Barriers and Facilitators of Physiotherapy Practice in Pediatric Intensive Care Units: A Multi-Center Cross-Sectional Descriptive-Analytic Study

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Abstract

Background: Physiotherapy in Pediatric Intensive Care Units (PICUs) plays a critical role in optimizing respiratory function and promoting early mobilization. Despite its importance, implementation remains inconsistent due to multiple barriers at institutional, patient, and professional levels. Identifying these barriers and facilitators is essential for improving physiotherapy integration in pediatric critical care. This study aimed to investigate barriers and facilitators of physiotherapy practice among physiotherapists working in PICUs across multiple centers in Iran, focusing on both respiratory and mobilization domains.

Methods: A multi‑center cross‑sectional descriptive‑analytic study was conducted between September–November 2025 in four pediatric hospitals (Mofid, Ali Asghar, Children's Medical Center, and Tabriz Pediatric Hospital). A total of 20 physiotherapists were recruited using convenience sampling. Data were collected using a structured, self‑administered questionnaire covering demographic information and four domains: institutional barriers, patient‑related barriers, staff cooperation, and facilitators. Statistical analysis was performed using SPSS version 26.

Results: A total of 20 questionnaires were analyzed. Institutional barriers make up the largest portion at 40%, indicating systemic challenges such as limited resources or lack of formal protocols. Facilitators account for 30%, showing that supportive elements like staff training and administrative backing play a significant role. Staff cooperation (20%) and patient-related barriers (10%) also contribute, highlighting interpersonal dynamics and clinical limitations. Institutional barriers were the most prominent obstacles to physiotherapy implementation in the PICU, with limited supportive administrative policies receiving the highest rating among these factors (80%).

Conclusion: Physiotherapy implementation in the PICU is mainly hindered by institutional and professional barriers, while patient-related factors were less significant. Facilitators were unanimously recognized as essential, and physician engagement, clear protocols, and multidisciplinary collaboration are key to advancing practice. The limited number of PICU staff, reflected in our sample of only 20 cases across several centers, highlights the need for broader multicenter studies.

Keywords: Physiotherapy in PICU, Institutional barriers, Facilitators of implementation, Multidisciplinary collaboration

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Introduction

Physiotherapy in pediatric intensive care units (PICUs) extends beyond passive and active support of bedridden children. The two key domains of physiotherapy in PICU are Respiratory physiotherapy and limb or early mobilization. Critically ill children, particularly those who are intubated and mechanically ventilated, are at high risk of impaired secretion clearance, atelectasis, decreased lung volumes and ventilator-associated complications.

Recent studies show that respiratory physiotherapy is effective in the pediatric with atelectasis. Both manual and instrumental techniques demonstrated efficacy, but instrumental techniques have better outcomes in many cases. In children with atelectasis, respiratory physiotherapy appears effective and safe in improving oxygenation or chest-x-ray findings. (1)

For instance, a systematic review found that chest physiotherapy techniques in ventilated children (such as manual hyperinflation, chest wall vibration, expiratory flow increase) could increase expiratory tidal volume and improve regional lung volumes, though the clinical significance remains uncertain.(2) Thus, in this context, physiotherapists are tasked with not only limb mobilization but also optimizing ventilation and lung mechanics via specific respiratory interventions. Role of limb/early mobilization physiotherapy Beyond the lungs, immobility in critical illness leads to muscle atrophy, ventilator dependency, increased length of stay, and functional delays.

In adult's ICU literature these effects are well documented; in PICU, evidence is fewer but emerging. One systematic review of early mobilization in PICU found that although data are limited, early mobilization is likely safe and feasible and has potential benefits for physical recovery. Mobilization activities may include turning in bed, assisted sitting, standing, walking, limb exercises — with goals such as improving thoracic mobility, increasing lung volume, clearing secretions (overlap with respiratory functions), improving muscle strength, cardiovascular fitness, preventing deformities, and also providing psychological benefits (3, 4).

