

M. Norrenberg
J.-L. Vincent
with the collaboration
of the European Society
of Intensive Care Medicine

A profile of European intensive care unit physiotherapists

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Abstract *Objective:* To determine the profile and role of the physiotherapist in European intensive care units (ICUs). *Design:* Postal questionnaire. *Setting:* 460 ICUs in 17 western European countries. *Participants:* Heads of intensive care physiotherapy. *Results:* One hundred and two completed questionnaires were analyzed, representing 22% of the questionnaires sent; 48% were from university hospitals, 45% of the hospitals had more than 700 beds, and 50% had more than 24 ICU beds. 38% of the hospitals had more than 30 physiotherapists working in the hospital, but 25% had no exclusive ICU physiotherapist. 34% had a physiotherapist available during the night, and 85% during the weekend. In almost 100% of ICUs the physiotherapist performed respiratory therapy, mobilization, and positioning. The physiotherapist played an active role in the adjustment of mechanical ventilation in 12% of the respondent's units, in weaning from mechanical ventilation in 22% of units, in extubation in 25%, and in the

implementation of non-invasive mechanical ventilation (NIV) in 46%. Among the physiotherapists, there were equivalent numbers of university and non-university graduates. Differences in the role of the physiotherapist were apparent between countries. For example, 80% of respondents from the United Kingdom stated that physiotherapists were available during the night, while in Germany and Sweden physiotherapists were available at night in none of the respondent's units. *Conclusions:* Even though the response rate was limited, variations in the role and profile of the ICU physiotherapist are apparent across Europe. The involvement of physiotherapists in more specialized techniques is also a function of the number of physiotherapists working exclusively in an ICU.

Key words Physiotherapy · Weaning · Noninvasive ventilation physical therapy · ICU organization · Quality of care · Mobilization

M. Norrenberg · J.-L. Vincent (✉)
Department of Intensive Care,
Erasmus University Hospital,
Route de Lennik 808, 1070 Brussels,
Belgium
e-mail: jlvincen@ulb.ac.be
Tel.: + 32-2-5553380
Fax: + 32-2-5554555

Introduction

Intensive care units (ICUs) have become a concentration not only of critically ill patients and advanced technology, but also of expert personnel with specialist training. A considerable amount of literature is available regarding the position, training, and roles of the nurse

and physician on the ICU [1, 2, 3, 4, 5], but relatively little has been written about the place of other critical care personnel, who nevertheless form an important part of the ICU team. Physiotherapists are routinely involved in ICU patient care particularly with regards to respiratory care and passive and active limb mobilization. How often and to what extent the physiotherapist is in-

volved in other procedures such as the adjustment of mechanical ventilation, supervision of weaning from mechanical ventilation, extubation, and implementation and supervision of noninvasive mechanical ventilation (NIV) is less clear, although some studies have suggested that the involvement of a physiotherapist in such procedures may be beneficial [6, 7, 8, 9, 10].

We were interested in developing a clearer picture of physiotherapists in European ICUs, and so developed a questionnaire to help define their position, role, education, and involvement of the profession in patient care.

Methods

As listings of ICU physiotherapists are not available in Europe, we contacted the physiotherapists via physician members of the European Society of Intensive Care Medicine (ESICM). From the 1400 members, 460 hospitals were identified in 17 western European countries, and the senior ICU physician at each of these hospitals was sent a copy of the questionnaire accompanied by a letter explaining the aim and purpose of the study and asking them to hand the questionnaire to the physiotherapist working in his/her ICU. The 460 multiple-choice questionnaires (see "Appendix") were sent in April 1996, and responses were accepted until June 1996. Questions were asked about the demographic characteristics of the respondents' ICUs and their professional role, and several hypothetical clinical situations were posed to elicit information on the level of physiotherapist autonomy.

Statistical analysis was performed using SPSS software. Comparison between countries was carried out using the χ^2 test. A *P* value less than 0.05 was considered as statistically significant.

Results

A total of 102 completed questionnaires were returned (22% response rate) with the largest representation from the United Kingdom (29), The Netherlands (20), Belgium (15), Germany (8), Portugal (6), Switzerland (6), and Sweden (4; Table 1). Only these seven countries were included in the between-country analysis. Of the 102 questionnaires received, 50 (50%) were from hospitals with more than 24 ICU beds, and 53 (52%) were mixed medicosurgical units (Table 2). Thirty-nine respondents (38%) reported that their hospital had more than 30 physiotherapists, 23 (23%) had between 20 and 30 physiotherapists, 27 (26%) between 10 and 20, and 12 (12%) of the hospitals had less than 10 physiotherapists. Hospitals in Belgium, The Netherlands, and the United Kingdom generally had greater numbers of physiotherapists than the other countries (*P* < 0.05), but also larger hospitals (*P* < 0.01).

