Minimum standards of clinical practice for physiotherapists working in critical care units in Ireland: a modified Delphi technique

Abstract

Introduction: Physiotherapists in Irish hospitals with critical care units deliver physiotherapy services 24 hours a day, 7 days a week. There is a perceived lack of consistency in the level of clinical competence, required skills and content of training between hospitals, compounded by the absence of a national policy, procedure or clinical framework for physiotherapists working in critical care. The study aimed to identify the minimum standards of clinical practice expected of physiotherapists working in critical care settings in Ireland.

Methods: A modified Delphi technique was used to survey a panel of senior and clinical specialist physiotherapists working in critical care units in Ireland to obtain consensus of items. The questionnaire of 214 items was completed over three rounds. Items were determined 'Essential/Not Essential/Unsure' by participants. Items that did not reach consensus were included in the subsequent round with additional items suggested by participants.

Results: 25/46(54%) physiotherapists completed the first round, with 17 and 13 completing round 2 and round 3 respectively. A total of 220 items were included, 120 of which were deemed essential for a minimum standards of independent clinical practice in Irish critical care units. 56 items were considered not essential while consensus was not reached on 44 items.

Conclusions: This study identified 120 items of knowledge and clinical skills considered essential as a minimum standard by physiotherapists working in Irish critical care units. Further discussion is required to determine how these results

can be applied to guide clinical practice for physiotherapists working in critical care in Ireland.

Key Words:

Critical care; physiotherapy; on-call; minimum standards; education

Introduction

Critically ill patients are usually cared for in a High Dependency Unit (HDU) or Intensive Care Unit (ICU) [1]. Physiotherapists in Irish hospitals with critical care units deliver physiotherapy services 24 hours a day, 7 days a week [1]. This is achieved by provision of physiotherapists working on call during evenings and weekends. On call working requires all physiotherapy staff to maintain a level of competence in the management of patients in critical care, irrespective of clinical specialty or primary area of practice [1, 2]. Competence to work in critical care is subjective to both the physiotherapist undertaking the training and their educator. The authors clinical experience and peer discussion through national respiratory groups indicates that both training to work in critical care and clinical practice may vary between hospitals. The perceived lack of consistency in the level of clinical competence, required skills and content of training between hospitals is compounded by the absence of a national policy, procedure or clinical framework for physiotherapists working in critical care. Previous research found clinically important differences in the treatment administered by the critical care physiotherapist compared with the on-call physiotherapists including duration of

assessment, treatment selection and execution [3]. This indicates a need to standardise training.

Existing research suggests there is international interest in exploring the minimum clinical standards required of physiotherapists to work in critical care with studies conducted in Australia and New Zealand, the United Kingdom (UK), Japan and South Africa [4-7]. Skinner et al [4] used a modified Delphi technique to investigate the minimum standards of clinical practice expected of physiotherapists working in critical care in Australia and New Zealand. An expert panel of physiotherapists completed three rounds of questionnaires to identify the required clinical skills. Twose et al [5] and Takahashi et al [6] replicated the study investigating the clinical standards expected in the United Kingdom and Japan respectively. The study conducted in South Africa [7] investigated the minimum standards required for physiotherapists working in critical cares, adopting qualitative methodology completing focus group sessions with experienced physiotherapists, both clinicians and academics [8]. While the study conducted in South Africa [7] differed in design to the Australasian, UK and Japanese studies [3-5] all studies identified the need to develop national standards and clinical frameworks to support education and reduce variability in clinical practice.

The differences in health service provision, pre-registration physiotherapy education and post-graduate training make it difficult to apply the results of the previous studies to the Irish setting. Therefore the aim of this study was to identify the minimum standards of clinical practice expected of physiotherapists working in critical care settings in Ireland. The objectives of this study were to gain a professional consensus of the minimum standards of clinical practice for

physiotherapists working in critical care in Ireland, to understand the clinical skills expected of a physiotherapist to work independently in a critical care setting in Ireland and to compare the minimum Irish standards with those of Australia and New Zealand, the UK and Japan.

Methods

Ethical considerations

The study was reviewed and approved by the Nursing and Health Research Ethics Filter Committee, Ulster University and the Clinical Research Ethics Committee, Galway University Hospital. A participant information sheet was provided to participants outlining the purpose and methodology of the study. Informed consent was assumed by completion of the questionnaires in each round. All data collected was anonymised in adherence with Ulster University General Data Protection Regulation (GDPR) guidelines [9].

Research Design

A modified Delphi technique was used in this study. The Delphi technique is a process used to establish a consensus by surveying a panel of experts through a series of questionnaires [10, 11]. The expert's responses may change as survey rounds are completed based on the information provided by the other panellists thus, establishing a true consensus by the end of the process [11, 12]. For the purpose of this study the modified Delphi technique that was used in previous studies [4-6] was replicated for this study in order to be consistent and enable

comparison of results later. A structured questionnaire of 214 items was used in the opening round with an open field for comments below each questionnaire item. This allowed for refinement of questionnaire items, the addition of new items and definitive consensus by the panel of experts.

Recruitment and Participants

Senior and clinical specialist physiotherapists working in critical care were recruited to create the expert panel. All 26 public hospitals listed in the National Adult Critical Care Capacity and Activity Census [13] with critical care units in Ireland were contacted by telephone in order to identify potential participants to receive the recruitment email. Additional participants were identified through snowball recruitment. Eligibility for recruitment was based on the inclusion and exclusion criteria. Senior or clinical specialist physiotherapist predominantly working in critical care were included while physiotherapists working in higher education institutions, senior or clinical specialist physiotherapists not working in critical care, staff grade physiotherapists, physiotherapy assistants and physiotherapy students were excluded from the study. Recruitment was sought by an email including the participant information sheet. A pre-determined sample size was not determined to allow as many physiotherapists as possible participate [4-5, 12].

Questionnaire

The same survey design as the Australia and New Zealand, UK and Japanese research was used to allow for comparison of data [4-6]. Permission for use of the questionnaire was sought from Twose et al [5]. The questionnaire was

reviewed to ensure the wording was appropriate for the Irish setting. Prior to commencing a pilot of the questionnaire and study procedure was completed with two senior physiotherapists that were not recruited to the study. Feedback was sought and no alterations were required. The survey questionnaire was developed with the intention of being as expansive as possible across the skills and knowledge required of a physiotherapist working in critical care [4]. The 214 questionnaire items were comprised of common critical care clinical conditions, physiotherapy assessments and treatments in a critical care setting. Participants were asked to grade each questionnaire item on the survey as "essential" for clinical practice, "not essential" for clinical practice or "unsure". Participants were invited to submit additional items thought to be required for clinical practice in critical care in Ireland in Rounds 1 and 2. Suggested items were added to the subsequent rounds for consensus opinion from the panel.

Procedure

Three rounds of questionnaires were administered to participants. Each round of the questionnaires were completed within 3 weeks. Questionnaires were disseminated electronically via SurveyMonkey™ (SurveyMonkey, Inc, San Mateo, CA, USA) [14], an online survey software package. Electronic reminders were sent to non-responders 1 and 2 weeks after the initial invite to encourage response. In the first round, demographic data was sought to characterise participants. Between each round, participants were sent a personalised report containing quantitative group results, qualitative feedback, and the participant's own responses for comparison purposes.