Physiotherapy in the pediatric intensive care unit (PICU) is increasingly recognized as a cornerstone of multidisciplinary care, aiming to optimize respiratory function, prevent ICU-acquired weakness, and facilitate recovery. Despite these benefits, its implementation remains inconsistent. A European point-prevalence study demonstrated that only ~39% of patient-days included mobility activities, with barriers such as cardiovascular instability, oversedation, and mechanical ventilation limiting uptake. These findings highlight the urgent need to investigate the obstacles that prevent physiotherapists from delivering evidence-based interventions in critically ill children. (5)

Respiratory physiotherapy in PICU faces unique challenges. Evidence supporting its efficacy is limited and heterogeneous, leading to uncertainty among clinicians. Shime (2024) emphasized that recommendations for respiratory physiotherapy in mechanically ventilated children are often extrapolated from small trials or adult data, raising concerns about safety and applicability. (6) Moreover, physiotherapists report variability in indications and techniques, with no standardized pediatric protocols to guide practice. These gaps in evidence and guidance contribute to reduced confidence and inconsistent application of respiratory physiotherapy in PICU. (7)

Mobilization physiotherapy, particularly early mobilization, is another area where barriers are evident. Rodriguez et al. (2023) identified institutional obstacles such as lack of guidelines, requirement for physician orders, and inadequate staffing or equipment as major impediments to adherence to early mobilization protocols in PICUs. Provider-related concerns, including fear of mobilizing unstable patients and knowledge gaps, further limit practice. Patient-related barriers such as sedation, mechanical ventilation, and multiple invasive devices compound these challenges. Similar barriers have been reported in adult ICUs, where qualitative studies highlight clinician hesitancy and organizational constraints; these findings are highly relevant to pediatric settings given the shared complexity of critical care. (8,9)

Finally, broader perspectives from adult ICU research reinforce the universality of these barriers. A qualitative study in European ICUs found that physiotherapists often struggle with balancing safety concerns, institutional expectations, and patient readiness when delivering rehabilitation. Although conducted in adult populations, these insights are transferable to PICU, where physiotherapists face comparable dilemmas in decision-making. (10)

Recognizing both respiratory and mobilization barriers across age groups is therefore essential for designing effective pediatric-specific interventions. By systematically exploring these challenges, cross-sectional descriptive studies can provide valuable evidence to guide policy, training, and resource allocation in pediatric critical care.

Methods

Study Design

This research employed a multi‑center cross‑sectional descriptive‑analytic design to identify barriers and facilitators of physiotherapy practice among physiotherapists working in Pediatric Intensive Care Units (PICUs). Both respiratory physiotherapy and mobilization physiotherapy domains will be examined. Data collected using a self‑administered structured questionnaire, developed based on current literature and validated by content experts. The study period is scheduled for three months (September–November 2025).

Study Setting

The study conducted across multiple pediatric hospitals in Iran to enhance representativeness. Participating centers include:

Mofid Children's Hospital, Tehran (tertiary pediatric referral center with an active PICU and specialized physiotherapy services), Ali Asghar Children's Hospital, Tehran. Children's Medical Center, Tehran. Mardani Azar children Hospital, Tabriz. This multi‑center approach ensures diversity in institutional practices and increases the generalizability of findings.

Study Population

The study population consists of physiotherapists currently employed in PICUs and directly involved in the clinical management of critically ill children, including respiratory and limb physiotherapy interventions.

Sample Size and Sampling Method

A total of 20 physiotherapists will be recruited using a convenience sampling method, reflecting the limited number of pediatric physiotherapists working in PICUs across the selected hospitals. This sample size is considered adequate for exploration descriptive analysis in a preliminary multi‑center study.

Inclusion Criteria:

1. Physiotherapists with at least six months of experience in pediatric physiotherapy.
2. Currently employed in a PICU (full‑time or part‑time).
3. Willingness to participate and provide informed consent.

Exclusion Criteria:

1. Physiotherapists are not directly engaged in PICU patient care.
2. Incomplete or improperly filled questionnaires.
3. Those unwilling to participate or who withdraw during data collection.

Data Collection Tool

Data will be collected using a researcher‑designed questionnaire comprising two sections:

1. Demographic data: gender, years of experience, type of hospital, and work schedule.
2. Barriers and facilitators section: items rated on a 3‑point Likert scale (1 = disagree, 2= natural 3 = agree). Domains include:

• Institutional barriers (Insufficient staff, Absence of protocols, limited equipment availability, Heavy workload, Limited supportive administrative policies, Inadequate pt training).

• Patient‑related barriers (hemodynamic instability, Inappropriate general conditions, Ventilator and sedation).

