utilized for individuals with COVID-19. Exploring physical therapy process of care, examination, and interventions for patients with COVID-19 can generate important knowledge about current clinical practice that can help to develop best practice recommendations across health care settings. These knowledge gaps point toward the critical need to describe the current process of care across settings to inform practice and to guide further research.

Physical therapists traditionally require use of a hands-on approach to facilitate movement necessitating close proximity to patients. Caring for patients with COVID-19 requires the need to constantly adapt practice including the frequent donning and doffing of personal protective equipment (PPE) and use of technology to educate family members.[16] Working under high stress conditions during this pandemic may place additional psychological burden on therapists and may impact their psychosocial health.[8,17] Currently, there is no information about the psychological effects of this disease on physical therapists and physical therapist assistants. Although there are psychological effects on patients affected by COVID-19 and their caregivers,[18] the focus of this study was primarily on the psychosocial impact on therapists working during the COVID-19 pandemic. The main objectives of this study, therefore, were to

(1) describe the process of care and preferred physical therapist practices for patients with COVID-19 across settings and (2) determine the self-reported psychosocial impact of working during the pandemic on clinicians.

## Methods

This cross-sectional study was approved by the Massachusetts General & Brigham Hospitals Institutional Review Board.

### Survey Development

Initial questions were drafted by members of the research team utilizing concepts specific to physical therapy process of care from previously published studies on different conditions[19,20] and psychosocial effects of infectious conditions on health care workers.[8,17] The survey contained a mix of closed- and open-ended questions. The survey incorporated questions related to the following constructs: demographics, process of care, primary impairments, outcome measures, and interventions; sources to guide clinical decision making, and use of PPE and psychosocial characteristics (Supplementary Appendix 1).

During the first stage of survey validation, cognitive interviews were conducted on two physical therapists actively working with patients affected by COVID-19 using virtual, semi-structured qualitative interviews.[21] The information from cognitive interviews was used to modify the survey. The modified survey was then electronically sent to 5 experts (clinicians working with COVID-19 and researchers with expertise in managing cardiovascular conditions and/or conducting survey research) for pilot testing to assess question clarity and readability, and to identify questions that may have a high item non-response rate.

The final 38-item anonymous survey was electronically distributed via Research Electronic Data Capture (RedCap) Online Survey Software (https://projectredcap.org)[22,23] to therapists. Modes of distribution included direct email to 4452 clinical instructors who were affiliated with the corresponding author's academic institution and practicing in various regions of the country (Pacific, Rocky Mountain, Midwest, Northeast, Southeast, Southwest, and Massachusetts) (Supplemental Figure), and 673 members of the APTA Cardiovascular and Pulmonary (CVP) listserv. Participants were asked to provide consent to access the survey. To maximize response rates, reminder emails or listserv posts were sent 2 additional times (1 week apart) from the original survey dissemination. The survey was open from May 19 to June 29, 2020.

### Analysis

Data was analyzed using IBM SPSS version 25.0 (IBM Corp, Armonk, New York, USA). Descriptive statistics were used to summarize the distribution of participants' responses. Chi-square tests of independence were conducted to compare demographic characteristics. Missing data was not included in the analysis. Two researchers used the six-step process for thematic analysis described by Braun and Clarke.[24] Due to limited research on COVID-19 at the time of this study, the researchers were unable to develop a provisional list of codes prior to data analysis. Instead, the researchers used inductive coding to code across the data set of open-ended survey responses. Each researcher kept a code book that included codes, descriptions, and data set excerpts which supported the code. After coding independently, the researchers shared their codebooks and met to resolve conflicts. Codes were collated into data-driven themes. After final analysis, definitions and names for each theme were generated.[24]

## Results

A total of 420 surveys were completed, for a response rate of 8.2%. Based on previous research, a sample size of 360-375 is considered to adequately represent the target population of 6000 with a ±5% level of precision in a survey study.[25,26] The majority of participants were female (64%), physical therapists (71.9%), working full time (60.5%), and practicing for 4 to 9 years (35.9%) (Tab. 1). Approximately one third of the participants identified working primarily in acute care, with another third working in outpatient or home care settings. Inpatient rehabilitation facilities, skilled nursing facilities (SNF), or long-term acute care (LTAC) were grouped together as "rehab settings." In the total sample, almost half of the participants were from the East Coast (48.1%), followed by the Midwest, Northeast, and Pacific Regions (Supplemental Figure).

**Process of care**

Upon admission to acute care, initiation of therapy most commonly occurred either 2 to 3 days or 5 days or more after admission. Since the outbreak, physical therapists in acute care treated 10 to 30 patients with COVID-19 on average; 18.5% of therapists reported having already treated more than 50 patients diagnosed with COVID-19 (Tab. 2). Approximately 29% of therapists reported that less than 20% of their caseload comprised patients with COVID-19, whereas 17% reported more than 80% of their caseload diagnosed with COVID-19. The most commonly reported average length of stay in the hospital for patients with COVID-19 ranged from 8 to 28 days. Following hospital discharge, approximately 42% of therapists reported that over 71% of patients were referred for follow-up physical therapy. Discharge location was closely split between subacute care/SNF and home with home care (22.6% and 20.5% respectively) (Tab. 2).

For rehabilitation settings, initiation of physical therapy most commonly occurred the day following admission. Thirty-eight percent of therapists in rehabilitation settings were not treating

any patients with COVID-19 at the time of survey completion. Among those who did see patients with COVID-19, 28% reported treating between 10 and 30 patients with COVID-19 since the outbreak. High variability was observed in the reported length of stay in the rehabilitation settings (8-29 days or more) (Tab. 2). At least 71% of therapists in outpatient and home care settings were not treating any patients with COVID-19.