Items were determined as essential or non-essential once consensus was reached. Consensus for the purpose of this study was defined as >70%, in keeping with previous research [4-6] to allow for comparison of findings. When the threshold of >70% consensus was reached, for either essential or non-essential, the item was removed from the successive rounds of questionnaires. Items where consensus was not reached were included in the subsequent round. Additional items suggested in Rounds 1 and 2 were cross-referenced against existing survey items, and were only included in following rounds when they did not duplicate an already administered item.

In keeping with the UK study [5], and to ensure the final consensus was not biased by 'unsure' responses, consensus was calculated using three potential denominators; 1. Total number of participants completing survey 2. Total number of responses excluding missing answers and 3. Total number of definite 'essential' or 'not essential' responses, excluding unsure responses. To be included as essential or not essential, consensus of 70% was required for all three calculations.

Commented [MOU1]: What happened to the unsure responses.

Analysis

Survey responses were downloaded from Survey Monkey™. Data analysis was primarily descriptive. Open comments were collated, themed by one researcher and anonymised for the purpose of the personalised reports. Data was exported from Survey Monkey™ and analysed using Microsoft Excel™. Data is presented as n=(%) unless otherwise specified.

Commented [MOU2]: Can you provide further information on this thematic analysis? How many researchers did it?

Results

(Insert Figure 1 and Table 1 here)

Participants

54% of physiotherapists (25/46) who were invited to participate completed round 1 to create the survey panel. Round 2 was completed by 68% of participants (17/25) and 52% (13/25) completed round 3. Participants represented all seven hospital groups in Ireland and 1 private hospital (Table 1). They had an average of 15 years post graduate experience, with 13 years in critical care. Post graduate education to Masters level had been completed by 24% (6/25).

(Inset Figure 2 here)

Consensus

Figure 2 shows the progress of items through the three rounds of the survey. Round 1 surveyed the participants on 214 items, of which consensus was not determined on 77 items. Round 2 consisted of these 77 items and an additional 5 items suggested by participants in round 1. Round 3 consisted of 50 items where consensus had not been reached and one additional item. Following the 3 rounds, 120 items were considered 'Essential' by the panel (Table 2), 56 'Not Essential' (Table 3) and consensus was not be reached on 44 items. Table 4 shows the items where consensus was not reached as well as the percentage of participants who deemed the item 'Essential'.

(Insert Table 2, Table 3, and Table 4 here)

Comments

During the round 225 comments were made by participants regarding the questionnaire items. The comments were collated, anonymised and the content themed. The five most common themes are observed were “Basic understanding/recognition/awareness/interpretation” required (n=65) “Item is specific to Unit/Hospital” (n=58) “Not seen/used in practice” (n=35) “Item (Assessment/Technique) is performed/lead by other members of the multi-disciplinary team” (n=22) “Not essential for on call working” (n=21). Additional comments were “As part of/ in collaboration with the multidisciplinary team” (n=7) “Need to be aware local infection control procedures/implications” (n=3) “Specialist skill” (n=3) and “Infrequent use” (n=2). It was acknowledged that “Imaging is reported” (n=8) with regard to radiological imaging.

Discussion

There is an international interest in exploring the minimum clinical standards required for physiotherapists to work in critical care [4-7]. Currently in Ireland there is no national clinical framework for physiotherapists working in critical care. The aim of this study was to identify the minimum standards of clinical practice expected of physiotherapists working in critical care settings in Ireland. The findings provide the first step towards the development of a minimum standards informed framework for physiotherapists working in critical care settings in Ireland by identifying 120 essential items. The study participants had substantial critical care experience, all had delivered on call training within the last 3 years, and all seven hospital groups in Ireland were represented.

In accordance with previous research [5], three survey rounds were used to achieve final consensus. This was to ensure the final result would not be biased by 'unsure' responses or unanswered questions. The decision to use 70% as the criteria for consensus was based on previous studies [4-6]. A number of items came close to achieving essential or not essential consensus but did not meet 70% on all three calculations, and therefore were classed as not reaching consensus. The threshold of 70% was a potential limitation of the study. For example, 'End Tidal Carbon Dioxide', 'Neutrophil Count' and 'An ability to perform a neurological examination of motor and sensory functions' achieved 69% consensus in the third round and was determined as 'consensus could not be reached'. Choosing a threshold is helpful for providing direction about the essential items. However as with this example, when consensus cannot be reached this result does not direct a definitive decision to exclude items from training.

It was anticipated that tertiary services, such as neurosurgery and extra-corpeal membrane oxygenation (ECMO), would be deemed not essential as these services are not commonly available in most critical care units in Ireland, yet most participants commented on the awareness of these as essential. Comments regarding these items did however explain these choices e.g. 'Specific to Unit/Hospital' or 'Not seen/used in this hospital'. All comments that participants provided were categorised into themes. The most common theme was "Basic understanding/ recognition/ awareness/ interpretation required". This demonstrated participants' reluctance to determine an item either essential or not essential as for the most part, these comments occurred when a participant replied "unsure". The theme of 'performed/lead by other members of the multi-

disciplinary team' was observed with physiotherapists identifying the involvement of a Speech and Language therapist with respect to 'swallow assessment' and tracheostomy care, and an Occupational Therapist in splinting.

A number of other differences compared to the previous four studies have been identified. Australia/New Zealand [4] and UK [5] both determined manual hyperinflation (MHI) essential and could not reach consensus on ventilator hyperinflation (VHI), while the Irish study found the opposite. Additionally, the use of non-invasive ventilation (NIV) was determined essential by the Irish study but not essential or no consensus by the Australia/New Zealand, UK or Japanese studies. As six years have passed between the Australia/New Zealand and this study, changes in clinical practice in that time may account for some of the different outcomes. The Japanese study [6] found oxygen therapy, VHI, MHI, nasopharyngeal suctioning and oropharyngeal suctioning not essential as physiotherapists are not permitted to perform these interventions in Japan. This highlighted the international differences in clinical practice and the value of conducting this research in individual countries, in contrast there is more harmonisation that differences.

Limitations

It has been suggested that a response rate of 70% in each round is required to ensure rigor [15]. The study failed to reach the desired response rate despite incorporating strategies to optimise recruitment and retention including identifying at least one contact physiotherapist for each hospital prior to issuing the survey, issuing personalised reports, sending regular reminder emails and access to each round

of the questionnaire was open for three weeks. However, the study was conducted during the Covid-19 pandemic (February 2021 – May 2021), in which physiotherapists working in critical care were burdened with significant demands, exhaustion and burnout [16]. Response fatigue may have been a factor [17] due to the length of the questionnaire (214 items in Round 1). The largest drop off in participants was observed from Round 1 to Round 2 [18]. The Delphi process requires continued commitment from participants to maintain involvement until the process is completed [12]. Increasing non response is common in panel surveys and decreased engagement can increase with subsequent rounds [19, 20]. Respondents may give less thoughtful answers or withdraw participation prior to completion of the study [21]. It was observed that fewer comments were received in the later rounds of this study.

