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Physical Therapy Utilization in Intensive Care Units

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Abstract

Objective: This study aimed to investigate the utilization of inpatient physical therapy (PT) for patients recovering from critical illness, focusing on factors such as staffing, PT availability, hospital criteria for initiating PT in the intensive care unit (ICU), and the types of PT commonly provided.

Design: Surveys were distributed to 984 physical therapists. The surveys included inquiries about the availability of PT staff for ICU patients, hospital protocols requiring physician consultation for initiating PT, established criteria for PT initiation in the ICU, and PT utilization for six specific patient scenarios involving ICU admission and mechanical ventilation.

Main Results: Out of 984 surveys distributed, 482 physical therapists responded. The majority of hospitals (89%) where these therapists worked mandated physician consultation for initiating PT in the ICU. Only 10% of hospitals had established criteria for PT initiation in the ICU. Community hospitals were more likely than academic hospitals to provide PT on weekends ($p=0.03$). The likelihood of PT involvement varied significantly among different clinical scenarios (highest at 87% for post-cerebrovascular accident patients, lowest at 64% for chronic obstructive pulmonary disease patients, $p<0.001$). The most common PT interventions for critically ill patients included functional mobility retraining and therapeutic exercise. Physical therapists reported varying perceptions of which PT interventions had the most positive impact, depending on the clinical scenario ($p<0.001$).

Conclusions: IPT is frequently administered to ICU patients during their recovery from critical illness. However, the frequency and types of PT interventions vary significantly based on hospital type and the specific clinical scenario.

Keywords: *Intensive care units, Physical Therapy, Critical Care, Rehabilitation.*

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Introduction

Patients in critical condition, especially those requiring mechanical ventilation, often experience acute neuromuscular weakness, leading to higher rates of readmission to intensive care units (ICUs), increased risk of institutionalization, reduced long-term physical function, and overall lower health-related quality of life. Factors such as immobility, systemic inflammatory responses in critical illness, poor nutrition, and exposure to medications like neuromuscular blockers and corticosteroids contribute to this neuromuscular weakness. (Gosselink et al., 2008)

During ICU stays, patients are typically prescribed bed rest initially. However, immobility alone has significant negative effects on physiology, causing issues like atelectasis, pressure ulcers, and increased vulnerability to aspiration and pneumonia. Studies show that even healthy volunteers can experience a loss of muscle strength daily with immobility, resulting in a reduction in postural muscle strength after just one week of complete bed rest. This impact is more pronounced in older adults and those with chronic conditions like congestive heart failure and chronic obstructive pulmonary disease. Furthermore, ICU patients face an elevated risk of developing acquired neuromuscular disorders, with over 50% developing critical illness polyneuropathy or myopathy after prolonged mechanical ventilation. Neuromuscular weakness post-ICU discharge significantly impairs daily physical activities such as lifting objects, climbing stairs, bending, kneeling, or walking moderate distances. (Schweickert et al., 2008)

Physical therapy has been explored as an intervention for patients recovering from critical illness. Studies indicate that PT can be safely administered to patients with acute respiratory failure on mechanical ventilation for more than four days. A small study from Taiwan showed modest improvements in Activities of Daily Living scores after a six-week physical training program. Additionally, a randomized controlled trial in Italy suggested that adding electrical stimulation to active limb mobilization reduced the time needed for bed-to-chair transfers in chronically ventilated COPD patients. However, essential PT activities like ambulation, positioning, and passive range of motion exercises are frequently overlooked in inpatient care. Despite this limited evidence, a European Respiratory Society and European Society of Intensive Care Medicine Task Force noted only level C evidence (uncontrolled or nonrandomized trials) regarding the effectiveness of acute physical therapy for critically ill adults. (Martin et al., 2005)

The utilization of physical therapy for patients recovering from critical illness remains understudied, particularly . Previous surveys in European and Australian ICUs indicated that physiotherapists primarily focused on respiratory therapies such as airway suctioning, postural drainage, and weaning from mechanical ventilation. Therefore, we conducted a national survey among physical therapists to understand current PT practices for critical illness recovery, including hospital staffing, the likelihood of PT provision for ICU patients, and the most common PT modalities employed. (Chaboyer et al., 2004)