**Impairment and Examination**

Acute care therapists identified impairments of the respiratory system as the most commonly occurring impairments (82.9%), closely followed by deconditioning (80%), cardiovascular (58%), musculoskeletal (44%), and neurological (40%) impairments (Tab. 3). The outcome measures most commonly used in acute care included Activity Measure for Post-Acute Care (AM-PAC)–"6 clicks" (42.5%) followed by the Borg Rating of Perceived Exertion scale (RPE) (36.3%) and dyspnea scales (34.9%). Among ICU specific measures, confusion assessment method for the ICU was the most frequently utilized (21.2%) followed by Richmond Agitation Sedation Scale (RASS) (16.4%) and the Johns Hopkins Highest Level of Mobility scale (15.8%). Selection of outcome measures was guided by feasibility of application (63%), best practice (44.5%), and knowledge of the test (42.5%) (Fig. 1).

In contrast to the acute care setting, deconditioning was noted to be the most prevalent impairment in rehabilitation and outpatient/home care settings. In rehabilitation settings, most commonly used outcome measures included Borg RPE (30%) followed by the Timed "Up and Go" Test (28%), Five Times Sit-to-Stand (26%), and dyspnea scales (22%). The Borg RPE (14.3%) continued to be the most commonly used in outpatient and home care settings followed by the Timed "Up and Go," the 2- and 6-Minute Walk Tests, and dyspnea scales (Fig. 1).

**Intervention**

Within the acute care settings, general conditioning (72%), patient education (72%), and gait training and dyspnea relief (70% each) were the most utilized interventions (Fig. 2). Approximately 20% of therapists reported using interventions not previously used by them in clinical practice. Prone positioning was the most commonly reported (16%) new intervention. Acute care therapists typically treated patients with COVID-19 3-5 times a week with treatment durations most commonly ranging between 21 and 40 minutes (Tab. 3).

Within rehabilitation settings, strength training (56%) was the most commonly reported intervention followed by general conditioning (54%), gait training (50%), and patient education (48%). Therapists reported using incentive spirometry and breathing exercises as new interventions that were not frequently used prior to the COVID-19 outbreak. Similar trends were noted in outpatient and home care settings. Majority of the rehabilitation therapists reported treating patients 5 times a week (38%) with sessions typically lasting 31 to 40 minutes. Outpatient and home care therapists most commonly treated patients with COVID-19 twice a week (14.9%), with treatment session durations lasting 41 to 50 minutes (Tab. 3).

**PPE and Psychosocial Health**

Among those therapists who completed the survey, 18.6% (N = 78) had been tested for COVID-19. Of those 78 participants, 7 tested positive. Wearing a mask was reported to be the most inconvenient and restrictive precaution (34.3%), followed by restricted access to the facilities (15%), restricted meetings (12 %), and use of goggles (12%). Most therapists rated their health

as good to excellent (77.4%) but reported some emotional stress related to COVID-19 (51.9%). Most therapists were slightly (22.9%) or somewhat (31.2%) concerned for their personal health but somewhat (25.2%) to very concerned (25%) for their family's health (Tab. 4). Increased sense of togetherness and cooperation (33.6%) and greater appreciation of life and work (38.1%) were also reported as a part of their experiences working during the pandemic.

**Qualitative Findings**

Four themes that emerged from the thematic analysis of open-ended survey responses included: barriers to care, the invisible threat, steep learning curve, and teamwork and collaboration.

**Barriers to care.** Barriers to care included both physical barriers such as masks and face shields, as well as a lack of access to resources. Masks and face shields created communication challenges, especially with deaf and hard of hearing patients. Participants reported hoarse voices from shouting to be heard by patients over physical barriers. Additional barriers to care included not being in the same physical space as patients and rapid transition to telehealth.

Care in the inpatient setting was often restricted to the patient room, which posed additional challenges as described by this participant: "Being able to challenge the patient enough when you are unable to leave the room. Learning how to make sure you have everything with you that you may need before entering the room. Importance of calling families and keeping them involved." *(Participant 198)*

Participants also described the toll of social isolation on patients and caregivers, which made discharge planning and education challenging. Unable to rely on patients' family members to

reorient delirious patients, therapists reported using technology to help support patient recovery: "I have found that when I'm able to Facetime families during treatment sessions, my patients tend to do better." *(Participant 112)*

There was an additional burden on participants who feared spreading the disease to others. One participant described the changes in the reactions of others toward a health care provider:

> "Friends and neighbors vary in reaction to my involvement with going into people's homes. It makes me sad when some get nervous to even visit or accept food prepared for them, and it makes me a little nervous, wondering that if I did go somewhere where people were not honoring precautions that I may spread the disease, so I am extra careful." *(Participant 387)*

**The invisible threat.** This theme captured the feelings associated with fear of the unknown, the variability in patient presentation, and receiving mixed messaging and misinformation. Two participants described the emotions experienced working as a health care provider during the pandemic:

> "Patients sick and dying without family members present is a reality I never thought I would have to experience. The fear of the unknown by medical community and patients is exhausting. The joyful moments, such as a patient being [discharged] from rehabilitation, are incredibly joyous!" *(Participant 243)*

> "The patients are so appreciative for the care they are given. It is exhausting and time-consuming donning and doffing PPE, as well as wearing the n95 [mask]. It is emotionally

and physically tiring but rewarding when someone who had been vented gets off and is rehabbed to a discharge home." *(Participant 92)*