Another limitation of the study design is the focus on the "technical competence" of the skill rather than the physiotherapists' clinical reasoning of appropriateness and application of the skill; this was also acknowledged by Skinner et al [4]. Equally, they must recognise the limitations of their knowledge and practice and seek help when necessary. As experience informs practice, additional training or co-working with senior colleagues may prove beneficial in supporting practice and developing clinical reasoning [24].

Consideration is now required as to how the items identified as essential for clinical practice in this study could be used to inform critical care practice and education, and the development of competency standards for physiotherapists, similar to that of critical care nurses in the UK [29].

Conclusion

This study identified 120 items as essential for a minimum standard of independent clinical practice in critical care units in Ireland. Given the low response rate confirmation of these items and further research may be required before a standard of competency can be developed. The results of this study represent a starting point to inform further discussion and research towards standardising practice for physiotherapists working in critical care in Ireland.

Acknowledgements

The authors would like to thank Paul Twose for supporting this study and for sharing the questionnaire and research design. The authors would like to acknowledge Elizabeth H Skinner, Peter Thomas, Julie C Reeve and Shane Patman for the development of the original questionnaire. The authors would also like to thank all those who gave their time to complete the questionnaire surveys.

Ethical Approval

Ethical approval for this study was provided by Ulster University Institute of Nursing and Health Research Filter Committee and Galway University Hospitals Clinical Research Ethics Committee (Ref: C.A. 2554).

Funding

This research did not receive any specific grant funding from agencies in the public, commercial, or not-for-profit sectors.

Conflicts of Interests

The authors declared no potential conflicts of interests.

References

1. National Clinical Programme for Critical Care. “Right Care, Right Now” Model of Care for Adult Critical Care. 2014. Available from: https://www.hse.ie/eng/services/publications/clinical-strategy-and-programmes/model-of-care-for-adult-critical-care.pdf [Date accessed: 21/06/2021]

2. O’Dowd D, Harte A, O’Sullivan C. Physiotherapists’ attitudes and practices towards physiologic monitor alarms in critical care: A single-centre pilot study. Physiotherapy Practice and Research. 2021; 42(1): 55-60

3. Shannon H, Stocks J, Gregson RK, Hines S, Peters MJ, Main E. Differences in delivery of respiratory treatments by on-call physiotherapists in mechanically ventilated children: a randomised crossover trial. Physiotherapy. 2015;101(4):357-63.

4. Skinner EH, Thomas P, Reeve JC, Patman S. Minimum standards of clinical practice for physiotherapists working in critical care settings in Australia and New Zealand: a modified Delphi technique. Physiotherapy theory and practice. 2016;32(6):468-82.

5. Twose P, Jones U, Cornell G. Minimum standards of clinical practice for physiotherapists working in critical care settings in the United Kingdom: a modified Delphi technique. Journal of the Intensive Care Society. 2019; 20(2):118-31.

6. Takahashi T, Kato M, Obata K, Kozu R, Fujimoto T, Yamashita K, Ando M, Kawai Y, Kojima N, Komatsu H, Nakamura K. Minimum standards of clinical practice for physical therapists working in intensive care units in Japan. Physical Therapy Research. 2020:E10060.

7. Van Aswegen H, Patman S, Plani N, Hanekom S. Developing minimum clinical standards for physiotherapy in South African ICUs: a qualitative study. Journal of evaluation in clinical practice. 2017;23(6):1258-65.

8. Plani N, van Aswegen H, Patman S, Hanekom S. Developing minimum clinical standards for physiotherapy in South African intensive care units: a mixed method approach. European Journal of Physiotherapy. 2017 Oct;19(sup1):31-3.

9. Ulster University. GDPR at Ulster University. [Internet] Available from: https://www.ulster.ac.uk/about/governance/compliance/gdpr [Date accessed 17/06/2021]

10. Duffield C. The Delphi technique: a comparison of results obtained using two expert panels. International journal of nursing studies. 1993;30(3):227-37.

11. Hsu CC, Sandford BA. The Delphi technique: making sense of consensus. Practical Assessment, Research, and Evaluation. 2007;12(1):10.

12. Hasson F, Keeney S, McKenna H. Research guidelines for the Delphi survey technique. Journal of advanced nursing. 2000;32(4):1008-15.

13. Health Service Executive. National Adult Critical Care capacity and Activity Census. 2016. Available from: https://www.hse.ie/eng/services/publications/clinical-strategy-and-programmes/critical-care-capacity-and-workforce-census-2016.pdf [Date accessed: 21/16/2021]

14. Survey Monkey. [Internet] Available from: https://www.surveymonkey.com/ [Date accessed: 21/16/2021]

15. Sumsion T. The Delphi technique: an adaptive research tool. British Journal of Occupational Therapy. 1998;61(4):153-6.

16. Crowley P, Hughes A. The impact of COVID-19 pandemic and the societal restrictions on the health and wellbeing of the population, and on the health service capacity and delivery: A plan for healthcare and population health recovery. 2021. Available from: https://www.hse.ie/eng/about/who/qid/covid-19-qi-learning/qi-resources-to-support-learning-from-covid19/covid-19-pandemic-impact-paper-2021.pdf [Date accessed: 21/16/2021]

17. Egleston BL, Miller SM, Meropol NJ. The impact of misclassification due to survey response fatigue on estimation and identifiability of treatment effects. Statistics in medicine. 2011;30(30):3560-72.

18. Gargon E, Crew R, Burnside G, Williamson PR. Higher number of items associated with significantly lower response rates in COS Delphi surveys. Journal of clinical epidemiology. 2019;108:110-20.

19. Porter SR, Whitcomb ME, Weitzer WH. Multiple surveys of students and survey fatigue. New directions for institutional research. 2004;2004(121):63-73.

20. Field A. Survey fatigue and the tragedy of the commons: Are we undermining our evaluation practice? Evaluation Matters — He Take Tō Te Aromatawai 6: 2020 Available from: https://www.nzcer.org.nz/system/files/journals/evaluation-maters/downloads/EM_Field_OF.pdf [Date accessed: 21/16/2021]

21. O'Reilly-Shah VN. Factors influencing healthcare provider respondent fatigue answering a globally administered in-app survey. PeerJ. 2017;5:e3785.

22. McKee G, Cronin C, Vasquez P, Burke D, O'Flaherty D. The physiotherapy experience of managing patients with COVID-19. Physiotherapy Practice and Research. 2020 Jan 1;41(2):95-7.

23. Society for Cardiothoracic Surgery in Great Britain and Ireland. [Internet] Available from: https://scts.org/patients/hospitals?region=73#results [Date accessed: 21/16/2021]

24. Connolly B, Barclay M, Blackwood B, Bradley J, Anand R, Borthwick M, Chikhani M, Dark P, Shyamsundar M, Warburton J, McAuley DF. Airway clearance techniques and use of mucoactive agents for adult critically ill patients with acute respiratory failure: a qualitative study exploring UK physiotherapy practice. Physiotherapy. 2020;108:78-87.