• Staff Cooperation (Effective cooperation with physician, Effective cooperation with Nurses, Teamwork decision making

Interdisciplinary sessions)

• Facilitators (Support of medical team, Receive Specialize training, Family Positive feedback, standard protocols PT work evaluation).

The questionnaire was developed based on previous studies (Schneiderman et al., 2025; Khalil et al., 2023) and adapted to the Iranian clinical context (11,12). Content validity assessed by a panel of five pediatric physiotherapy and intensive care experts.

Data Collection Procedure

Eligible physiotherapists from all participating hospitals invited to participate after receiving a full explanation of the study objectives. Written informed consent will be obtained. Questionnaires distributed either in paper format or electronically via email/online forms. Data collection span three months (November 2025). To ensure accuracy, each returned questionnaire

checked for completeness. Anonymous coding applied to maintain participant confidentiality.

Data Analysis

Data entered into SPSS version 26 for statistical analysis. Descriptive statistics (mean, frequency) summarized demographic characteristics and questionnaire responses. Domain mean scores calculated to identify the most frequent barriers and facilitators.

Results

Participant Characteristics

The physiotherapists who completed the survey had an average of 12 years of experience in pediatric physiotherapy and 9.8 years of work in the PICU. The maximum reported experience was 34 years, while the minimum was 1.5 years. All responses were collected from public hospitals, and the majority of participants were female (96%).

Institutional barriers

Analysis of institutional barriers to physiotherapy implementation in the PICU revealed several key challenges. The most frequently reported obstacles were limited supportive administrative policies (80% agreement), insufficient staff (60%), and heavy workload (60%). Absence of standardized protocols was also highlighted by half of the respondents (50%), while inadequate physiotherapist training was acknowledged by 46%. Limited equipment availability was less consistently perceived as a barrier, with only 33% agreeing, whereas 60% disagreed. These findings indicate that organizational and policy-related issues, rather than material resources, constitute the primary constraints to effective physiotherapy practice in the intensive care setting. (Table1).

Patient-related Barriers

Patient-related barriers were perceived as less significant compared to institutional obstacles. Hemodynamic instability was reported as a barrier by only 6% of respondents, while nearly half (46%) remained neutral and an equal proportion (46%) disagreed. Inappropriate general condition was not considered a major limitation, with 86% disagreeing and no respondents agreeing. Similarly, ventilator dependency and sedation were rarely identified as barriers, with only 6% agreement and 80% disagreement. These findings suggest that clinical patient factors were not widely regarded as substantial impediments to physiotherapy implementation in the PICU. (Table2)

Table 1: Institutional barriers

Institutional Barriers	***Agree(%)***	***Neutral(%)***	***Disagree(%)***
Insufficient staff	60	20	20
Absence of protocols	50	30	20
limited equipment availability	33	6	60
Heavy workload	60	20	20
Limited supportive administrative policies	80	0	20
Inadequate pt training	46	0	53

Table 2: Patient-related Barriers

Patient-Related Barriers	**Agree (%)**	**Neutral (%)**	**Disagree (%)**
hemodynamic instability	*6*	*46*	*46*
Inappropriate general conditions	*0*	*13*	*86*
Ventilator and sedation	*6*	*13*	*80*

Staff Cooperation

Staff cooperation was perceived as a mixed factor influencing physiotherapy implementation in the PICU. Effective collaboration with physicians was unanimously reported, with 100% agreement among respondents. Cooperation with nurses was also considered favorable, with 60% agreement and no disagreement. However, teamwork in decision-making was less evident, as only 20% agreed, while 40% remained neutral and another 40% disagreed. Similarly, interdisciplinary sessions were not widely practiced, with just 20% agreement compared to 50% disagreement. These findings suggest that while physician and nursing collaboration is strong, broader interdisciplinary teamwork and structured decision-making remain limited. (Table3)

Table 3: Staff cooperation

Staff Cooperation	*Agree (%)*	*Neutral (%)*	*Disagree (%)*
Effective cooperation with physicians	100	0	0
Effective cooperation with Nurses	60	40	0
Teamwork decision making	20	40	40
Interdisciplinary sessions	20	30	50