Therapists noted great variability in patient presentation, information, and PPE availability across institutions. Patients and staff at times relied on unreliable sources for information that contributed to the spread of misinformation. Participants reported that managing PPE and infection control measures were an adjustment but dealing with an evolving situation with no end in sight was more stressful. A participant working in the ambulatory care setting described the challenges associated with asymptomatic spread:

"In outpatient, we don't particularly worry about [the] actively sick; it's the asymptomatic spread we are concerned about. It is hard to prepare against an invisible threat. Also, there are so many varying personal feelings toward COVID, ranging from pure fear to ambivalence, so dealing with both differing staff and patient opinion has been a process." *(Participant 379)*

**Steep learning curve.** Participants dealt with rapid role changes, changing productivity standards and workflow, and needing to increase their knowledge quickly. Some participants described being forced outside of comfort zones by drastic redeployment to serving as part of the proning team in the ICU. One participant described:

"A challenge for me has been that these patients tend to take a turn for the worst very quickly, and my coping strategies have had to change, given the sheer amount of patients that I have lost to COVID-19. Generally, my patients who pass away have been sick for a very long time, and I am able to reason with myself that they are in a better place. It's

very different for these patients because a lot of them were otherwise very healthy and were unable to say goodbye to their families. I have learned to be their best advocate, whether that be that they need an extra day before d/c or that they really should be going home instead of rehabilitation even if it's with barriers." *(Participant 187)*

**Teamwork and collaboration.** Some participants felt supported by leadership and administration and received frequently updated information and guidelines. Participants described a sense of pride toward the dedication of the health care team captured in this quote:

"I have been overwhelmed by the camaraderie of the entire care team. The staff on the COVID-19 floors have shown compassionate care and continue to go above and beyond despite personal fatigue. I feel very honored to be a part of this team. I hope this sense of togetherness and teamwork continues once this is behind us." *(Participant 240)*

## Discussion

This study is one of the first to describe preliminary data on process of care, utilization of physical therapy including examination and intervention strategies, and the psychosocial impact of working during the pandemic.

### Process of Care

Although the referral to physical therapy in acute care settings generally remained high, the timeframe for initiation of therapy following admission was delayed. Recommendations for active therapy mobilization require that the patient is conscious (RASS $\geq$ -2).[27] It is possible that patient severity might have resulted in this delay with patients too heavily sedated, unconscious, or unstable for therapy. A high variation seen in COVID-19 caseload among therapists could

most likely be due to regional differences in incidence of COVID-19 and interhospital policies regarding use of physical therapy services and PPE conservation. Future studies comparing the utilization of rehabilitation services across geographical areas and health care systems and examining the reasons for delayed utilization of services are warranted.

This study's participants also reported a much longer hospital stay for patients with COVID-19 (8-28 days) than previously seen for patients with other infectious diseases.[28] These results highlight that patient presentation with COVID-19 was more severe than other respiratory diseases requiring a longer stay. Longer length of stay could also be attributed to difficulties with discharge planning. At the time of this study, patiens were discharged to home rather than subacute rehabilitation facilities unless absolutely necessary.[29] Additionally, some patients may have favored discharge to home over rehabilitation. A longer hospital stay is associated with adverse physical, functional, and psychological consequences of immobility[30] and may in turn impact the length of time these patients would need in subsequent postacute rehabilitation settings. DeBiase et al[31] reported that the number of patients in rehabilitation settings is projected to increase as more patients with COVID-19 discharge from hospitals with ongoing rehabilitation needs. Considering the snowball effect of longer hospital stays in this population, steps to initiate early use of rehabilitation services must be considered.

At the time of this survey, therapists in rehabilitation settings were treating fewer patients with COVID-19. Despite the lower numbers of patients with COVID-19 admitted to rehabilitation settings, their referral rate to therapy was generally high. Home care and outpatient therapists were treating even smaller numbers of patients with COVID-19. The many uncertainties regarding the potential risks of treating patients in outpatient settings, possible exposure of

susceptible individuals to the virus, and fear of the virus among individuals seeking care limit the ability to make any predictions on when the patients with COVID-19 could safely be treated in outpatient facilities.

**Impairments and Examination**

Respiratory system impairments followed closely by deconditioning were the most commonly reported impairments in acute care. This was consistent with previous literature on COVID-19 when the pulmonary system was shown to be greatly impacted and a primary cause of mortality.[32, 31, 33-35] Similar trends were noted across settings with deconditioning becoming more predominant as the patient progressed from acute to postacute care settings. A myriad of other impairments involving other major body systems was also noted in patients with COVID-19 across settings. Given the high frequency of respiratory impairments and deconditioning, a thorough assessment of these parameters in patients with COVID-19 regardless of the setting is crucial. Additionally, musculoskeletal and neurological impairments can compound functional limitation and should not be ignored during assessment. This multisystem involvement further highlights the need for a more comprehensive approach to evaluation and management addressing all involved systems. Also, because the length of stay could depend on the type and severity of impairments, future research should examine the determinants of length of stay based on impairments.

Choice of outcome measures for patients with COVID-19 could be heavily impacted by the disease severity and limited availability of space due to confinement of patients in their rooms.[36] Many standardized outcome measures such as walk tests, test batteries (those needing longer

administration times), and testing that required breathing equipment were less frequently utilized possibly due to lower activity tolerance in severe disease and infection control measures. Instead, self-reported measures (Borg and Dyspnea scales) were more commonly used within the acute care settings. It was also interesting to note that ICU-specific measures were less frequently used in acute care settings. Despite recommendations on the use of RASS as an important tool to guide clinical decision making on initiation of active mobilization,[37] this measure was used only by 16% of therapists. It appears that in the acute care setting—where patients were at a higher risk of transmission—feasibility was the main criterion that drove the selection of outcome measures. Given the safety concerns involved in the treatment of these patients, identification and development of short, feasible, and valid measures specific to this population subset are needed. The use of performance-based functional measures increased in the outpatient and home care settings, probably as the patients were virus free, tolerated more activity, and were less of a safety concern.