25. Bastick EK, O'Keefe DD, Farlie MK, Ryan DT, Haines TP, Katz N, Knight JL, Saber KJ, Strugess TR, Skinner EH. Postgraduate clinical physiotherapy education in acute hospitals: a cohort study. Physiotherapy theory and practice. 2018; 36:157-169

26. Jünger S, Payne SA, Brine J, Radbruch L, Brearley SG. Guidance on Conducting and REporting DElphi Studies (CREDES) in palliative care: recommendations based on a methodological systematic review. Palliative medicine. 2017;31(8):684-706.

27. Hanekom S, Van Aswegen H, Plani N, Patman S. Developing minimum clinical standards for physiotherapy in South African intensive care units: the nominal group technique in action. Journal of evaluation in clinical practice. 2015;21(1):118-27.

28. Potter M, Gordon S, Hamer P. The nominal group technique: a useful consensus methodology in physiotherapy research. New Zealand Journal of Physiotherapy. 2004;32:126-30.

29. National Competency Framework for Adult Critical Care Nurses: Critical Care Network National Nurse Leads. [Internet] Available from: https://www.cc3n.org.uk/step-competency-framework.html [Date accessed: 21/16/2021]

Table 1: Demographic data for participants

	Units	Panel (n=25)
Hospitals	n (%)	
Public Hospitals		24 (96)
Private Hospitals		1 (4)
Current role	n (%)	
Clinical Specialist physiotherapist		7 (28)
Senior physiotherapist		18 (72)
ICU Level	n (%)	
Level 3 Tertiary Services e.g. ECMO, neurosurgery		6 (24)
Level 3 ICU		22 (88)
Level 2 HDU		7 (28)
Years in employed current role	Median (IQR)	6 (1-20)
	Mean	7
Clinical Experience	Median (IQR)	16 (5-24)
	Mean	15
ICU Experience	Median (IQR)	15 (2-24)
	Mean	13
Delivered physiotherapy training within critical care in the past 3 years	n (%)	25 (100)
Highest Qualification	n (%)	
Entry Level		18 (72)
Masters		6 (24)

489 **Table 2: Items deemed 'Essential' (Consensus >70%)**

	Round 1 %	Round 2 %	Round 3 %
As a minimum standard a physiotherapist is aware of key literature that guides evidence based physiotherapy practice in critical care settings	76		
As a minimum standard a physiotherapist can understand equipment (including recognition of equipment), use/safety apply or handle equipment, understand the implications for physiotherapy of:			
Oxygen therapy devices	100		
Endotracheal tubes and tracheostomy	100		
Central venous catheters	88		
Arterial lines	96		
Intercostal catheters	100		
Wound drains	88		
Indwelling urinary catheter	92		
Vascath / haemodialysis catheter / continuous veno-venous haemofiltration	76		
Nasogastric tubes	84		
As a minimum standard a physiotherapist can accurately interpret readings from clinical monitoring including:			
Body temperature	100		
Heart rate	100		
Blood pressure	100		
Basic ECGs	64	59	77
SpO2 / pulse oximetry	100		
Fluid intake and output	80		
	Round 1 %	Round 2 %	Round 3 %

As a minimum standard a physiotherapist can accurately interpret findings from laboratory investigations including:			
Haemoglobin	100		
Platelets, APTT, INR	88		
Troponin	88		
White cell count	100		
C-reactive Protein	84		
Sputum cultures	72		
D Dimers	*	71	
As a minimum standard a physiotherapist is aware of the actions and implications for physiotherapy of the following medications:			
Vasopressors / inotropes	100		
Anti-hypertensives	88		
Anti-arrhythmia	92		
Sedation and neuromuscular paralysing agents	100		
Bronchodilators	96		
Mucolytics	84		
Anti-coagulants	*	88	
As a minimum standard a physiotherapist can independently interpret findings from imaging investigations (excluding the imaging report) including:			
Chest radiographs	84		
As a minimum standard a physiotherapist can interpret the results from neurological equipment/examinations and functional tests including:			
An ability to interpret a Glasgow Coma Score (GCS)	92		

	Round 1 %	Round 2 %	Round 3 %

As a minimum standard a physiotherapist can perform and accurately interpret the results of common respiratory examinations including:			
Observation of respiratory rate	96		
Patterns of breathing	96		
Palpate the chest wall	96		
Auscultation	92		
As a minimum standard a physiotherapist understand the key principles of providing the following differing modes of mechanical/assisted ventilation including:			
CPAP	92		
PEEP / EPAP	92		
PS / IPAP	92		
SIMV (volume)/(pressure)	92		
Assist-Control (AC)	88		
Pressure-Regulated Volume Control	84		
Bi-level	88		
Weaning protocols	64	71	
As a minimum standard a physiotherapist can assess and interpret mechanical ventilation settings/measurements including:			
Respiratory rate	92		
Tidal volume	92		
Breath types (spontaneous, mandatory, assisted)	92		
The levels of FiO2	92		
The levels of PEEP	92		
The levels of PS	92		
Peak inspiratory pressure	92		
	Round 1 %	Round 2 %	Round 3 %

As a minimum standard a physiotherapist can:			
Assess the effectiveness / quality of a patient's cough	92		
Change the inner cannula of a tracheostomy	*	88	
As a minimum standard a physiotherapist can interpret indices from blood gas measurement including:			
pH	92		
PaCO2	92		
PaO2, SpO2, SaO2	92		
PaO2/FiO2 ratio	80		
HCO3	80		
Lactate	56	76	
As a minimum standard a physiotherapist can complete musculoskeletal and/or functional assessments including:			
Manual Muscle testing	88		
Dynamometry	64	71	
Range of motion	88		
Ability to assess tone and reflexes	88		
Deep vein thrombosis screening	80		
Peripheral oedema	76		
Objective measures of physical function	64	71	
As a minimum standard a physiotherapist understands pathophysiology and presenting features, likely medical management and implications for physiotherapy for a range of conditions including:			
Respiratory failure Type I and II	92		
Community acquired/nosocomial/hospital-acquired pneumonia	88		

	Round 1 %	Round 2 %	Round 3 %
Pleural effusion	88		

Obstructive respiratory disease	92		
Restrictive respiratory disease	92		
Suppurative lung diseases	88		
Acute lung injury/acute respiratory distress syndrome	92		
Acute coronary syndrome	92		
Shock (cardiogenic)	80		
Heart failure	76		
Post-cardiac surgery	64	71	
Post-thoracic surgery	64	71	
Post-abdominal surgery	88		
Renal failure: acute and chronic	72		
Immunocompromise	80		
Systemic inflammatory response syndrome	60		
Shock (septic)	84		
Multi-organ failure	84		
ICU Acquired weakness (ICU-AW)	80		
Guillain-Barre Syndrome	64	82	
Thromboembolic disease	88		
Intracerebral haemorrhage/Subarachnoid haemorrhage	76		
Traumatic Brain Injury	76		
Chest Trauma	84		
Polytrauma	76		
Spinal Cord Injury	76		
End of life	*	88	

