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PHYSICIANS' AND NURSES' SATISFACTION WITH THE QUALITY AND EFFECTIVENESS OF PHYSIOTHERAPY CARE IN INTENSIVE CARE UNITS IN CROATIA

ZADOVOLJSTVO LIJEČNIKA I MEDICINSKIH SESTARA KVALITETOM I UČINKOVITOŠĆU FIZIOTERAPEUTSKE SKRBI U JEDINICAMA INTENZIVNE MEDICINE U HRVATSKOJ

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Abstract

Introduction: Intensive Care Units (ICUs) provide advanced, evidence-based care for critically ill patients. Physiotherapy is a vital component of ICU care but is often unavailable or insufficiently standardized. This study examined physicians' and nurses' satisfaction with physiotherapy care in Croatian ICUs and identified potential areas for improvement.

Methods: A 26-item digital questionnaire was disseminated throughout Croatian ICUs to physicians and nurses. The items addressed included physiotherapy availability, equipment accessibility, satisfaction with the quality and effectiveness of care, and their perspectives on improvement. Responses were rated on a 5-point Likert scale or by selecting predefined options. Data analysis was performed using descriptive statistics in R Studio.

Results: In total, 120 participants from 12 Croatian counties were included. The majority of responses (105) were from nurses/technicians, and only 15 from physicians. Physiotherapists were available in all ICUs, mainly on a consultative basis and mostly during morning shifts. Participants reported that physiotherapy interventions were effective in reducing pain, improving joint mobility, and enhancing respiratory function. Despite high overall satisfaction, participants emphasized the need for extended physiotherapist availability, improved ICU-specific training, and greater professional autonomy.

Conclusion: Physicians and nurses expressed general satisfaction with ICU physiotherapy care but suggested improvements in physiotherapy availability and staff competence. Implementing standardized physiotherapy practices across ICUs could improve treatment outcomes and contribute to earlier patient discharge.

Keywords: availability; intensive care unit; physiotherapy; quality; satisfaction.

Sažetak

Uvod: U Jedinicama intenzivne medicine (JIM) zbrinjavaju se kritično bolesnici primjenom naprednih metoda liječenja temeljenih na dokazima. Fizioterapija ima ključnu ulogu u skrbi u JIM-u, no često je nedostupna ili nedovoljno standardizirana. Cilj istraživanja bio je analizirati zadovoljstvo liječnika i medicinskih sestara kvalitetom i učinkovitošću fizioterapeutske skrbi u JIM-ovima u Hrvatskoj te ispitati kako se ista može poboljšati.

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Metode: Liječnici i medicinske sestre/tehničari zaposleni u JIM-ovima diljem Hrvatske ispunili su digitalni upitnik od 26 pitanja vezanih za dostupnost i kvalitetu fizioterapeutske skrbi i opreme, te mogućnosti poboljšanja iste. Odgovori su uključivali odabir ocjene slaganja s jednom od ponuđenih tvrdnji u rasponu od 1 do 5 (Likertova skala) ili odabir jednog od ponuđenih odgovora. Dobiveni odgovori analizirani su deskriptivnom statistikom u programu R studio.

Rezultati: U istraživanju je sudjelovalo 120 ispitanika (105 medicinskih sestara i tehničara, 15 liječnika) iz 12 županija u RH. Fizioterapeuti su bili dostupni u svim JIM-ovima, uglavnom radeći konzilijarno ili u jutarnjoj smjeni. Ispitanici smatraju da fizioterapijske intervencije doprinose ublažavanju boli, povećanju pokretljivosti zglobova i poboljšanju respiracijske funkcije. Unatoč visokom stupnju zadovoljstva, izrazili su potrebu za boljom dostupnošću, te učinkonvitijim treningom i edukacijom fizioterapeuta.