Facilitators

All respondents unanimously agreed on several facilitators that enhance the implementation of physiotherapy in the PICU. Full support from the medical team (100%), specialized training opportunities (100%), family positive feedback (100%), the presence of standard protocols (100%), and physiotherapy work evaluation (100%) were all recognized as critical enablers. These findings emphasize that strong institutional endorsement, structured training, and positive reinforcement mechanisms play a decisive role in promoting effective physiotherapy practice in intensive care settings. (Table4)

Table 4: Facilitators

Facilitators	*Agree (%)*	*Neutral (%)*	*Disagree (%)*
Support of medical team	100	0	0
Receive Specialize training	100	0	0
Family Positive feedback	100	0	0
standard protocols	100	0	0
PT work evaluation	100	0	0

Comparative Summary of Barriers

Overall, institutional barriers emerged as the most significant, reflecting structural and organizational limitations. Staff cooperation showed mixed results, with strong physician collaboration but weaker interdisciplinary teamwork. In contrast, patient-related barriers were rarely considered major obstacles, suggesting that clinical conditions were not the primary constraint. Finally, while barriers exist, the presence of strong facilitators—including medical team support, training, and protocols—indicates that effective strategies are available to overcome institutional and organizational challenges.

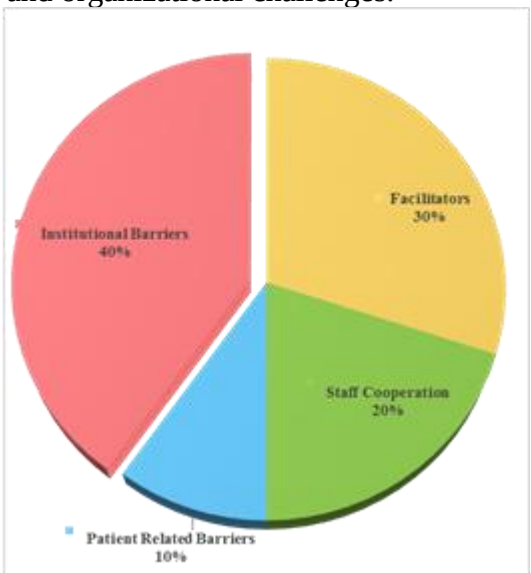

Figure1: comparative Summary of Barriers to physiotherapy Implementation in PICU

Institutional barriers make up the largest portion at 40%, indicating systemic challenges such as limited resources or lack of formal protocols. Facilitators account for 30%, showing that supportive elements like staff training and administrative backing play a significant role. Staff cooperation (20%) and patient-related barriers (10%) also contribute, highlighting interpersonal dynamics and clinical limitations.

Discussion

Our study identified a range of barriers and facilitators influencing physiotherapy implementation in the PICU, consistent with prior research across pediatric and adult intensive care settings.

Institutional Barriers emerged as the most prominent challenge, with respondents highlighting Limited supportive administrative policies, Insufficient staff, Absence of protocols, limited equipment availability, Heavy workload, Inadequate training for physiotherapists. These findings align with Rodriguez et al. (2023), who reported that the absence of clear protocols and reliance. Similarly, Woodbridge et al. (2023) emphasized organizational constraints and resource shortages in adult ICUs, underscoring the systemic nature of these barriers across age groups.

Patient-related Barriers were not strongly emphasized in our study. This finding suggests that physiotherapists, when provided with a physician's order, generally proceed with physiotherapy interventions while carefully adhering to necessary precautions. Unlike institutional or professional barriers, patient-related challenges such as sedation or mechanical ventilation did not appear to significantly hinder practice, indicating that clinical judgment allow physiotherapists to manage these conditions effectively. Comparable concerns were noted by Ista et al. (2020), who identified cardiovascular instability and oversedation as leading reasons for withholding mobilization. Shime (2024) further highlighted safety concerns associated with respiratory physiotherapy in ventilated children, reinforcing the delicate balance between therapeutic benefit and patient risk.

Staff Cooperation included Effective cooperation with physician, Effective cooperation with Nurses, Teamwork making decision, Interdisciplinary sessions. Interprofessional cooperation in our study revealed that physicians received the highest ratings for collaboration, followed by nursing staff. This finding highlights the pivotal role of physicians in guiding physiotherapy practice within the PICU. When physicians clearly specify the type of physiotherapy intended and outline any clinical limitations, physiotherapists report greater satisfaction and confidence in delivering care. Such structured collaboration not only enhances clarity of roles but also fosters a safer and more effective integration of physiotherapy into critical care routines. While Shkurka et al. (2025), who described physiotherapists' decision-making as strongly influenced by knowledge gaps and lack of confidence. Woodbridge et al. (2023) similarly reported hesitancy among adult ICU staff, suggesting that professional preparedness and confidence remain critical determinants of physiotherapy uptake across contexts.