	Round 1 %	Round 2 %	Round 3 %
As a minimum standard a physiotherapist can provide the following techniques, including an understanding of the			

implications, contraindications, evidence for the technique and progressions:			
Oxygen therapy	92		
Humidification	88		
Active Cycle Breathing Technique	92		
Manual airway clearance techniques	92		
Positive pressure devices for airway clearance	68	82	
Oscillating positive expiratory pressure devices for airway clearance	84		
Periodic/intermittent CPAP including initiation and titration of settings	56	71	
NIV / BiPAP - for Type I or Type II respiratory failure, initiation and titration of settings	60	76	
NIV / BiPAP - intermittent, short term applications during physiotherapy to assist secretion mobilisation techniques or lung recruitment including initiation and titration of settings	52	76	
NIV / BiPAP - for use during exercise or mobilisation including initiation and titration of settings	48	65	77
Manual inexsufflator-exsufflator (Cough assist)	76		
Supported coughing	84		
Directed coughing/instructing the patient to cough effectively	92		
Assisted coughing - chest wall	88		
Ventilator hyperinflation (VHI) via an endotracheal tube or tracheostomy	76		
Nasopharyngeal airway suctioning, including insertion of NP airway	80		
Oropharyngeal airway suctioning, including insertion of OP airway	92		
	Round 1 %	Round 2 %	Round 3 %
Suction via a tracheal tube	92		

Patient positioning for respiratory care	92		
Patient prone positioning in severe respiratory failure / acute lung injury	72		
Patient positioning for prevention of pressure ulcers, management of tone, maintenance of musculoskeletal function	76		
Mobilisation of non-ventilated patient	92		
Mobilisation of ventilated patient	80		
Bed exercises	88		
Early mobility protocols	*	*	92
As a minimum standard a physiotherapist can appropriately request/co-ordinate the following:			
Titration of analgesia to achieve physiotherapy goals	88		

(* item added during subsequent round)

Table 3: Items deemed 'Not Essential' (Consensus >70%)

	Round 1 %	Round 2 %	Round 3 %

As a minimum standard a physiotherapist can understand equipment (including recognition of equipment), use/safety apply or handle equipment, understand the implications for physiotherapy of:			
Extra-corporeal membrane oxygenation (ECMO)	48	65	92
Sengstaken-Blakemore / Minnesota tubes (balloon tamponade)	44	71	
As a minimum standard a physiotherapist can accurately interpret readings from clinical monitoring including:			
Advanced ECG's (i.e. conduction blocks, 12-lead ECG)	88		
Nutritional status including feed administration, volume and type	72		
As a minimum standard a physiotherapist can accurately interpret findings from laboratory investigations including:			
Haematocrit	68	82	
Creatinine Kinase (CK)	48	71	
Procalcitonin (PCT)	80		
Liver function tests e.g. ALT, LDH, Bilirubin	48	76	
As a minimum standard a physiotherapist is aware of the actions and implications for physiotherapy of the following medications:			
Prostacyclin	80		
As a minimum standard a physiotherapist can independently interpret findings from imaging investigations (excluding the imaging report) including			
CT-Brain	64	71	
CT - Chest	60	76	
CT - Spine	68	76	
MRI - Brain	68	76	
MRI – Spine	72		

	Round 1 %	Round 2 %	Round 3 %
MRI - Chest	68	71	

Ultrasound – Chest	84		
As a minimum standard a physiotherapist can interpret the results from neurological equipment/examinations and functional tests including:			
Electroencephalograms (EEG)	92		
An ability to perform an assessment of sedation levels	80		
An ability to interpret an assessment of cranial nerve function	72		
An ability to perform an assessment of cranial nerve function	84		
Ability to perform a delirium assessment e.g. the Confusion Assessment Method for ICU	76		
As a minimum standard a physiotherapist understand the key principles of providing the following differing modes of mechanical/assisted ventilation including			
High Frequency Oscillatory Ventilation (HFOV)	60	71	
As a minimum standard a physiotherapist can assess and interpret mechanical ventilation settings/measurements including:			
Static and/or dynamic lung compliance measurements	80		
Upper and lower inflection points of P-V curves	80		
Maximum expiratory pressure (MEP) measurements	68	59	92
As a minimum standard a physiotherapist can:			
Perform respiratory function tests	76		
Perform a spontaneous breathing trial	72		
Interpret the rapid shallow breathing index (RSBI)	80		
Perform a swallow assessment	80		
As a minimum standard a physiotherapist can interpret indices from blood gas measurement including:			
A-a gradient	84		
P50	88		

	Round 1 %	Round 2 %	Round 3 %
Anion gap	84		

As a minimum standard a physiotherapist has knowledge of methods for advanced haemodynamic monitoring, can interpret the measurements and understands the implication of these for physiotherapists:			
Pulmonary arterial catheter measurements	76		
PiCCO measurements	84		
As a minimum standard a physiotherapist can complete musculoskeletal and/or functional assessments including:			
Bio impedance testing of body composition	88		
As a minimum standard a physiotherapist understands pathophysiology and presenting features, likely medical management and implications for physiotherapy for a range of conditions including:			
Hepatitis	56	59	77
As a minimum standard a physiotherapist can provide the following techniques, including an understanding of the implications, contraindications, evidence for the technique and progressions:			
Glottal stacking	76		
Feldenkreis	84		
Intermittent Positive Pressure Breathing (IPPB)	72		
Recruitment manoeuvres	72		
Bronchial Lavage	88		
Performing bronchoscopy independently	92		
Assisting bronchoscopy via delivery of secretion mobilisation techniques during the procedure	84		
Inspiratory muscle training	56	76	
Splinting and/or casting for the upper limbs and lower limbs	80		
Collars	68	71	
Braces	68	76	
	Round 1 %	Round 2 %	Round 3 %
Electrical stimulation	80		

Additional rehabilitation techniques (e.g. hydrotherapy, Wii)	88		
As a minimum standard a physiotherapist can:			
Intubate a patient	88		
Extubate a patient	84		
Lead the co-ordination of weaning protocols	76		
Lead the co-ordination of cuff deflation trials	64	65	77
Lead the co-ordination of speaking valve trials	64	71	
Decannulate a tracheostomy	88		
Tracheostomy exchange	76		

(* item added during subsequent round)

Table 4: Items where consensus could not be reached

	Round 1 %	Round 2 %	Round 3 %

As a minimum standard a physiotherapist can understand equipment (including recognition of equipment), use/safety apply or handle equipment, understand the implications for physiotherapy of:			
Intra-aortic balloon pump (IABP)	52	41	46
Intracranial pressure (ICP) monitors and extra-ventricular drains (EVD)	44	35	46
As a minimum standard a physiotherapist can accurately interpret readings from clinical monitoring including:			
Central venous pressure (CVP)	68	65	62
End tidal carbon dioxide	64	65	69
As a minimum standard a physiotherapist can accurately interpret findings from laboratory investigations including:			
Neutrophil count	60	65	69
Albumin	48	41	31
Renal function tests e.g. urea and creatinine	64	53	62
Blood glucose levels	52	59	46
As a minimum standard a physiotherapist is aware of the actions and implications for physiotherapy of the following medications:			
Calcium channel blockers, cerebral diuretics, hypertonic saline	48	65	38
Nitric oxide	44	41	38
As a minimum standard a physiotherapist can independently interpret findings from imaging investigations (excluding the imaging report) including:			
Skeletal x-rays	44	59	62
As a minimum standard a physiotherapist can interpret the results from neurological equipment/examinations and functional tests including:			
Intra-cranial pressure (ICP) monitors and cerebral perfusion pressure (CPP)	48	18	23