Zaključak: Temeljem dobivenih rezultata može se zaključiti kako su liječnici i medicinske sestre zadovoljni pruženom fizioterapeutskom skrbi u JIM-ovima, ali da svakako postoji prostor za njeno poboljšanje, osobito u dostupnosti i educiranosti fizioterapeuta. Standardizacija fizioterapeutske skrbi u JIM-ovima mogla bi poboljšati ishode liječenja i doprinjeti ranijim otpustima bolesnika.

Ključne riječ: dostupnost; fizioterapija; jedinica intenzivne medicine; kvaliteta; zadovoljstvo.

Introduction

Intensive Care Units (ICUs) are specialized hospital departments responsible for treating critically ill patients with acute, life-threatening conditions. These units use advanced medical technologies and therapeutic strategies to stabilize vital functions and prevent or minimize possible complications (1).

Among the leading causes of ICU admission are respiratory diseases, which often require mechanical ventilation that increases the risk of ventilator-associated pneumonia (VAP). Complications associated with VAP further prolong hospitalization and increase healthcare costs (2,3). Another common complication of ICU management is intensive care unit-acquired weakness (ICUAW), which develops in 50–80% of patients mechanically ventilated for more than 48 hours (4,5). ICUAW causes structural and functional impairments that have lasting impacts on quality of life (5). Skeletal muscle atrophy develops rapidly within hours of intubation, while ocular and facial muscles typically remain unaffected. Moreover, prolonged mechanical ventilation contributes to weakness of the diaphragm and other respiratory muscles, thereby extending ICU stays and increasing the risk of VAP (6).

A fundamental physiotherapeutic strategy for the prevention and treatment of ICU-acquired weakness is early mobilization. By definition, it is initiated within 72 hours of ICU admission and involves a progression of activities from passive and active range of motion to full ambulation (7,8).

Respiratory physiotherapy and early mobilization in the Intensive Care Unit (ICU) are essential components in the management and recovery of critically ill patients.

Equally important in critical care is the preservation of mucociliary transport function through effective secretion management. This includes techniques such as postural drainage combined with manual percussion and expiratory vibrations, followed by forced coughing and expectoration (9,10,11). Additionally, positive expiratory pressure (PEP) devices, typically set at 10–20 cm H_2O, and mechanical insufflation-exsufflation devices generating alternating positive and negative pressures are frequently employed to assist coughing and expectoration (12,13).

In the ICU setting, maintaining respiratory and peripheral muscle function demands a coordinated, multidisciplinary approach. Physiotherapists, as essential members of the team, need to possess specialized skills and a profound understanding of mechanical ventilation principles, its modes, variations, and possible complications (14). Such an approach has been shown to shorten the duration of mechanical ventilation and reduce the length of hospital stay (15).

Despite increasing evidence supporting early rehabilitation strategies, their uptake and delivery in Europe have been variable. Physiotherapy care is often not standardized, and official data on physiotherapists'

availability in ICUs remains limited (2). To address the lack of a standardized ICU physiotherapy framework, the European Respiratory Society developed the Harmonised Education in Respiratory Medicine for European Specialists (HERMES) curriculum, which defines essential knowledge and competencies for managing critically ill patients (16,17).

Standardisation of physiotherapy care in the ICU is necessary to ensure consistency, quality, and evidence-based practice across healthcare institutions.

According to the Regulation on Norms and Standards for the Provision of Healthcare Services in Croatia, ICU teams are formally composed of physicians and nurses/technicians (18). Although physiotherapists are not formally included in these regulations, they are often a part of ICU teams across Croatia, as their interventions significantly contribute to improved clinical outcomes and earlier patient discharge. While their role in ICUs is well documented, Croatia still lacks a formal training program for respiratory physiotherapists, who primarily acquire their skills through informal training.

This study assessed physicians' and nurses' satisfaction with physiotherapy care in Croatian ICUs and explored opportunities for improvement.

Methods

The study was conducted in June 2024 using an electronic survey distributed across Croatia. Participants included physicians and nurses employed in Intensive Care Units (ICUs). Inclusion criteria required participants to be between 20 and 64 years of age and have sufficient proficiency in the Croatian language. Participation was voluntary, and respondents were informed that they could withdraw from the study at any time.