**Intervention**

Therapists reported using interventions that they had not previously used in practice. Prone positioning was one such intervention that was infrequently used in acute care settings prior to the COVID-19 outbreak. Prone positioning was found to improve oxygenation status in these patients.[38] Given the involvement of physical therapists in proning patients with COVID-19, it is likely that they will continue to be an integral part of proning teams with patients who are difficult to wean in the ICU settings in future. Therapists in other settings reported using incentive spirometry and breathing exercises more frequently than they did prior to COVID-19. In contrast, interventions such as inspiratory muscle training were not frequently utilized despite

evidence supporting their use following prolonged mechanical ventilation, likely due to safety concerns around disinfecting and cleaning.[39]

Acute care therapists in this study typically treated a patient with COVID-19 anywhere from 21 to 40 minutes per session. Although this is within typical range for acute care rehabilitation, many acute care treatment sessions do not extend to 40 minutes.[40] This extended time may have been due to the severity of deconditioning requiring longer rest periods within treatment, multisystem involvement requiring the therapist to address several systems during one session, or less severe patients being able to tolerate longer durations of treatment. It remains unclear if the longer therapy duration was associated with better patient outcomes and warrants examining associations between treatment time and outcomes in future research. Among the few outpatient and home care therapists treating patients with COVID-19, the treatment duration was much longer than typical for outpatient settings (41-50 minutes), likely due to added time for cleaning and maintaining isolation requirements. Frequency of treatment sessions across settings followed typical patterns. Because patients with COVID-19 demonstrated multisystem impairments, plans of care should incorporate innovative activities that can target multiple systems at a time. Combining respiratory breathing exercises during balance intervention is one example of how the physical therapist can address multisystem impairments in their allotted therapy session time limit. This will be crucial given the difficulty with productivity standards and staffing models.

**PPE and Psychosocial health**

Therapists continue to be front-line health care workers in the treatment of patients with COVID-19. Despite this, participants in this study had a low rate of testing for the virus. Possible reasons

for this low rate of testing could be the limited guidance on serial testing for health care workers at the time of survey dissemination. Also, between March to June 2020, the overall rate of COVID-19 testing in the United States was much lower (<0.01 to 1.17 per 1000 individuals), likely due to limited availability of testing.[41] Therapists experienced emotional distress regarding their own health and their family's health. Given the possibility of chronic long-lasting physical effects from the disease based on previous reports on SARS[10] along with heightened emotional stress, follow-up with these therapists longitudinally would be crucial in assessing the long-term physical and psychological impacts from the disease.

Participants described difficulty maintaining productivity standards due to increased time to don and doff PPE and follow infection control measures. The physical therapy profession has seen an increase in attention paid to productivity standards, billing units, and other time-sensitive job duties over the past decade. There has been an increase in burnout among therapists, often observed in the acute care setting.[42] When exercising clinical decision making in a regular acute care setting, a physical therapist is impacted by hospital equipment availability, insurance reimbursement, staff numbers, and lack of support staff.[43] It is safe to assume that these factors will be the same, if not worse, during the COVID-19 pandemic. Hospital equipment, PPE, and staff have all been at a premium since March 2020. The influence of these outside factors was seen in some of this study's results regarding difficulty maintaining productivity standards typically set for the therapists. It has also been shown that patients with cardiovascular or pulmonary complications tend to have lower rates of participation in acute care physical therapy.[44] Because most patients hospitalized with COVID-19 have some degree of pulmonary or cardiovascular involvement, it would be important to look even more closely at physical

therapy service utilization and patient participation in sessions. The current study assessed number of treatment sessions and length of sessions, but further research should explore other parameters.

With regard to physical therapy staffing in acute care settings, there is no clear answer as to an ideal staffing ratio or productivity number. One study found that the physical therapist supply and need for therapy services in an area heavily influenced staffing ratios and the roles of therapists in those hospitals. [45] In hospitals dealing with high numbers of patients with COVID-19, this would also be the case. The role of the therapy services will be heavily influenced by the supply of therapists at that hospital. This could lead to a difference in utilization of physical therapy services and the interventions used by therapists in acute care settings. This was partly seen in the current study with regard to length and frequency of treatment sessions for patients with COVID-19 and to a lesser degree with regard to interventions performed by physical therapists with these patients. Typical supply and demand theory applies when considering the role of therapists in treating patients with COVID-19. Regardless of setting, the availability of therapists, equipment, and support and the demand (patient volume) will greatly impact therapy service utilization.

The therapists in this study also reported facing challenges related to physical isolation. Participants described challenges with discharge planning and patent/family education, rapid changes in their roles, productivity standards, workflow, and the need to increase their knowledge rapidly. Supports within health care administration must be built to help overcome these challenges and bolster a sense of camaraderie.

### Limitations

This study was not without limitations. First, despite 2 reminders sent to maximize participation, the response rate remained low. The ability of physical therapists to respond to the survey could have been limited due to the narrow time frame in which the survey was collected, given their extensive involvement in patient care and their emotional and physical stress. Also, because the survey was anonymous, the ability to reach out specifically to the nonrespondents was limited. Second, there was an overrepresentation of Massachusetts in this study. This could be attributed to the time when this survey was disseminated, as this was closely aligned with a surge of COVID-19 that emerged on the East Coast, with Massachusetts as one of the epicenters. This could have influenced the number of physical therapists who were involved in the care of patients with COVID-19 in these areas as compared to the rest of the country. Another limitation was a lack of focus on the reasons for choices about therapy treatment parameters. Decisions regarding therapy duration, frequency, and intensity should be examined for correlations with specific patient factors. There was a lack of follow-up on the therapist's symptoms, disease progression, or length of time out of work. A future study should attempt to further explore assess these factors.