	Round 1 %	Round 2 %	Round 3 %
An ability to perform a Glasgow Coma Score (GCS)	64	54	62

An ability to interpret an assessment of sedation levels	68	65	54
An ability to perform a neurological examination of motor and sensory functions	68	47	69
Ability to interpret a delirium assessment e.g. the Confusion Assessment Method for ICU	56	59	62
As a minimum standard a physiotherapist understand the key principles of providing the following differing modes of mechanical/assisted ventilation including:			
Airway Pressure Release Ventilation (APRV)	56	29	31
As a minimum standard a physiotherapist can assess and interpret mechanical ventilation settings/measurements including:			
Maximum inspiratory pressure (MIP) measurements	64	35	31
As a minimum standard a physiotherapist can:			
Interpret respiratory function tests	64	41	38
Measure peak cough flow on or off mechanical ventilation	52	35	54
Perform a cuff volume and/or pressure test on an endotracheal tube or tracheostomy	52	53	62
As a minimum standard a physiotherapist can interpret indices from blood gas measurement including:			
Base Excess (BE)	56	41	46
Oxygen content (CaO2)	68	47	38
Venous blood gas interpretation (including SvO2)	60	24	31
As a minimum standard a physiotherapist has knowledge of methods for advanced haemodynamic monitoring, can interpret the measurements and understands the implication of these for physiotherapists:			
Implanted or external pacemakers and determine presence of pacing on ECG	56	35	31

	Round 1 %	Round 2 %	Round 3 %
As a minimum standard a physiotherapist can complete musculoskeletal and/or functional assessments including:			

Objective measures of cardiopulmonary exercise tolerance	64	65	54
Objective measures of quality of life	44	53	46
As a minimum standard a physiotherapist understands pathophysiology and presenting features, likely medical management and implications for physiotherapy for a range of conditions including:			
Pancreatitis	52	47	46
Metabolic/electrolyte disturbances	44	59	46
Fat embolism	44	59	38
Brain death and organ procurement	56	35	31
Organ transplantation	64	29	31
Burns	44	29	15
As a minimum standard a physiotherapist can provide the following techniques, including an understanding of the implications, contraindications, evidence for the technique and progressions:			
Autogenic drainage	60	29	46
Assisted coughing - subcostal thrusts for spinal cord injuries	52	47	54
Cough stimulation - tracheal rub	64	24	31
Cough stimulation - oropharyngeal catheter stimulation	48	59	62
Manual hyperinflation (MHI) via an endotracheal tube or tracheostomy	48	47	54
Instillation of normal saline into the endotracheal tube	52	53	46
Treadmill, cycle ergometry or stationary bike	50	59	62
As a minimum standard a physiotherapist can appropriately request/co-ordinate the following:			
Titration of sedation to achieve physiotherapy goals	64	53	54
Titration of inotropes to achieve physiotherapy goals	56	47	54

	Round 1 %	Round 2 %	Round 3 %
As a minimum standard a physiotherapist can:			
Determine the appropriateness of a patient for extubation	48	53	54

	Determine the appropriateness of a patient for tracheostomy decannulation	56	24	23

(* item added during subsequent round)

Figure 1: Panel Selection and Completion Rates

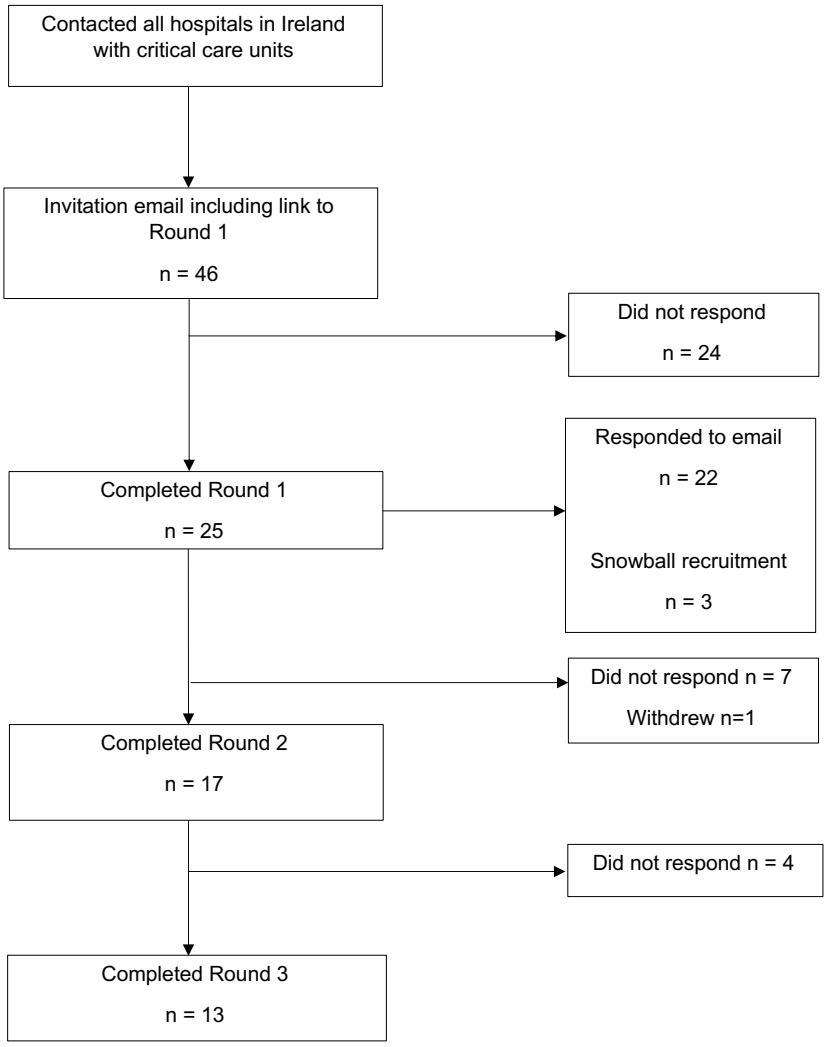

Figure 1: Panel Selection and Completion Rates

Flow chart of participant involvement and completion rates. The flow diagram illustrates the recruitment of participants, their involvement through the three rounds of the survey and the completion through the rounds.