Methods and Instruments

Data were collected through a specifically designed digital questionnaire (MS Office Forms), which participants accessed via a link or QR code (Appendix 1). Prior to distribution, department heads received an invitation to participate, including an explanation of the study's purpose, assurance of anonymity, and a statement of voluntary participation. The questionnaire consisted of 26 items, comprising 8 questions on socio-demographic characteristics and employment, 6 on the availability of physiotherapy services, 6 addressing access to physiotherapy equipment, and 6 on satisfaction with physiotherapy care in the ICU. The latter section was further supplemented with a structured question on potential improvements to physiotherapy services and the most commonly applied interventions according to participants. Responses were recorded using a 5-point Likert scale (1-strongly disagree, 5-strongly agree) or as categorical selections.

Statistical Analysis

For the analysis of questionnaire data, descriptive statistics were applied, and the results are presented both descriptively and in tabular form. For all numerical variables, basic statistical measures were calculated, including mean, median, standard deviation, minimum, maximum, and quartiles. For all categorical variables, frequencies, relative frequencies (percentages), and the most common values were determined. Likert-scale items were analyzed using descriptive statistics, including frequency distribution, most frequent rating, and median.

All statistical procedures were performed using R Studio (RStudio version 4.0.4., Posit, PBC).

Results

A total of 120 participants (100 women and 20 men) were included in the study, with a mean age of 36.66 years (range 20-64, SD = 10.69). The participants took approximately 9 minutes to complete the survey.

As presented in Table 1, most participants were nurses, and the largest educational group consisted of bachelor's degree holders.

Table 1. Participants' occupation and educational level

	Category	Freq
1	Physician in training/resident	5
2	Specialist physician	10
3	Nurse/technician (Master's degree, MSc)	13
4	Nurse/technician (Bachelor's degree, BSc)	54
5	Nurse/technician (Secondary school)	38

The length of participants' work experience in the ICU is presented in Table 2. More than half of the participants had at least five years of experience, which adds to the credibility of their responses.7

Table 2. Length of participants' professional experience

	Category	Freq
1	1-5 years	43
2	5-10 years	31
3	10-15 years	12
4	More than 15 years	33

Tables 3 and 4 divide participants by location and type of healthcare institution they work at. The majority were employed in Clinical Hospital Centers, with the highest representation from Split-Dalmatia County, the City of Zagreb, and Zagreb County.

Table 3. Number of participants by healthcare institution category

	Category	Freq
1	Clinical Hospital	7
2	University Hospital Center	92
3	General Hospital	17
4	County General Hospital	3
5	Specialized Hospital	1

Table 4. Number of participants by healthcare institution location

	Counties	**Freq**
1	Bjelovar-Bilogora	1
2	City of Zagreb and Zagreb County	34
3	Istria	1
4	Karlovac	10
5	Krapina-Zagorje	1
6	Osijek-Baranja	6
7	Primorje-Gorski Kotar	11
8	Split-Dalmatia	47
9	Varaždin	6
10	Vukovar-Srijem	1
11	Zadar	1

Table 5 provides an overview of ICU physiotherapists' working hours, reflecting physiotherapy service availability and continuity in Croatia. The findings indicate a lack of standardized schedules, predominance of morning shift coverage, and absence of 24-hour physiotherapy services in all ICUs.

Table 5. ICU physiotherapists' working hours and availability

	Category	**Freq**
1	Attends on a consultative basis (upon request, according to referral)	36
2	Present continuously during the morning/day shift	52
3	Present continuously during the morning and afternoon shifts	31
4	Present continuously 24 hours a day	0

Table 6 details participants' assessments of physiotherapists' competence, effectiveness, overall satisfaction, and the perceived quality of ICU physiotherapy.

Table 7 presents participants' views on the most frequently performed physiotherapy interventions in their ICUs.