Materials and Methods

Initially, we convened conferences involving physical therapists and critical care physicians from our institution to identify common ICU diagnoses that might necessitate an inpatient physical therapy consultation. Based on their input and our clinical experience, we developed six distinct ICU patient scenarios where physical therapy might be involved in patient care. To isolate the primary diagnosis's impact on physical therapy utilization, we standardized all other components of each scenario. For instance, each patient remained intubated and on mechanical ventilation for two weeks across all six scenarios. Except for the cerebrovascular accident

(CVA) and cervical (C6) fracture scenarios, patients were described as alert, able to follow commands, and generally weak (3+ to 4 out of 5 muscle strength). Age and gender were intentionally omitted from the scenarios to eliminate their influence. The survey underwent review by critical care physicians and physical therapists to ensure clarity, completeness, and realism, with minor protocol adjustments made based on their feedback.

The survey was distributed to members , representing 71,000 members nationally. A cover letter explained the study's purpose: to assess PT utilization for critically ill patients . Non-respondents did not receive reminders or follow-up surveys. Participation was voluntary and anonymous, with no compensation provided.

The survey, taking about 15 minutes to complete, gathered demographic data about respondents' primary hospital employment and PT staffing issues. It presented six mechanically ventilated patient scenarios commonly seen in ICUs. Physical therapists were asked about the likelihood of PT consultation and the number of weekly PT sessions for each scenario. PT involvement was categorized as "frequent" if estimated involvement exceeded 75%. Using a 1 to 7 Likert scale, therapists rated the likelihood of six PT types for each scenario: chest physiotherapy, passive range of motion exercises, preventive positioning, therapeutic exercise, functional mobility retraining, and functional electrical stimulation. Additionally, therapists indicated the most effective PT type for each scenario.

Statistical Analysis

Descriptive statistics were reported as Mean ± SD or percent (95% CI). Reliability was assessed using Cronbach’s alpha for the entire survey and each sub-scale. Exploratory factor analysis (EFA) using Principal Component Analysis (PCA) evaluated construct validity. Chi-square tests assessed categorical variables, while mixed model repeated measures analysis and ordinal logistic regression were used for Likert scale data analysis. Analysis was conducted using SPSS 16.0 for reliability and PCA and SAS 9.1 for other analyses.

Results

Demographics

490 physical therapists from hospitals responded to the survey, resulting in a 50% response rate. Eight respondents were excluded as they no longer worked in critical care settings, leaving 482 physical therapists for analysis. Of these, 33% worked in university or university-affiliated hospitals, with the rest in community hospitals. Hospital sizes varied: 34% were <250 beds, 29% were 250–400 beds, and 37% were >400 beds. Nearly half of the hospitals (49%) had over 24 ICU beds.

Internal consistency was high for the entire survey and its subscales (Table 1), with 10 components explaining 68.5% of the variance. The majority of items loaded strongly on one component, supporting the survey's construct validity.

Physical Therapy Involvement

Most hospitals (89%) required physician consultation to initiate PT for ICU patients, with only 10% having established PT initiation criteria. Only 1% of hospitals automatically evaluated all ICU patients. University hospitals had less routine weekend PT coverage (58%) than community hospitals (68%). A small percentage provided PT at night (1% university, 3% community).

PT was likely to be routinely provided in all patient scenarios but more so for neurological and trauma cases compared to medical cases ($p < 0.0001$). Neurological and trauma patients were

also more likely to receive therapy >3–5 days/week ($p < 0.0001$). University hospitals had lower odds of providing PT >3–5 days/week than community hospitals ($p < 0.0001$).

Types of Physical Therapy

Therapeutic exercises and functional mobility retraining were common for ICU patients, with positioning and passive range of motion exercises also used, especially for neurological scenarios. Chest physiotherapy and functional electrical stimulation were less likely across all scenarios ($p < 0.0001$). Functional mobility retraining and therapeutic exercise were preferred for trauma, pneumonia, and stroke scenarios ($p < 0.0001$).