Seventy-six respondents (75%) reported that their ICU had at least one physiotherapist working there exclusively (Fig. 1), with no significant differences between countries. The availability of physiotherapists in the ICU during the night was generally very low; only

Table 1 Questionnaire distribution and response by country

Country	Number of questionnaires sent	Number of questionnaires returned
Austria	16	1
Belgium	41	15
Denmark	11	1
Finland	9	3
France	69	2
Germany	80	8
Greece	17	1
Ireland	6	3
Italy	33	2
Luxembourg	2	0
The Netherlands	37	20
Norway	5	0
Portugal	9	7
Spain	20	0
Sweden	22	4
Switzerland	23	6
United Kingdom	60	29
Total	460	102

Table 2 Respondent's hospital and ICU demographics

Type of hospital	
University	48%
Affiliated	25%
Community	26%
Number of hospital beds	
< 250	8%
250–400	17%
401–700	30%
> 700	45%
Type of ICU	
Medical	9%
Surgical	16%
Paediatric	10%
Mixed medico-surgical	51%
Others	14%
Total number of ICU beds	
< 8	9%
8–14	16%
15–24	25%
> 24	50%

34 (33%) of the respondents reported that their ICU had a physiotherapist regularly available at night. As expected, this percentage was higher in university hospitals than in others, with 42% night availability (*P* < 0.05). Considerable variation between countries was observed, with 23 of 29 (79%) United Kingdom respondents stating that physiotherapists were regularly available during the night, yet in Germany, Portugal and Sweden all respondents reported no night-time physiotherapist availability (*P* < 0.01). The routine availability of a physiotherapist at the weekend was reported by 85 respondents (83%), with no significant dif-

Fig. 1 Number of physiotherapists working exclusively in the ICU

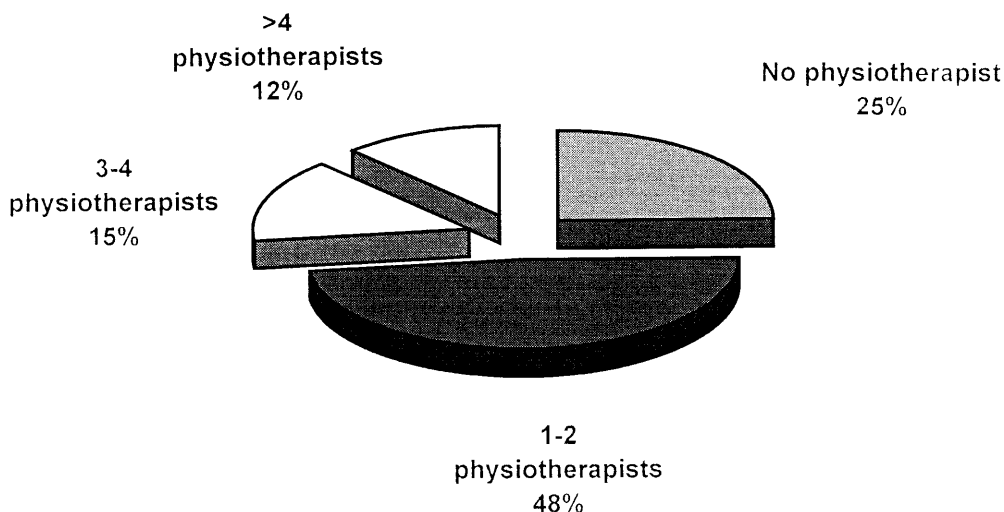


Table 3 Physiotherapy practice

	Yes	Rarely	No
Mobilisation	100%		
Respiratory therapy	98%	2%	
Positioning	90%	9%	1%
Airway suctioning	70%	14%	16%
Implementation and supervision of NIV	46%	25%	29%
Extubation	25%	25%	50%
Supervision of weaning from MV	22%	22%	56%
Adjustment of MV	12%	23%	65%
Intubation	1%	9%	90%

MV: mechanical ventilation, NIV: non-invasive ventilation

Table 4 Relation between number of ICU physiotherapists and their involvement in the implementation of non-invasive ventilation (% of respondents)

Number of ICU physiotherapists	Implementation and supervision of NIV		
	Yes	Rarely	No
None	23	23	54
1-2	52	24	24
3-4	54	33	13
> 4	67	25	8

ference between countries. All university hospitals had physiotherapists available during the weekend.