Table 6. Assessment of physiotherapists' performance, effectiveness, and satisfaction in ICUs

	Statement	**Grade (N)**	**Median grade**
1	A physiotherapist is trained to work with critically ill patients	1(2), 2(5), 3(21), 4(36), 5(54)	4
2	The physiotherapist is familiar with ICU medical equipment used in patient care	1(6), 2(13), 3(24), 4(37), 5(40)	4
3	The role of the physiotherapist in the treatment process is important for faster recovery of critically ill patients	1(1), 2(2), 3(4), 4(10), 5(103)	5
4	The physiotherapist contributes to pain reduction in patients	1(2), 2(5), 3(16), 4(38), 5(59)	4
5	The physiotherapist contributes to improved mobility in patients	1(0), 2(1), 3(4), 4(19, 5(96)	5
6	The physiotherapist contributes to prevention of pressure ulcers in patients	1(1), 2(8), 3(8), 4(34), 5(69)	5
7	The physiotherapist has access to various therapy aids in the ICU	1(6), 2(22), 3(38), 4(32), 5(22)	3
8	The physiotherapist improves patients' respiratory status in the ICU	1(0), 2(4), 3(6), 4(31), 5(79)	5
9	Nurses/technicians perform physiotherapy procedures when a physiotherapist is unavailable in the ICU	1(10), 2(20), 3(39), 4(28), 5(23)	3
10	The physiotherapist plans and implements physiotherapy procedures in consultation with ICU doctors	1(2), 2(3), 3(16), 4(38), 5(61)	5
11	I am satisfied with the knowledge and skills the physiotherapist demonstrates in the ICU	1(3), 2(9), 3(17), 4(34), 5(57)	4
12	The physiotherapist actively participates in the application of noninvasive mechanical ventilation	1(22), 2(23), 3(26), 4(17), 5(32)	3
13	The physiotherapist independently carries out bronchial secretion aspiration procedures	1(45), 2(17), 3(20), 4(9), 5(29)	3
14	The physiotherapist uses various aids such as mobility and respiratory therapy equipment	1(7), 2(10), 3(25), 4(27), 5(51)	4
15	How would you rate the overall satisfaction with the work of the physiotherapists in your ICU?	1(2), 2(10), 3(21), 4(46), 5(40)	4

Table 7. Reported frequency of physiotherapy interventions in ICUs (only one answer allowed)

	Category	Freq
1	Gait training	1
2	Passive joint mobilization	43
3	Patient positioning	2
4	Interventions for secretion mobilization	9
5	Patient verticalization	18
6	Breathing exercises	31
7	Peripheral muscle strengthening exercises	16

When asked how ICU physiotherapy could be improved, most participants emphasized the need for longer physiotherapist presence in the unit. Other suggestions included better training on ICU equipment and procedures, improved communication with staff and patients, and greater professional autonomy. A full overview of responses is presented in Table 8.

Table 8. Identified areas for improvement in ICU physiotherapy practice

	Category	Freq
1	Better education on devices and procedures performed in the ICU	15
2	Longer presence of physiotherapists in the ICU	89
3	Communication with doctors and nurses/technicians	6
4	Communication with patients	1
5	Greater professional autonomy	8

Discussion

Implementing continuous physiotherapy in the ICU has been shown to significantly improve patient outcomes by preventing respiratory infections, reducing the duration of mechanical ventilation, shortening ICU stays, and thereby lowering overall treatment costs (19,20). Early rehabilitation is associated with an increase in functional capacity and muscle strength, an improvement in walking distance and a better perception of health-related quality of life (21).

Despite clear evidence of its benefits, physiotherapy care in Croatia remains inconsistently accessible, lacks continuity and is not standardized across healthcare settings. Furthermore, physicians and nurses tend to associate physiotherapy primarily with passive patient mobilization, whereas essential ICU interventions such as noninvasive mechanical ventilation and bronchial secretion aspiration are rarely recognized as part of the physiotherapists' role. Although overall satisfaction with physiotherapy care was high, participants identified key areas for improvement, including greater ICU presence, enhanced professional training, and increased autonomy in clinical practice.