Passive range of motion was more likely for stroke, C6 fracture, and trauma scenarios, while positioning was favored for stroke and C6 fracture scenarios. Functional electrical stimulation was more likely for stroke, C6 fracture, and COPD scenarios.

Functional mobility retraining was deemed most efficacious across scenarios, followed by therapeutic exercises, with differences based on specific patient scenarios ($p < 0.001$). Most uncertainty about PT impact was in the C6 fracture and quadriplegia scenario. Medical scenarios showed differences in therapist opinions between functional mobility retraining and therapeutic exercises ($p = 0.02$).

Table 1: Reliability of the Survey of Acute Care Physical Therapists

Scale	**Cronbach's Alpha**	**Range of Factor Loadings**
Entire Survey	0.843	
Likelihood to Care (11a, 12a, 13a, 14a, 15a, 16a)	0.839	.593 – .760
How soon after Admission (11b, 12b, 13b, 14b, 15b, 16b)	0.831	.489 – .761
How many days a week (11c, 12c, 13c, 14c, 15c, 16c)	0.938	.772 – .891
Chest Physiotherapy	0.974	.897 – .897
Passive Range of Motion	0.898	.397 – .907
Positioning for the prevention of wounds and contractures	0.923	.716 – .847
Therapeutic Exercise	0.872	.696 – .796
Functional Mobility Re-training	0.856	.490 – .853
Functional Electrical Stimulation	0.755	.582 – .856
Best Impact	0.897	.665 – .847

Table 2: Frequency of Physical Therapy Stratified by Primary Diagnosis

Type of Acute Respiratory Failure	**Routine Use of Acute Care Physical Therapy**	**Physical Therapy Performed 1–5 days/week**	**Physical Therapy Performed 6–7 days/week**
Neurological			
Cerebral Vascular Accident	87% (84–90%)	62% (58–66%)	38% (34–42%)
C6 fracture with quadraplegia	78% (82–88%)	62% (57–67%)	38% (32–43%)
Trauma			
MVA with liver laceration	80% (76–84%)	66% (62–70%)	34% (30–38%)

Medical			
COPD exacerbation	68% (64–72%)	72% (68–76%)	28% (24–32%)
Sepsis and pneumonia	63% (60–68%)	74% (70–78%)	26% (22–30%)
Myocardial infarction/heart failure	65% (62–70%)	69% (65–72%)	31% (27–35%)

Table 3: Mean ± SD of the Likelihood of Performing Various Types of Physical Therapy based on a Likert Scale from 1 (Very Unlikely) – 7 (Very Likely)

Type of Acute Respiratory Failure	**Chest Physiotherapy**	**Passive ROM**	**Positioning**	**Therapeutic Exercises**	**Functional Mobility Retraining**	**Electrical Stimulation**
Neurological						
Cerebral Vascular Accident	1.46 ± 1.28	4.79 ± 2.27	5.47 ± 1.77	6.17 ± 1.35	6.28 ± 1.33	1.46 ± 0.91
C6 fracture with quadraplegia	1.60 ± 1.53	5.98 ± 1.70	6.14 ± 1.45	5.95 ± 1.61	5.64 ± 1.82	1.59 ± 1.23
Trauma						
MVA with liver laceration	1.43 ± 1.27	3.19 ± 2.30	4.67 ± 2.00	6.32 ± 1.11	6.41 ± 1.14	1.10 ± 0.44
Medical						
COPD exacerbation	1.57 ± 1.43	2.96 ± 2.27	4.63 ± 2.03	6.27 ± 1.23	6.39 ± 1.09	1.16 ± 0.56
Sepsis and pneumonia	1.60 ± 1.55	2.87 ± 2.19	4.48 ± 2.05	6.23 ± 1.20	6.34 ± 1.21	1.08 ± 0.35
Myocardial infarction/heart failure	1.41 ± 1.15	2.76 ± 2.16	4.26 ± 2.09	6.20 ± 1.24	6.35 ± 1.22	1.08 ± 0.35