## Conclusion

Physical therapy delivery and process of care varied across settings. Feasibility of performing an assessment was the main driver for selection of outcome measures, warranting a closer look at the available measures, especially in acute care settings. Interventions were mainly geared toward improving respiratory function and deconditioning. Interventions such as prone positioning that were less frequently used prior to COVID-19 were utilized in acute care. This

condition also led to use of the otherwise uncommon respiratory interventions in the outpatient and homecare settings.

## Author Contributions

Concept/idea/research design: D. Tiwari, K. Naidoo, N. Chatiwala, P.L. Bartlo, A. Triola, B. Ong, S. Gore

Writing: D. Tiwari, K. Naidoo, N. Chatiwala, P.L. Bartlo, A. Triola, B. Ong, S. Gore

Data collection: K. Naidoo, N. Chatiwala, P.L. Bartlo, A. Triola, S. Gore

Data analysis: D. Tiwari, K. Naidoo, N. Chatiwala, P.L. Bartlo, S. Gore

Project management: D. Tiwari, S. Gore

Providing participants: K. Naidoo

Consultation (including review of manuscript before submitting): D. Tiwari, A. Triola, B. Ong, S. Gore

## Ethics Approval

This study was approved by the Institutional Review Board at Massachusetts General & Brigham Hospitals (MGB) (protocol no. 2020P001389).

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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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**Table 1. Demographics of Survey Participants**

| Characteristics N = 420 | Total N (%) | Men N (%) | Women N (%) | Missing N (%) | Chi Square, *P* |
|---|---|---|---|---|---|
| **Age (y)** | | | | 92 (21.9) | 2.67, *P* = .445 |
| <30 | 45 (10.7) | 6 (10.5) | 39 (14.4) | | |
| 30-39 | 128 (30.5) | 21 (36.8) | 106 (39.3) | | |
| 40-49 | 67 (16) | 16 (28.1) | 51 (18.9) | | |
| ≥50 | 88 (21) | 14 (24.6) | 74 (27.4) | | |
| **Sex** | | 57 (13.6) | 270 (64.3) | 93 (22.1) | |
| **Occupation** | | | | 92 (21.9) | 1.77, *P* = .184 |
| Physical therapist | 301 (71.9) | 50 (87.7) | 251 (93) | | |
| Physical therapist assistant | 26 (6.2) | 7 (12.3) | 19 (7) | | |
| **Current employment status** | | | | 93 (22.1) | 10.06, *P* = .018* |
| Full time | 254 (60.5) | 51 (89.5) | 202 (74.8) | | |
| Part time | 57 (13.6) | 2 (3.5) | 55 (20.4) | | |
| Part time <20 hrs | 6 (1.4) | 2 (3.5) | 4 (1.5) | | |
| Per Diem | 10 (2.4) | 2 (3.5) | 8 (3) | | |
| **Length of time in current job (y)** | | | | 92 (21.9) | 2.23, *P* = .526 |
| <1 | 13 (3.9) | 3 (5.3) | 9 (3.3) | | |
| 1-3 | 61 (18.1) | 13 (22.8) | 45 (16.7) | | |
| 4-9 | 121 (35.9) | 17 (29.8) | 101 (37.4) | | |
| ≥10 | 142 (42.1) | 24 (42.1) | 115 (42.6) | | |
| **Setting** | | | | | |
| Acute care | 146 (34.8%) | | | | |
| Inpatient rehabilitation | 50 (11.9%) | | | | |

| | | |
|---|---|---|
| Outpatient and home care | 154 (36.7%) | |
| Not identified | 70 (16.7%) | |