In Croatia, there is a need for additional formal education and specialization in ICU physiotherapy to enhance professional competence and clinical outcomes.

The availability and competence of physiotherapists vary internationally. In Western Europe, 25% of hospitals report no dedicated ICU physiotherapists, 34% provide coverage during night shifts, and 85% provide coverage during weekends (22). However, some European Union countries reflect the situation in Croatia. One study reported physiotherapists' presence in 76% of surveyed ICUs, primarily during daytime hours (60.9%). In 39% of ICUs, physiotherapists were available for less than three hours per day, 65% provided interventions as needed, and only 4.3% offered weekend coverage (23). In a scoping review of 1121 titles from South Africa and United States of America, variability in physiotherapist to patient ratio was observed, ranging from 1:4 to 1:50 physiotherapist to critical care beds, while 11–40% ICUs reported daily physiotherapist presence (24). Unlike in some European countries, where physiotherapists are integrated into ICU teams and often present during daytime hours or available 24/7, Croatia lacks official data on the availability of physiotherapy services in ICUs (19).

The effectiveness of physiotherapy and early mobilization in the ICU was evaluated at University Hospital Centre Rijeka by comparing 8-hour and 12-hour physiotherapy programs. The study included 437 patients with ICU stays of more than 24 hours, assigned to either an experimental group (12-hour care) or a control group (8-hour care). In the experimental group, 44% of patients achieved sitting and 21% standing, compared with the control group, where only 26% achieved sitting and 6% standing. Patients receiving 12-hour care were also weaned from mechanical ventilation sooner and transferred to the ward more quickly (25).

A study of patients with amyotrophic lateral sclerosis (ALS) assessed tolerance to non-invasive ventilation (NIV) before and after the employment of a respiratory physiotherapist (RT). At follow-up, NIV tolerance reached 73% in the RT group, compared with 22% in the group without RT involvement. These findings demonstrate that active involvement of respiratory physiotherapists in optimizing NIV can increase patient tolerance by up to 50%, resulting in significantly improved outcomes (26).

To ensure optimal patient care, the European Society of Intensive Care Medicine advises one physiotherapist for every five patients, available seven days a week (20). A study conducted in Chile found that 70% of ICUs have physiotherapists available 24/7, with coverage in 87% of public and 46% of private hospitals. In 41% of

hospitals, one physiotherapist manages up to five patients during the week, while 23% of ICUs employ specialized physiotherapists, predominantly in the private sector. Continuous physiotherapy care is essential for managing ICU patients, yet the availability of specialized education and training remains limited (27).

A study involving 815 mechanically ventilated patients showed that continuous 24-hour physiotherapy coverage resulted in shorter ventilation periods, reduced ICU stays, and lower treatment costs compared to care limited to 12 hours per day (28).

A study conducted in Malaysia investigated nurses' perceptions of physiotherapists in the ICU, surveying 33 nurses with a minimum of six months of ICU experience. A 19-item questionnaire assessed physiotherapist availability, roles, and interventions. Patient mobilization was identified as a primary role, contributing to faster weaning from mechanical ventilation and shorter ICU stays (29).

The studies referenced above emphasize the importance of continuous physiotherapy in achieving favorable treatment outcomes. Limitations of this study include uneven regional representation (nine regions unrepresented), disproportionate participation by nurses and technicians (87%) compared with physicians (13%), and a realatively short study duration.

Despite these limitations, responses from 120 participants across more than half of Croatia's regions provided valuable insights, supporting the essential role of physiotherapists in ICU teams and highlighting the benefits of extended physiotherapy availability in critical care.

Conclusion

Physiotherapy care in ICUs is essential for the multidisciplinary management of critically ill patients, contributing to improved functional outcomes and preventing complications associated with prolonged hospitalization. The integration of physiotherapists into ICU teams significantly enhances patient outcomes and overall treatment effectiveness. In Croatia, however, continuous and standardized physiotherapy care remains underdeveloped, despite clear evidence of its significance. While healthcare professionals express satisfaction with physiotherapist involvement in ICUs, they emphasize the need for improved staffing coverage and advanced clinical competence. Future research should aim for a more balanced representation of physicians and nurses, with broader regional participation, to achieve a comprehensive evaluation of physiotherapy care and promote the standardization of ICU practices across Croatia.