Table 4: Effect of Patient Scenario on the Likelihood of Using Different Types of Physical Therapy

Chest Physiotherapy	**Passive ROM**	**Positioning**	**Therapeutic Exercises**	**Functional Mobility Retraining**	**Electrical Stimulation**
OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
C6 vs PNEU	1.052 (0.750–1.476)	12.486 (9.642–16.169)a	5.520 (4.307–7.075)a	0.826 (0.642–1.062)	0.453 (0.351–0.583)a
COPD vs PNEU	1.137 (0.819–1.578)	1.070 (0.850–1.347)	1.138 (0.910–1.422)	1.095 (0.850–1.410)	1.056 (0.811–1.375)

MI vs PNEU	0.874 (0.620–1.232)	0.915 (0.725–1.155)	0.821 (0.656–1.026)	0.951 (0.741–1.222)	1.021 (0.784–1.329)
MVA vs PNEU	0.752 (0.528–1.071)	1.287 (1.023–1.619)b	1.176 (0.941–1.470)	1.125 (0.873–1.449)	1.119 (0.857–1.460)
Stroke vs PNEU	0.873 (0.620–1.230)	4.535 (3.591–5.727)a	2.488 (1.981–3.125)a	0.987 (0.769–1.268)	0.991 (0.763–1.288)

Table 5 Type of Physical Therapy Considered to have the Most Positive Impact on Outcome

Type of Acute Respiratory Failure	**Functional Mobility Retraining**	**Therapeutic Exercises**	**Other**
Neurological			
Cerebral Vascular Accident	84% (80–88%)	13% (10–16%)	3% (1–5%)
C6 fracture with quadraplegia	43% (37–48%)	30% (26–34%)	28% (24–32%)
Trauma			
MVA with liver laceration	77% (73–81%)	22% (18–26%)	1% (0%–2%)
Medical			
COPD exacerbation	65% (61–69%)	32% (28–36%)	3% (1–5%)
Sepsis and pneumonia	68% (64–72%)	28% (24–32%)	4% (2–6%)
Myocardial infarction/heart failure	63% (59–67%)	35% (31–39%)	2% (1–3%)

Discussion

Our national survey uncovered key trends in the use of physical therapy (PT) for critically ill patients . PT was commonly provided to ICU patients during recovery from critical illness, often initiated by primary physicians with less than 10% of hospitals having set PT initiation criteria. The likelihood and frequency of PT varied notably based on hospital type and clinical scenario. Functional mobility retraining and therapeutic exercises were the main PT types used, although preferences varied by scenario. Unlike practices in Europe and Australia, chest physiotherapy was infrequently provided by U.S. physical therapists. Additionally, opinions diverged on which PT types were most impactful across scenarios. (Combes et al., 2003)

Therapeutic exercises and functional mobility retraining serve distinct therapeutic purposes. Therapeutic exercise aims at restoring strength, flexibility, and endurance, involving various limb exercises and resistance training. Functional mobility retraining, on the other hand, focuses on balance, coordination, and independent walking, often starting with progressive walking aided by therapists or devices. Our survey revealed these as common PT approaches for ICU patients post-critical illness. However, determining the optimal balance between these approaches requires further investigation. (Ceriana et al., 2003)

Future studies could audit medical records prospectively or retrospectively for a clearer picture. We also did not capture the perspectives of other healthcare professionals involved in PT, like respiratory therapists or nurses, which may offer additional insights into PT practices in ICUs. (Yende et al., 2006)

Our study focused on mechanically ventilated patients after two weeks, excluding early ICU PT involvement. Early PT has shown benefits in reducing mechanical ventilation duration and improving functional independence. Similarly, our study did not explore PT post-discharge, although evidence suggests its efficacy in improving motor strength and functional independence in ICU survivors. (Bailey et al., 2007)

In conclusion, PT is a common practice for ICU patient recovery but its optimal types and timing warrant further investigation to enhance long-term physical function and quality of life for critical illness survivors. (Chiang et al., 2006)

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