Figure 2: Inclusion and exclusion of questionnaire items

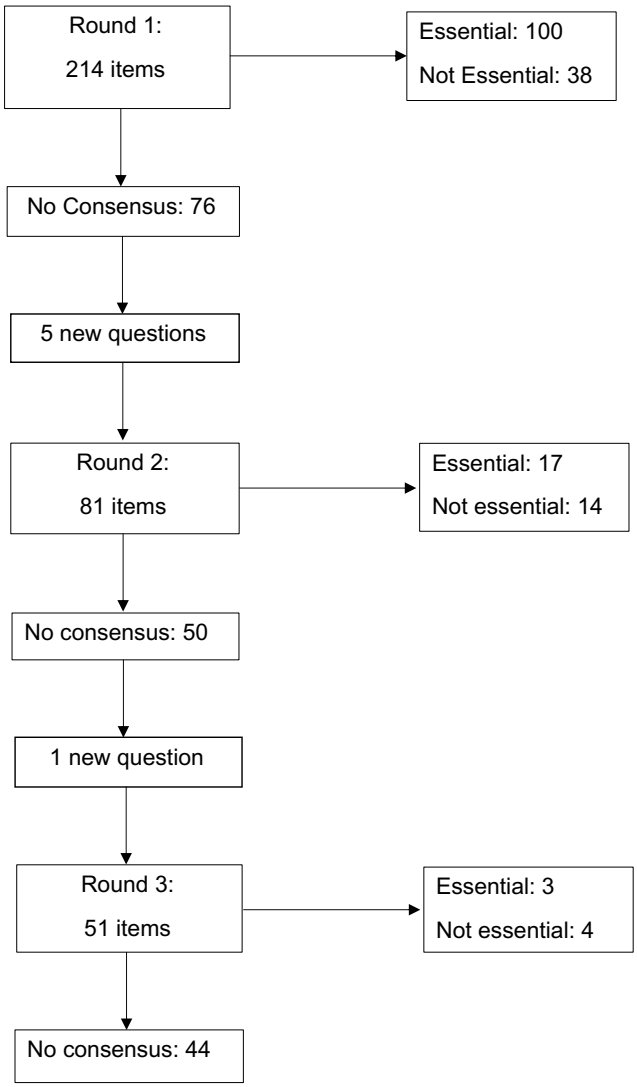

Figure 2: Inclusion and exclusion of questionnaire items

Flow chart of the inclusion and exclusion of questionnaire items. This flow diagram illustrates the number of items included in each questionnaire round, the number of items reaching consensus, the number that did not reach consensus and the number of items included based on suggestions from participants.

Table 1: Demographic data for participants

	Units	Panel (n=25)
Hospitals	n (%)	
Public Hospitals		24 (96)

Private Hospitals		1 (4)
Current role	n (%)	
Clinical Specialist physiotherapist		7 (28)
Senior physiotherapist		18 (72)
ICU Level	n (%)	
Level 3 Tertiary Services e.g. ECMO, neurosurgery		6 (24)
Level 3 ICU		22 (88)
Level 2 HDU		7 (28)
Years in employed current role	Median (IQR)	6 (1-20)
	Mean	7
Clinical Experience	Median (IQR)	16 (5-24)
	Mean	15
ICU Experience	Median (IQR)	15 (2-24)
	Mean	13
Delivered physiotherapy training within critical care in the past 3 years	n (%)	25 (100)
Highest Qualification	n (%)	
Entry Level		18 (72)
Masters		6 (24)

Table 2: Items deemed 'Essential' (Consensus >70%)

	Round 1 %	Round 2 %	Round 3 %
As a minimum standard a physiotherapist is aware of key literature that guides evidence based physiotherapy practice in critical care settings	76		
As a minimum standard a physiotherapist can understand equipment (including recognition of equipment), use/safety apply or handle equipment, understand the implications for physiotherapy of:			
Oxygen therapy devices	100		
Endotracheal tubes and tracheostomy	100		
Central venous catheters	88		
Arterial lines	96		
Intercostal catheters	100		
Wound drains	88		
Indwelling urinary catheter	92		
Vascath / haemodialysis catheter / continuous veno-venous haemofiltration	76		
Nasogastric tubes	84		
As a minimum standard a physiotherapist can accurately interpret readings from clinical monitoring including:			
Body temperature	100		
Heart rate	100		
Blood pressure	100		

Basic ECGs	64	59	77
SpO2 / pulse oximetry	100		
Fluid intake and output	80		
As a minimum standard a physiotherapist can accurately interpret findings from laboratory investigations including:			
Haemoglobin	100		
Platelets, APTT, INR	88		
Troponin	88		
White cell count	100		
C-reactive Protein	84		
Sputum cultures	72		
D Dimers	*	71	

	Round 1 %	Round 2 %	Round 3 %
As a minimum standard a physiotherapist is aware of the actions and implications for physiotherapy of the following medications:			
Vasopressors / inotropes	100		
Anti-hypertensives	88		
Anti-arrhythmia	92		
Sedation and neuromuscular paralysing agents	100		
Bronchodilators	96		
Mucolytics	84		
Anti-coagulants	*	88	
As a minimum standard a physiotherapist can independently interpret findings from imaging investigations (excluding the imaging report) including:			

Chest radiographs	84		
As a minimum standard a physiotherapist can interpret the results from neurological equipment/examinations and functional tests including:			
An ability to interpret a Glasgow Coma Score (GCS)	92		
As a minimum standard a physiotherapist can perform and accurately interpret the results of common respiratory examinations including:			
Observation of respiratory rate	96		
Patterns of breathing	96		
Palpate the chest wall	96		
Auscultation	92		
As a minimum standard a physiotherapist understand the key principles of providing the following differing modes of mechanical/assisted ventilation including:			
CPAP	92		
PEEP / EPAP	92		
PS / IPAP	92		
SIMV (volume)/(pressure)	92		
Assist-Control (AC)	88		
Pressure-Regulated Volume Control	84		
Bi-level	88		
Weaning protocols	64	71	

	Round 1 %	Round 2 %	Round 3 %

As a minimum standard a physiotherapist can assess and interpret mechanical ventilation settings/measurements including:			
Respiratory rate	92		
Tidal volume	92		
Breath types (spontaneous, mandatory, assisted)	92		
The levels of FiO2	92		
The levels of PEEP	92		
The levels of PS	92		
Peak inspiratory pressure	92		
As a minimum standard a physiotherapist can:			
Assess the effectiveness / quality of a patient's cough	92		
Change the inner cannula of a tracheostomy	*	88	
As a minimum standard a physiotherapist can interpret indices from blood gas measurement including:			
pH	92		
PaCO2	92		
PaO2, SpO2, SaO2	92		
PaO2/FiO2 ratio	80		
HCO3	80		
Lactate	56	76	
As a minimum standard a physiotherapist can complete musculoskeletal and/or functional assessments including:			
Manual Muscle testing	88		
Dynamometry	64	71	
Range of motion	88		
Ability to assess tone and reflexes	88		

Deep vein thrombosis screening	80	
Peripheral oedema	76	
Objective measures of physical function	64	71

As a minimum standard a physiotherapist understands pathophysiology and presenting features, likely medical management and implications for physiotherapy for a range of conditions including:

Respiratory failure Type I and II	92	
Community acquired/nosocomial/hospital-acquired pneumonia	88	

	Round 1 %	Round 2 %	Round 3 %
Pleural effusion	88		
Obstructive respiratory disease	92		
Restrictive respiratory disease	92		
Suppurative lung diseases	88		
Acute lung injury/acute respiratory distress syndrome	92		
Acute coronary syndrome	92		
Shock (cardiogenic)	80		
Heart failure	76		
Post-cardiac surgery	64	71	
Post-thoracic surgery	64	71	
Post-abdominal surgery	88		
Renal failure: acute and chronic	72		
Immunocompromise	80		
Systemic inflammatory response syndrome	60		
Shock (septic)	84		
Multi-organ failure	84		