References

1. Gupta S, Sharma S. An Evidence-Based Approach To The Role Of Physiotherapy In ICU. Int J Physiother Res. 2022;10(2):4150-61. doi:10.16965/ijpr.2022.106.
2. Pathmanathan N, Beaumont N, Gratrix A. Respiratory physiotherapy in the critical care unit. BJA Educ. 2015;15(1):20-5. doi:10.1093/bjaceaccp/mku005.
3. Pattanshetty R, Gaude G. Effect of multimodality chest physiotherapy in prevention of ventilator-associated pneumonia: A randomized clinical trial. Indian J Crit Care Med. 2010;14(2):70–6. doi:10.4103/0972-5229.68218.
4. Gulišija J, Čapkun V, Stipić SS. Rani i konačni ishod bolesnika oboljelih od mišićne slabosti stečene u COVID jedinici intenzivnog liječenja: koliko precizno možemo procijeniti rani i konačni ishod bolesnika po odvajanju bolesnika od mehaničke ventilacije? Lijec Vjesn. 2022;144(Suppl 3):15-21. doi:10.26800/LV-144-supl3-2.
5. Anekwe DE, Biswas S, Bussières A, Spahija J. Early rehabilitation reduces the likelihood of developing intensive care unit-acquired weakness: a systematic review and meta-analysis. Physiotherapy. 2020;107:1-10. doi:10.1016/j.physio.2019.12.004.
6. Hodgson CL, Tipping CJ. Physiotherapy management of intensive care unit-acquired weakness. J Physiother. 2017;63(1):4-10. doi:10.1016/j.jphys.2016.10.011.
7. Schaller SJ, Scheffenbichler FT, Bein T, Blobner M, Grunow JJ, Hamsen U, et al. Guideline on positioning and early mobilisation in the critically ill by an expert panel. Intensive Care Med. 2024;50:1211-27. doi:10.1007/s00134-024-07532-2.
8. Hermans G, van Mechelen H, Clerckx B, Vanhullebusch T, Mesotten D, Wilmer A et al. Acute outcomes and 1-year mortality of ICU-acquired weakness. A Cohort Study and Propensity-matched Analysis. Am J Respir Crit Care Med. 2014. doi:10.1164/rccm.201312-2257OC.
9. Bott J, Blumenthal S, Buxton M, Ellum S, Falconer C, Garrod R et al. Guidelines for the physiotherapy management of the adult, medical, spontaneously breathing patient. Thorax. 2009;64(Suppl 1):i1-i52. doi:10.1136/thx.2008.105727.
10. Belli S, Prince I, Savio G, Paracchini E, Cattaneo D, Bianchi M et al. Airway Clearance Techniques: The Right Choice for the Right Patient. Front. Med. 2021;8(1). doi:10.3389/fmed.2021.544826.
11. McCarren B, Alison JA, Herbert RD. Vibration and its effect on the respiratory system. Aust J Physiother. 2006;52(1):39-43. doi:10.1016/S0004-9514(07)70004-5.
12. van der Schans CP, van der Mark TW, de Vries G, Piers DA, Beekhuis H, Dankert-Roelse JE et al. Effect of positive expiratory pressure breathing in patients with cystic fibrosis. Thorax. 1991;46(4):252-6. doi:10.1136/thx.46.4.252.
13. Homnick DN. Mechanical Insufflation-Exsufflation for Airway Mucus Clearance. Respir Care. 2007;52(10):1296-307. doi:10.1016/S0021-843X(07)70255-9.
14. Bissett B, Gosselink R, van Haren FMP. Respiratory Muscle Rehabilitation in Patients with Prolonged Mechanical Ventilation: A Targeted Approach. Ann. Update Intensive Care Emerg. Med. 2020;595-609. doi:10.1007/978-3-030-42457-7_57.
15. Chiarici A, Andrenelli E, Serpilli O, Andreolini M, Tedesco S, Pomponio G et al. An Early Tailored Approach Is the Key to Effective Rehabilitation in the Intensive Care Unit. Arch Phys Med Rehabil. 2019;100(8):1506-1443. doi:10.1016/j.apmr.2019.01.015.
16. Rodrigues A, Muñoz Castro G, Jácome C, Langer D, Parry SM, Burtin C. Current developments and future directions in respiratory physiotherapy. Eur Respir Rev. 2020;29(158):200264. doi:10.1183/16000617.0264-2020.
17. Gosselink R, Clerckx B, Robbeets C, Vanhullebusch T. Physiotherapy in Intensive Care Unit, Neth J Crit Care. 2011;(15) 66-75. doi:10.1155/2011/789078.
18. Pravilnik o normativima i standardima za obavljanje zdravstvene djelatnosti [Internet]. Narodne-novine.nn.hr. 2020 [cited 2025 Oct 23]. Available from: https://narodne-novine.nn.hr/clanci/sluzbeni/2020_04_52_1048.html.
19. Ramalho F, Oliveira A, Machado A, Azevedo V, Gonçalves MR, Ntoumenopoulos G et al. Physiotherapists in intensive care units: Where are we? Pulmonology. 2024 [cited 2025 Oct 28]. Available from: https://www.journalpulmonology.org/en-physiotherapists-in-intensive-care-units-avance-S2531043724000163.