**Table 2.** Process of Care for Patients With COVID-19[a]

| Process of Care | All Settings Total N = 420 | Missing n (%) | Acute Care n (%) Total N = 146 | Missing n (%) | Inpatient Settings (SNF and inpatient rehabilitation) n (%) Total N = 50 | Missing n (%) | Outpatient and other settings (private outpatient, hospital outpatient, home care, others) Total N = 154 | Missing n (%) |
|---|---|---|---|---|---|---|---|---|
| **Physical therapy initiation timeframe** | | 220 (52.4) | | 21 (14.4) | | 19 (38) | N/A | |
| On admission day | 8 (1.9) | | 3 (2.1) | | 2 (4) | | | |
| Day 1 | 35 (8.3) | | 13 (8.9) | | 18 (36) | | | |
| 2-3 days post-admission | 70 (16.7) | | 52 (35.6) | | 5 (10) | | | |
| 5 days or more | 48 (11.4) | | 40 (27.4) | | 4 (8) | | | |
| After discharge | 7 (1.7) | | 0 (0) | | 0 (0) | | | |
| Other | 18 (4.3) | | 15 (10.3) | | 1 (2) | | | |
| NA | 14 (3.3) | | 2 (1.4) | | 1 (2) | | | |
| **No. of patients treated** | | 68 (16.2) | | 0 (0) | | 0 (0) | | 0 (0) |
| None | 150 (35.7) | | 20 (13.7) | | 19 (38) | | 109 (70.8) | |
| <10 | 63 (15) | | 27 (18.5) | | 8 (16) | | 28 (18.2) | |
| 10-20 | 42 (10) | | 29 (19.9) | | 9 (18) | | 4 (2.6) | |
| 21-30 | 27 (6.4) | | 21 (14.4) | | 5 (10) | | 1 (0.6) | |
| 31-40 | 12 (2.9) | | 7 (4.8) | | 3 (6) | | 2 (1.3) | |
| 41-50 | 19 (4.5) | | 15 (10.3) | | 3 (6) | | 1 (0.6) | |
| >50 | 39 (9.3) | | 27 (18.5) | | 3 (6) | | 9 (5.8) | |
| **Percentage of caseload diagnosed with COVID-19** | | 220 (52.4) | | 22 (15.1) | | 19 (38) | | 109 (70.8) |
| 0-20 | 82 (19.5) | | 42 (28.8) | | 10 (20) | | 30 (19.5) | |
| 21-40 | 31 (7.4) | | 22 (15.1) | | 4 (8) | | 5 (3.2) | |
| 41-60 | 25 (6) | | 18 (12.3) | | 5 (10) | | 2 (1.3) | |
| 61-80 | 18 (4.3) | | 17 (11.6) | | 0 (0) | | 1 (0.6) | |
| 81-100 | 44 (10.5) | | 25 (17.1) | | 12 (24) | | 7 (4.5) | |
| **Patients with PT** | | 222 (52.9) | | 24 (16.4) | | 19 (38) | | 109 (70.8) |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **consult** | | | | | | | | |
| 0-20 | 32 (7.6) | | 13 (8.9) | | 6 (12) | | 13 (8.4) | |
| 21-40 | 28 (6.7) | | 23 (15.8) | | 0 (0) | | 5 (3.2) | |
| 41-60 | 46 (11) | | 39 (26.7) | | 1 (2) | | 6 (3.9) | |
| 61-80 | 35 (8.3) | | 31 (21.2) | | 2 (4) | | 2 (1.3) | |
| 81-100 | 49 (11.7) | | 15 (10.3) | | 22 (44) | | 12 (7.8) | |
| NA | 8 (1.9) | | 1 (0.7) | | 0 (0) | | 7 (4.5) | |
| **Mean length of stay in hospital/facility/ home (d)** | | 231 (55) | | 28 (19.2) | | 19 (38) | NA | |
| 0-7 | 5 (1.2) | | 3 (2.1) | | 0 (0) | | | |
| 8-14 | 54 (12.9) | | 40 (27.4) | | 6 (12) | | | |
| 15-21 | 47 (11.2) | | 34 (23.3) | | 9 (18) | | | |
| 22-28 | 31 (7.4) | | 19 (13) | | 6 (12) | | | |
| 29 or more | 37 (8.8) | | 3 (2.1) | | 8 (16) | | | |
| NA | 15 (3.6) | | | | 2 (4) | | | |
| **Patients referred to PT postdischarge (%)** | | 232 (55.2) | | 26 (17.8) | | 19 (38) | NA | |
| 0 | 10 (2.4) | | 2 (1.4) | | 3 (6) | | | |
| <10 | 17 (4.0) | | 9 (6.2) | | 2 (4) | | | |
| 10-20 | 12 (2.9) | | 7 (4.8) | | 3 (6) | | | |
| 21-30 | 6 (1.4) | | 5 (3.4) | | 0 (0) | | | |
| 31-40 | 8 (1.9) | | 6 (4.1) | | 0 (0) | | | |
| 41-50 | 10 (2.4) | | 9 (6.2) | | 0 (0) | | | |
| 51-60 | 12 (2.9 | | 9 (6.2) | | 1 (2) | | | |
| 61-70 | 10 (2.4) | | 9 (6.2) | | 1 (2) | | | |
| 71-80 | 26 (6.2) | | 23 (15.8) | | 0 (0) | | | |
| 81-90 | 25 (6.0) | | 19 (13) | | 3 (6) | | | |
| 91-100 | 34 (8.1) | | 19 (13) | | 11 (22) | | | |
| NA | 18 (4.3) | | 3 (2.1) | | 7 (14) | | | |
| **Postacute physical therapy settings where patients were discharged** | | 231 (55) | | | | 20 (40) | NA | |
| Home without services | 9 (2.1) | | 7 (4.8) | | 0 (0) | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Home with home care | 70 (16.7) | | 30 (20.5) | | 17 (34) | | | |
| Home with telehealth | 1 (0.2) | | 1 (0.7) | | 0 (0) | | | |
| Outpatient physical therapy | 9 (2.1) | | 2 (1.4) | | 4 (8) | | | |
| Outpatient pulmonary rehabilitation | 2 (0.4) | | 0 (0) | | 0 (0) | | | |
| Inpatient rehabilitation | 27 (6.4) | | 24 (16.4) | | 0 (0) | | | |
| Long-term acute care | 9 (2.1) | | 6 (1.4) | | 1 (2) | | | |
| Subacute care/SNF | 42 (10) | | 33 (22.6) | | 6 (12) | | | |
| Others | 20 (4.8) | | 16 (11) | | 2 (4) | | | |

[a]SNF = skilled nursing facility, PT = physical therapist.