The active professional role of the physiotherapist is presented in Table 3. All respondents stated that physiotherapists in their unit were involved in respiratory therapy and mobilization. There were considerable differences between countries in physiotherapist involvement in specific tasks. Weaning from mechanical venti-

Table 5 Training and educational profile of the physiotherapists

Diploma	
University graduates	56%
Post-graduate specialisation	
ICU therapy	29%
Respiratory therapy	43%
Involvement	
Clinical investigations	41%
Seminars	72%
Training of students	89%

Table 6 Clinical scenario. Example: A patient is being weaned with a T-tube 40%, blood gases are: pH 7.4 – PaCO₂ 40 Torr (5.3 kPa) – PaO₂ 100 Torr (13.3 kPa). What do you do?

Wait for medical instructions	36%
Call the doctor and suggest he/she should extubate the patient	25%
Call the doctor and suggest the nurse should extubate the patient	11%
Call the doctor and ask whether you can extubate the patient	21%
Extubate the patient and tell the doctor later	2%

lation was only exceptionally, or never, supervised by physiotherapists in Sweden, The Netherlands, and Switzerland, while in Germany and the United Kingdom 25% of respondents said that physiotherapists supervised weaning, and in Belgium and Portugal this figure rose to 53 and 57%, respectively ($P < 0.01$). Overall only 25% of respondents stated that physiotherapists in their unit extubated patients, but this figure was largely due to the high percentages in Belgium (53) and the United Kingdom (34) ($P < 0.01$ vs. other countries). Only 13% of respondents reported that physiothera-

pists were involved in adjusting mechanical ventilation, and again this was most common in Belgium (40%, $P < 0.01$ vs. other countries). Involvement in the implementation and supervision of NIV was reported by 46% of respondents.

While there were clear differences in professional involvement according to country, the numbers of physiotherapists working in the ICU also made a difference. In ICUs with four or more physiotherapists working exclusively in the ICU, respondents stated that physiotherapists more often extubated patients, and were more often involved in the adjustment of mechanical ventilation, in the supervision of weaning from mechanical ventilation, and in the implementation and supervision of NIV (Table 4), than in units with fewer exclusive physiotherapists (all $P < 0.05$).

Overall the respondents reported that there were equal numbers of university and non-university graduate physiotherapists, but more respondents in Belgium, the United Kingdom, and Portugal stated that physiotherapists were university graduates than in the other countries ($P < 0.01$). Thirty respondents (29%) had a specific postgraduate specialization in ICU therapy, and 44 (43%) had a postgraduate specialization in respiratory therapy (Table 5). Postgraduate specialization was especially common in the United Kingdom (71% intensive care therapy, 82% respiratory therapy, $P < 0.05$ vs. other countries).

Forty-two respondents (41%) were involved in clinical investigation, most often in Belgium (71%) and the United Kingdom (59%), 73 (72%) in seminars, and 90 (89%) in student training.

Four clinical situations were presented to the respondents to assess their autonomy. Concerning the adjustment of mechanical ventilation, clinical status during weaning (Table 6), and tracheal suctioning, the most common responses were "wait for medical instructions" or "call the physician and ask his/her opinion."

Discussion

Remarkably little literature exists regarding the ICU physiotherapist. In guidelines published by the ESICM [12], one dedicated physiotherapist per 12 beds is considered desirable in low-care units and essential in medium- to high-care units (defined as units with a nurse:patient ratio greater than 1:1.6), and in a report from the American College of Critical Care Medicine it is considered essential that a respiratory therapist be available to the ICU at all times [13]. Our study shows that the provision of ICU physiotherapists in Europe falls short of these recommendations, varying widely with one in four ICUs having no exclusive physiotherapist, and two in three having no physiotherapist available at night.