20. Valentin A, Ferdinande P. Recommendations on basic requirements for intensive care units: structural and organizational aspects. Intensive Care Med. 2011;37(10):1575-87. doi:10.1007/s00134-011-2301-7.
21. Arias-Fernández P, Romero-Martin M, Gómez-Salgado J, Fernández-García D. Rehabilitation and early mobilization in the critical patient: systematic review. J Phys Ther Sci. 2018;30(9):1193-1201. doi:10.1589/jpts.30.1193.
22. Norrenberg M, Vincent JL. A profile of European intensive care unit physiotherapists. Intensive Care Med. 2000;26(7):988-94. doi:10.1007/s001340051145.
23. Salvitti S, Repossini E. Perception, experience and knowledge of early physiotherapy in intensive care units of Rome: a survey. Monaldi Arch Chest Dis. 2020;90(4). doi:10.4081/monaldi.2020.1251.
24. Twose P, Newey V, Jones U. The role and staffing of physiotherapy in critical care: a scoping review. J Assoc Chart Physiother Resp Care. 2022;54(2):92-118. doi:10.56792/LAII9050.
25. Marincel Antolović I, Mikolić I, Kamber S, Hrlec M. Učinkovitost fizikalne terapije u jedinici intenzivnog liječenja u razdoblju od godinu dana. World of Health. 2023;6(1):44-49. doi:10.24141/woh.2023.6.1.44.
26. Kareus SA, Kagebein S, Rudnicki SA. The importance of a respiratory therapist in the ALS clinic. Amyotroph Lateral Scler. 2008;9(3):173-6. doi:10.1080/17482960801907194.
27. Aranis N, Molina J, Leppe J, Castro-Ávila AC, Fu C, Merino-Osorio C. Characteristics of physiotherapy staffing levels and caseload: a cross-sectional survey of Chilean adult Intensive Care Units. Medwave. 2019;19(01):e7576-6. doi:10.5867/medwave.2019.01.7576.
28. Rotta BP, Silva JM da, Fu C, Goulardins JB, Pires-Neto R de C, Tanaka C. Relationship between availability of physiotherapy services and ICU costs. J Bras Pneumol. 2018;44(3):184-9. doi:10.1590/S1806-37562017000000196.
29. Gupte P, Swaminathan N. Nurses perceptions of physiotherapists in critical care team: Report of a qualitative study. Indian J Crit Care Med. 2016;20(3):141-5. doi:10.4103/0972-5229.178176.