**Table 3. Primary Impairments and Intervention Parameters for Patients With COVID-19[a]**

| | **All Settings** Total N = 420 | **Missing n (%)** | **Acute Care n (%)** Total N = 146 | **Missing n (%)** | **Inpatient settings** (SNF and inpatient rehabilitation) n (%) Total N = 50 | **Missing n (%)** | **Outpatient and other settings** (private outpatient, hospital outpatient, home care, others) Total N = 154 | **Missing n (%)** |
|---|---|---|---|---|---|---|---|---|
| **Primary impairments** | | 0 (0) | | 0 (0) | | 0 (0) | | 0 (0) |
| Respiratory | 182 (43.3) | | 121 (82.9) | | 28 (56) | | 33 (21.4) | |
| Cardiovascular | 133 (31.7) | | 85 (58.2) | | 23 (46) | | 25 (16.2) | |
| Neurological | 80 (19) | | 59 (40.4) | | 10 (20) | | 11 (7.1) | |
| Musculoskeletal | 96 (22.9) | | 65 (44.5) | | 11 (22) | | 20 (13) | |
| Pain | 30 (7.1) | | 15 (10.3) | | 4 (8) | | 11 (7.1) | |
| Deconditioning | 187 (44.5) | | 117 (80.1) | | 29 (58) | | 41 (26.6) | |
| Other | 5 (1.2) | | 2 (1.4) | | 2 (4) | | 1 (0.6) | |
| **Days of week spent in patient care** | | 219 (52.1) | | 21 (14.4) | | 19 (38) | | 109 (70.8) |
| 0-2 | 63 (15) | | 35 (24) | | 6 (12) | | 22 (14.3) | |
| 3-5 | 134 (31.9) | | 88 (60.3) | | 24 (48) | | 22 (14.3) | |
| 6-7 | 4 (1) | | 2 (1.4) | | 1 (2) | | 1 (0.6) | |
| **Mean duration of treatment sessions (min)** | | 224 (53.3) | | 23 (15.8) | | 19 (38) | | 112 (72.7) |
| <20 | 13 (3.1) | | 10 (6.8) | | 0 (0) | | 3 (1.9) | |
| 21-30 | 70 (16.7) | | 54 (37) | | 8 (16) | | 8 (5.2) | |
| 31-40 | 62 (14.8) | | 37 (25.3) | | 12 (24) | | 13 (8.4) | |
| 41-50 | 33 (7.9) | | 14 (9.6) | | 3 (6) | | 16 (10.4) | |
| 51-60 | 11 (2.6) | | 4 (2.7) | | 7 (14) | | 0 (0) | |
| >60 | 4 (1) | | 2 (1.4) | | 1 (2) | | 1 (0.6) | |
| Other | 3 (0.7) | | 2 (1.4) | | 0 (0) | | 1 (0.6) | |
| **Mean frequency of sessions per day** | | 227 (54) | | 23 (15.8) | | 19 (38) | | 115 (74.7) |
| 1x | 176 (41.9) | | 119 (81.5) | | 25 (50) | | 32 (20.8) | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2x | 14 (3.3) | | 4 (2.7) | | 4 (8) | | 6 (3.9) | |
| 3x | 3 (0.7) | | 0 (0) | | 2 (4) | | 1 (0.6) | |
| **Mean frequency of sessions per week** | | 225 (53.6) | | 23 (15.8) | | 19 (38) | | 113 (73.4) |
| 1x | 7 (1.7) | | 1 (0.7) | | 1 (2) | | 5 (3.2) | |
| 2x | 36 (8.6) | | 13 (8.9) | | 0 (0) | | 23 (14.9) | |
| 3x | 48 (11.4) | | 44 (30.1) | | 1 (2) | | 3 (1.9) | |
| 4x | 36 (8.6) | | 31 (21.2) | | 4 (8) | | 1 (0.6) | |
| 5x | 49 (11.7) | | 26 (17.8) | | 19 (38) | | 4 (2.6) | |
| 6x | 10 (2.4) | | 5 (3.4) | | 4 (8) | | 1 (0.6) | |
| 7x | 9 (2.1) | | 3 (2.1) | | 2 (4) | | 4 (2.6) | |

[a]SNF = skilled nursing facility

**Table 4. Psychosocial Characteristics**

| Characteristics<br>N = 420 | Total<br>N (%) | Men<br>N (%) | Women<br>N (%) | Missing<br>N (%) | Chi Square, *P* |
|---|---|---|---|---|---|
| **Self-rated health** | | | | 85 (20.2) | 0.39, *P* = .529 |
| Good to excellent | 325 (77.4) | 56 (98.2) | 261 (96.7) | | |
| Very poor to fair | 10 (2.4) | 1 (1.8) | 9 (3.3) | | |
| **Emotional distress related to COVID-19**, (Yes) | 218 (51.9) | 25 (43.9) | 189 (70) | 87 (20.7) | 13.22, *P* < .001* |
| **Degree of concern- personal health** | | | | 86 (20.5) | 1.97, *P* = .741 |
| No more than usual | 33 (7.9) | 8 (14) | 25 (9.3) | | |
| Slight | 96 (22.9) | 16 (28.1) | 79 (29.3) | | |
| Somewhat | 131 (31.2) | 19 (33.3) | 108 (40) | | |
| Very | 61 (14.5) | 11 (19.3) | 48 (17.8) | | |
| Extreme | 13 (3.1) | 3 (5.3) | 10 (3.7) | | |
| **Degree of concern - family health** | | | | 86 (20.5) | 1.61, *P* = .806 |
| No more than usual | 19 (4.5) | 2 (3.5) | 17 (6.3) | | |
| Slight | 68 (16.2) | 13 (22.8) | 55 (20.4) | | |
| Somewhat | 106 (25.2) | 20 (35.1) | 83 (30.7) | | |
| Very | 105 (25) | 15 (26.3) | 86 (31.9) | | |
| Extreme | 36 (8.6) | 7 (12.3) | 29 (10.7) | | |