We acknowledge that the response rate to our questionnaire was low (22%). In a questionnaire survey of pulmonary rehabilitation programs by Kida et al. [14] the response rate was 40% in Europe, but the questionnaire was sent to the medical directors about their rehabilitation program, rather than to individual physiotherapists, which may account for the higher response rates. Our aim was to establish direct contact with the professionals involved in physiotherapy practice in the ICU, and as no lists of ICU physiotherapists exist in Europe, we used doctor members of the ESICM as our point of contact, although we realise that this may have resulted in a lower response rate than if we had been able to send the questionnaires directly to named physiotherapists. Questionnaire studies also always carry an intrinsic selection bias in that only the most motivated bother to respond. However, we received responses from a broad selection of countries and hospital types and size; we therefore believe we have achieved a fair cross-section of European ICU physiotherapists. Despite these potential limitations on the interpretation of the data obtained, we thus believe this questionnaire provides an important initial insight into the role of the physiotherapist in western European ICUs.

One interesting facet of European ICU physiotherapy is that virtually every physiotherapist performs both respiratory therapy and mobilization (physical) therapy. This is in contrast to the usual situation in the United States, where the two therapies are well separated and performed by different persons. As observed by Nava et al. [15], in Europe the physiotherapist performs the same role as a respiratory therapist with involvement in the weaning process and the administration of NIV, as well as the more traditional rehabilitation procedures. According to the results of our survey, some post-graduate specialisation does exist in respiratory therapy but it is still very localised (mostly in the UK).

Although there are few published reports on the effectiveness of physiotherapy in the critically ill, available data support a positive role for the ICU physiotherapist, particularly in high-risk patients. Ciesla [16] noted that the efficacy of chest physiotherapy has been well demonstrated, resulting in a reduced incidence of pulmonary infection and improved pulmonary function. Ntoumenopoulos et al. [17] reported a trend to reduced nosocomial infections in mechanically ventilated trauma patients treated with manual lung hyperinflation and postural drainage compared to patients receiving no lung physiotherapy. Schwartz Cowley et al. [18] stressed the value of the physiotherapist as part of a rehabilitation team for trauma patients. These authors suggest that early intervention by such a team, could preserve organ system function, prevent secondary medical complications, and restore function. Others have empha-

sised the important role of the physiotherapist in pulmonary rehabilitation programs [14].

Several studies have been conducted on the role of the physiotherapist in weaning patients from mechanical ventilation. Cohen et al. [6] suggested that a “team approach” to weaning, with the team composed of a physician, a respiratory therapist, and the bedside nurse, reduced the duration and cost of mechanical ventilation and improved the weaning success rate. Ely et al. [9] suggested that daily screening of respiratory function by the respiratory therapist, with trials of spontaneous breathing in appropriate patients, could reduce the duration of mechanical ventilation and the cost of intensive care, and was associated with fewer complications than standard care. More recently Horst et al. [11] reported that protocol-based weaning by respiratory therapists leads to more rapid extubation and reduced hospital stays than physician-directed weaning. Hall et al. [19] suggested that the presence of a physiotherapist in the weaning team is associated with reduced patient anxiety. Other groups have also documented the benefits of including a physiotherapy on the weaning team [7, 10, 20], although these studies have been conducted almost exclusively in hospitals in the United States.

Physiotherapists may also be involved in the monitoring and adjustment of NIV, a process requiring considerable time input [21], and constant availability, particularly at initiation. As for involvement in weaning, it was therefore not surprising that there was greater physiotherapy involvement in NIV in units with more exclusive ICU physiotherapists. Adequate training and experience of the health professionals involved are important for the success of this technique [22], and Meduri et al. [23] suggested that a systematic educational program instituted by a dedicated physiotherapist is necessary to successfully implement this form of treatment.

Although the data presented here are scarce, such studies are important in identifying differences in ICU format and organisation within and between countries. Legal differences between countries may also exist, influencing the autonomy of physiotherapists, and accounting for some of the differences seen in our survey. Such differences clearly need to be examined, and the role of the physiotherapist across Europe better defined and standardised. From our results it is apparent that many European ICUs have insufficient physiotherapist input as defined by international guidelines. By increasing the numbers of physiotherapists exclusively dedicated to intensive care, their involvement in rehabilitation teams, in the processes of weaning and NIV, etc, could be expanded, providing benefits for patients and other members of the ICU team. Further studies evaluating the ICU physiotherapist’s role are clearly indicated, and results used to encourage improved staffing levels across Europe.