APPENDIX 1

Questionnaire: "Perception and Availability of Physiotherapy in Intensive Care Units in the Republic of Croatia"

1.	**Your age**	_____ (fill in)
2.	**Your gender**	a) M b) F c) I prefer not to disclose
3.	**Your level of education**	a) Secondary school b) Bachelor's degree (BSc) c) Master's degree (MSc)
4.	**Your occupation**	a) Nurse/technician (Secondary school) b) Nurse/technician (BSc) c) Nurse/technician (MSc) d) Physician in training/resident e) Specialist physician
5.	**Category of healthcare facility where you are employed**	a) University Hospital Center b) Clinical Hospital c) General Hospital d) County General Hospital e) Specialized Hospital
6.	**County in which your facility is located**	List of counties in Croatia
7.	**Category of ICU where you work**	a) General b) Surgical c) Internal medicine d) Pediatric e) Urology f) Neurology g) Other
8.	**How long have you been working at your current workplace?**	a) 1-5 years b) 5-10 years c) 10-15 years d) More than 15 years

9.	**How much time per day is the physiotherapist present in your ICU?**	a) Present continuously during morning or day shifts b) Present continuously during morning and afternoon shifts c) Present continuously 24 hours a day d) Attends on a consultative basis (upon request, according to referral)
	For the following questions, indicate your answer on a scale from 1 to 5 (1 – strongly disagree, 5 – strongly agree)	
10.	**The physiotherapist is trained to work with critically ill patients**	1 – 2 – 3 – 4 – 5
11.	**The physiotherapist is familiar with the medical equipment available in the ICU and used in treating critically ill patients**	1 – 2 – 3 – 4 – 5
12.	**The physiotherapist's role in the treatment process is important for faster recovery of critically ill patients**	1 – 2 – 3 – 4 – 5
13.	**The physiotherapist's interventions reduce pain in patients**	1 – 2 – 3 – 4 – 5
14.	**The physiotherapist's interventions improve patient mobility**	1 – 2 – 3 – 4 – 5
15.	**The physiotherapist's interventions prevent the development of pressure ulcers in patients**	1 – 2 – 3 – 4 – 5
16.	**The physiotherapist has access to various aids for conducting therapy in the ICU**	1 – 2 – 3 – 4 – 5
17.	**The physiotherapist's interventions improve respiratory status in ICU patients**	1 – 2 – 3 – 4 – 5
18.	**Nurses/technicians perform physiotherapy procedures when the physiotherapist is not present in the ICU**	1 – 2 – 3 – 4 – 5
19.	**The physiotherapist independently plans and carries out physiotherapy procedures in consultation with physicians in the ICU**	1 – 2 – 3 – 4 – 5
20.	**I am satisfied with the knowledge and skills that the physiotherapist applies in their work in the ICU**	1 – 2 – 3 – 4 – 5
21.	**The physiotherapist actively participates in the application of NIV (non-invasive ventilation)**	1 – 2 – 3 – 4 – 5
22.	**The physiotherapist independently performs bronchial secretion aspiration procedures**	1 – 2 – 3 – 4 – 5
23.	**The physiotherapist uses various aids (mobility aids, respiratory therapy aids, ADL aids, etc.) in their work**	1 – 2 – 3 – 4 – 5
24.	**Which physiotherapy intervention do you think is performed most frequently in your ICU?**	a) Patient verticalization b) Gait training (with/without mobility aids) c) Breathing exercises d) Peripheral muscle strengthening exercises e) Patient positioning f) Interventions for secretion mobilization g) Passive joint mobilization
25.	**In which aspect could the physiotherapists' work in your ICU be improved?**	a) Communication with patients b) Communication with doctors and nurses/technicians c) Greater professional autonomy d) Better education on devices and procedures performed in the ICU e) Longer presence of physiotherapists in the ICU
26.	**How would you rate your overall satisfaction with the physiotherapist's work in your ICU?**	1 – 2 – 3 – 4 – 5