Facilitators were Support of medical team, Receive Specialize training, Family Positive feedback, standard algorithm, Physiotherapist work evaluation. Facilitators were unanimously endorsed by all respondents in our study. This consensus underscores the perception that multidisciplinary support, adequate equipment, and supportive administrative policies are not optional but essential for advancing physiotherapy practice in the PICU. The universal agreement highlights a strong professional recognition that without these facilitators, overcoming institutional, patient-related, and professional barriers would be far more difficult. Such findings emphasize the need for sustained organizational commitment and structured collaboration to ensure physiotherapy integration becomes a routine component of critical care. Schneiderman et al. (2025) emphasized the importance of institutional endorsement and team collaboration, while Khalil et al. (2023) demonstrated that structured training and administrative backing significantly improved physiotherapy integration. These findings highlight that organizational commitment and interprofessional cooperation can mitigate many of the barriers identified.

Conclusion

This study highlights the multifaceted barriers and facilitators influencing physiotherapy implementation in the PICU. Institutional barriers, including lack of guidelines, staffing limitations, and restricted resources, emerged as the most significant challenges, while patient-related barriers were less pronounced, suggesting that physiotherapists can safely deliver care when physician orders and appropriate precautions are in place. Professional barriers such as limited training and communication gaps further underscore the need for structured educational programs and interprofessional collaboration.

Importantly, all respondents unanimously agreed on the necessity of facilitators—such as multidisciplinary support, adequate equipment, and administrative endorsement—for advancing physiotherapy practice. Physician cooperation was rated highest among interprofessional factors, reinforcing the critical role of medical leadership in guiding physiotherapy interventions and ensuring clarity regarding treatment goals and limitations.

Overall, these findings emphasize that overcoming institutional and professional barriers, while strengthening facilitators and physician engagement, is essential for integrating physiotherapy into routine PICU care. Future efforts should focus on developing clear protocols, enhancing training, and fostering collaborative team dynamics to optimize patient outcomes

Limitation

It should be noted that the number of professionals working in PICUs is limited, and in our study, we were able to recruit only 20 cases across several centers.

Table 5: Comparative Table of Barriers and Facilitators in PICU Physiotherapy

Domain	*Findings in Current Study*	*Related Studies (Comparison)*	*References*
Institutional Barriers	Institutional barriers were the most prominent; *limited supportive administrative policies* received the highest rating, followed by lack of guidelines, insufficient staff, and restricted equipment.	Rodriguez et al. (2023) found absence of clear protocols; Woodbridge et al. (2023) in adult ICUs highlighted organizational constraints and resource shortages.	Rodriguez et al. (2023); Woodbridge et al. (2023)
Patient-related Barriers	Patient-related barriers were less emphasized; physiotherapists generally proceeded with interventions when physician orders were provided, adhering to necessary precautions.	Ista et al. (2020) showed cardiovascular instability and oversedation as leading reasons for withholding mobilization; Shime (2024) emphasized safety concerns with respiratory physiotherapy in ventilated children.	Ista et al. (2020); Shime (2024)
Professional Barriers	Reported inadequate training, limited interprofessional communication, and uncertainty in patient readiness.	Shkurka et al. (2025) described physiotherapists' decision-making influenced by knowledge gaps and lack of confidence; Woodbridge et al. (2023) found similar hesitancy in adult ICUs.	Shkurka et al. (2025); Woodbridge et al. (2023)
Facilitators	All respondents unanimously endorsed facilitators, including multidisciplinary support, adequate equipment, and supportive administrative policies, as essential for advancing physiotherapy practice.	Schneiderman et al. (2025) reported institutional endorsement and team collaboration as key facilitators; Khalil et al. (2023) showed structured training and administrative support improved physiotherapy integration.	Schneiderman et al. (2025); Khalil et al. (2023)

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Ethical consideration
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Conflict of interest
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Authors' contributions
All authors contributed equally to the preparation of article.

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