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Appendix: questionnaire

Medical environment

1. In which country do you live?
Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, The Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom
2. How would you best describe your hospital?
University hospital, university-affiliated hospital, community hospital
3. What is the total number of beds in your hospital?
< 250, 250–400, 401–700, > 700
4. What is the total number of intensive care beds in your hospital?
< 8, 8–14, 15–24, > 24
5. How many beds are there in your intensive care unit (ICU)?
< 6, 6–8, 9–12, 13–18, > 18
6. How can you best describe your ICU?
Medical, surgical, pediatric, medicosurgical, other
7. Of the total number of patients admitted to your ICU, children represent what percentage?
0%, < 10%, 10–30%, > 30%
8. How many physiotherapists work in the hospital?
< 10, 10–20, 20–30, > 30
9. How many physiotherapists work as hospital employees?
0%, 1–50%, 51–99%, 100%
10. How many physiotherapists work exclusively in your ICU (total)?
0, 1–2, 3–4, > 4
11. How many full-time equivalent physiotherapists work in the ICU?
0, 1–2, 3–4, > 4
12. Are there physiotherapists available in the ICU during the night?
yes, exceptionally, no
13. Are there physiotherapists available in the ICU at the weekend?
Yes, exceptionally, no
14. Is there a Department of Physiotherapy including all the hospital physiotherapists?
Yes, no
15. If yes, who is responsible for this Department?
A physiotherapist, a physician, a nurse
16. Do physiotherapists play an active role in:
(yes, exceptionally, no – for each activity)

- Respiratory therapy (postural drainage, chest percussion, breathing exercises)
 - Airway suctioning
 - Intubation
 - Extubation
 - Mobilization
 - Positioning
 - Adjustment of mechanical ventilation
 - Supervision of weaning from mechanical ventilation
 - Implementation and supervision of noninvasive ventilatory support (continuous positive airway pressure, mask intermittent positive pressure ventilation)
 - Measurement of ventilatory mechanics
 - Metabolic measurements
17. In your ICU are physiotherapists non-university graduates?
18. In your ICU are physiotherapists university graduates?
19. How long are the specific studies in physiotherapy?
2 years, 2–4 years, > 4 years
20. Do you have a postgraduate specialization in intensive care therapy?
21. Do you have a postgraduate specialization in respiratory therapy?
22. Are you involved in:
(yes, no – for each question)
- Training of physiotherapy students
 - Clinical investigation
 - Seminars in your hospital
 - Animal investigation
23. If any, what are your main topics of investigation?
(asked to select a first and second choice from the list)
- Respiratory therapy
 - Hemodynamics
 - Neurosurgery
 - Physical therapy
 - Coronary care
 - Ventilatory mechanics
 - Metabolic
 - Noninvasive mechanical ventilation
 - Others
- Clinical situations
24. A patient has a pressure support of 12 cmH₂O and FiO₂ 40%, blood gases are: pH 7.30, PaCO₂ 50 Torr (6.7 kPa), PaO₂ 60 Torr (8 kPa). What do you do?
(select one)
- Wait for medical instructions.
 - Call the physician and ask for instructions.
 - Call the physician and suggest that he/she should increase the level of pressure support.
 - Change the level of pressure support and immediately call the physician to inform him/her.
 - Change the level of pressure support and tell the physician later.
25. A patient is being weaned with a T-tube 40%, blood gases are: pH 7.4, PaCO₂ 40 Torr (5.3 kPa), PaO₂ 100 Torr (13.3 kPa). What do you do?
- Wait for medical instructions.
 - Call the physician and suggest that he/she should extubate the patient.
 - Call the physician and suggest that the nurse should extubate the patient.
 - Call the physician and ask whether you can extubate the patient.
 - Extubate the patient and tell the physician later.
26. A patient is weaned on a T-tube (FiO₂ 40%), and an arterial catheter is placed. Ten minutes later you observe tachycardia, sudation, pallor. The pulse oximeter indicates SaO₂ 90%. What do you do?
- Wait for medical instructions.
 - Call the physician and ask his/her instructions.
 - Draw a blood gas sample for analysis and call the physician with the results.
 - Put the patient back on mechanical ventilation before calling the physician.
27. After respiratory treatment, a nonintubated patient is unable to cough adequately and retains secretions. What do you do?
- Ask the physician to aspirate the patient's trachea.
 - Ask the physician to be present while you perform tracheal suction.
 - Suggest that the nurse aspirate the patient's trachea.
 - Decide to perform tracheal suctioning by yourself.

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