## Figure Legends

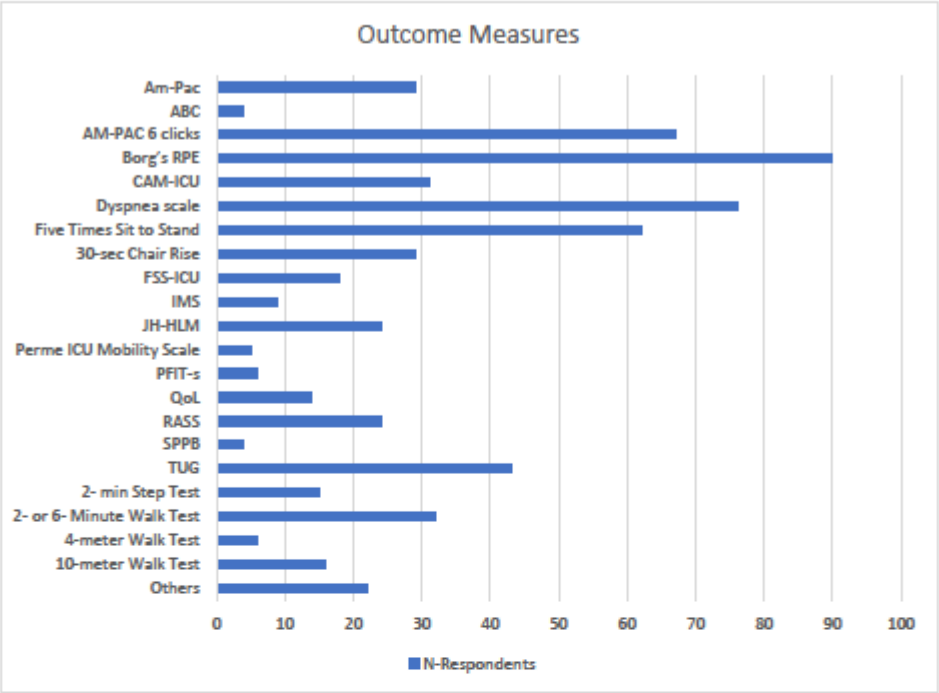

**Figure 1.** Outcome measures used by therapists for patients with COVID-19. AM-PAC = Activity Measure for Post–Acute Care (AM-PAC); ABC = Activities-specific Balance Confidence scale; AM-PAC 6 clicks = short form of AM-PAC; Borg's RPE – Borg Rating of Perceived Exertion Scale; CAM-ICU = Confusion Assessment Method for Intensive Care Units; FSS-ICU = Functional Status Score for the Intensive Care Unit; IMS = ICU Mobility Scale, JH-HLM = Johns Hopkins Highest Level of Mobility Scale; PFIT-s = Physical Function Intensive Care Test; QoL = Quality of Life Scale; RASS = Richmond Agitation-Sedation Scale; SPPB = Short Physical Performance Battery; TUG = Timed "Up and Go" Test.

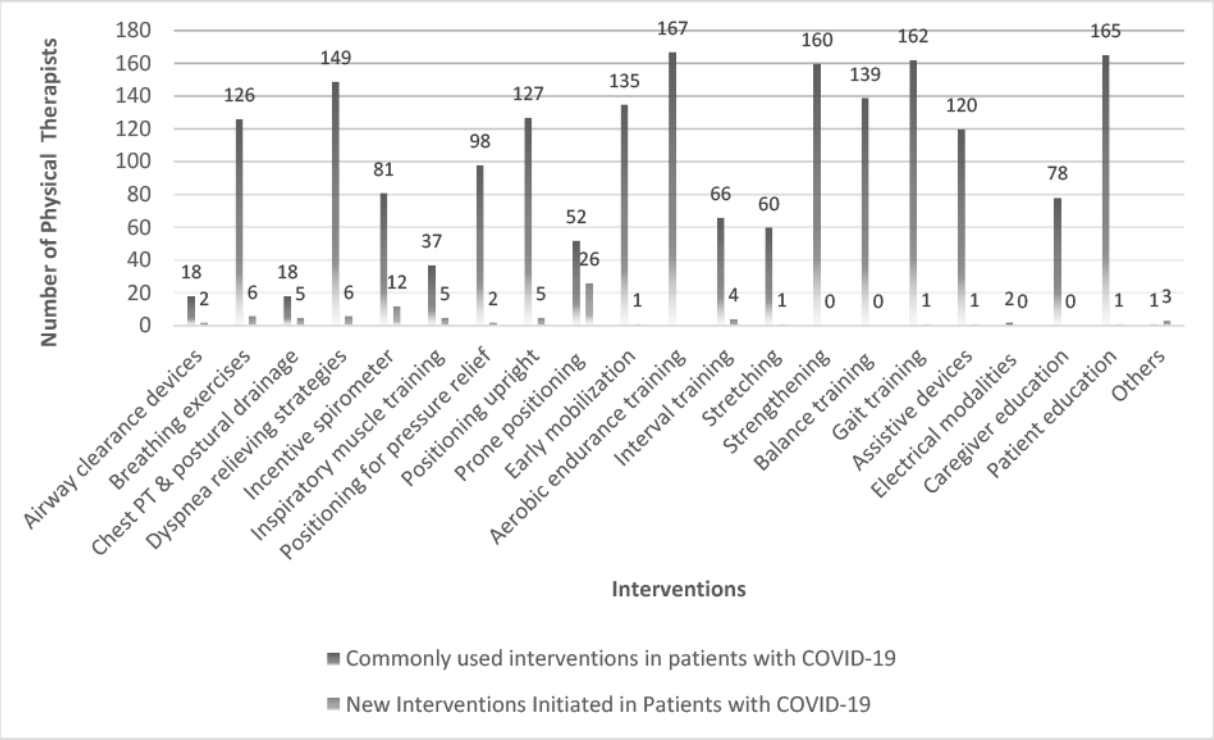


**Figure 2.** Physical therapist interventions for patients with COVID-19.