ICU Acquired weakness (ICU-AW)	80	
Guillain-Barre Syndrome	64	82
Thromboembolic disease	88	
Intracerebral haemorrhage/Subarachnoid haemorrhage	76	
Traumatic Brain Injury	76	
Chest Trauma	84	
Polytrauma	76	
Spinal Cord Injury	76	
End of life	*	88
As a minimum standard a physiotherapist can provide the following techniques, including an understanding of the implications, contraindications, evidence for the technique and progressions:		
Oxygen therapy	92	
Humidification	88	
Active Cycle Breathing Technique	92	
Manual airway clearance techniques	92	
Positive pressure devices for airway clearance	68	82
Oscillating positive expiratory pressure devices for airway clearance	84	

	Round 1 %	Round 2 %	Round 3 %
Periodic/intermittent CPAP including initiation and titration of settings	56	71	
NIV / BiPAP - for Type I or Type II respiratory failure, initiation and titration of settings	60	76	

NIV / BiPAP - intermittent, short term applications during physiotherapy to assist secretion mobilisation techniques or lung recruitment including initiation and titration of settings	52	76	
NIV / BiPAP - for use during exercise or mobilisation including initiation and titration of settings	48	65	77
Manual inexsufflator-exsufflator (Cough assist)	76		
Supported coughing	84		
Directed coughing/instructing the patient to cough effectively	92		
Assisted coughing - chest wall	88		
Ventilator hyperinflation (VHI) via an endotracheal tube or tracheostomy	76		
Nasopharyngeal airway suctioning, including insertion of NP airway	80		
Oropharyngeal airway suctioning, including insertion of OP airway	92		
Suction via a tracheal tube	92		
Patient positioning for respiratory care	92		
Patient prone positioning in severe respiratory failure / acute lung injury	72		
Patient positioning for prevention of pressure ulcers, management of tone, maintenance of musculoskeletal function	76		
Mobilisation of non-ventilated patient	92		
Mobilisation of ventilated patient	80		
Bed exercises	88		
Early mobility protocols	*	*	92
As a minimum standard a physiotherapist can appropriately request/co-ordinate the following:			
Titration of analgesia to achieve physiotherapy goals	88		

(* item added during subsequent round)

Table 3: Items deemed 'Not Essential' (Consensus >70%)

	Round 1 %	Round 2 %	Round 3 %
As a minimum standard a physiotherapist can understand equipment (including recognition of equipment), use/safety apply or handle equipment, understand the implications for physiotherapy of:			
Extra-corporeal membrane oxygenation (ECMO)	48	65	92
Sengstaken-Blakemore / Minnesota tubes (balloon tamponade)	44	71	
As a minimum standard a physiotherapist can accurately interpret readings from clinical monitoring including:			
Advanced ECG's (i.e. conduction blocks, 12-lead ECG)	88		
Nutritional status including feed administration, volume and type	72		
As a minimum standard a physiotherapist can accurately interpret findings from laboratory investigations including:			
Haematocrit	68	82	
Creatinine Kinase (CK)	48	71	
Procalcitonin (PCT)	80		
Liver function tests e.g. ALT, LDH, Bilirubin	48	76	
As a minimum standard a physiotherapist is aware of the actions and implications for physiotherapy of the following medications:			
Prostacyclin	80		
As a minimum standard a physiotherapist can independently interpret findings from imaging investigations (excluding the imaging report) including			
CT-Brain	64	71	

CT - Chest	60	76	
CT - Spine	68	76	
MRI - Brain	68	76	
MRI – Spine	72		
MRI - Chest	68	71	
Ultrasound – Chest	84		
As a minimum standard a physiotherapist can interpret the results from neurological equipment/examinations and functional tests including:			
Electroencephalograms (EEG)	92		
An ability to perform an assessment of sedation levels	80		
An ability to interpret an assessment of cranial nerve function	72		

	Round 1 %	Round 2 %	Round 3 %
An ability to perform an assessment of cranial nerve function	84		
Ability to perform a delirium assessment e.g. the Confusion Assessment Method for ICU	76		
As a minimum standard a physiotherapist understand the key principles of providing the following differing modes of mechanical/assisted ventilation including			
High Frequency Oscillatory Ventilation (HFOV)	60	71	
As a minimum standard a physiotherapist can assess and interpret mechanical ventilation settings/measurements including:			
Static and/or dynamic lung compliance measurements	80		
Upper and lower inflection points of P-V curves	80		
Maximum expiratory pressure (MEP) measurements	68	59	92

As a minimum standard a physiotherapist can:	
Perform respiratory function tests	76
Perform a spontaneous breathing trial	72
Interpret the rapid shallow breathing index (RSBI)	80
Perform a swallow assessment	80
As a minimum standard a physiotherapist can interpret indices from blood gas measurement including:	
A-a gradient	84
P50	88
Anion gap	84
As a minimum standard a physiotherapist has knowledge of methods for advanced haemodynamic monitoring, can interpret the measurements and understands the implication of these for physiotherapists:	
Pulmonary arterial catheter measurements	76
PiCCO measurements	84
As a minimum standard a physiotherapist can complete musculoskeletal and/or functional assessments including:	
Bio impedance testing of body composition	88

	Round 1 %	Round 2 %	Round 3 %
As a minimum standard a physiotherapist understands pathophysiology and presenting features, likely medical management and implications for physiotherapy for a range of conditions including:			
Hepatitis	56	59	77

As a minimum standard a physiotherapist can provide the following techniques, including an understanding of the implications, contraindications, evidence for the technique and progressions:			
Glottal stacking	76		
Feldenkreis	84		
Intermittent Positive Pressure Breathing (IPPB)	72		
Recruitment manoeuvres	72		
Bronchial Lavage	88		
Performing bronchoscopy independently	92		
Assisting bronchoscopy via delivery of secretion mobilisation techniques during the procedure	84		
Inspiratory muscle training	56	76	
Splinting and/or casting for the upper limbs and lower limbs	80		
Collars	68	71	
Braces	68	76	
Electrical stimulation	80		
Additional rehabilitation techniques (e.g. hydrotherapy, Wii)	88		
As a minimum standard a physiotherapist can:			
Intubate a patient	88		
Extubate a patient	84		
Lead the co-ordination of weaning protocols	76		
Lead the co-ordination of cuff deflation trials	64	65	77
Lead the co-ordination of speaking valve trials	64	71	
Decannulate a tracheostomy	88		
Tracheostomy exchange	76		

(* item added during subsequent round)

Table 4: Items where consensus could not be reached

	Round 1 %	Round 2 %	Round 3 %
As a minimum standard a physiotherapist can understand equipment (including recognition of equipment), use/safety apply or handle equipment, understand the implications for physiotherapy of:			
Intra-aortic balloon pump (IABP)	52	41	46
Intracranial pressure (ICP) monitors and extra-ventricular drains (EVD)	44	35	46
As a minimum standard a physiotherapist can accurately interpret readings from clinical monitoring including:			
Central venous pressure (CVP)	68	65	62
End tidal carbon dioxide	64	65	69
As a minimum standard a physiotherapist can accurately interpret findings from laboratory investigations including:			
Neutrophil count	60	65	69
Albumin	48	41	31
Renal function tests e.g. urea and creatinine	64	53	62
Blood glucose levels	52	59	46
As a minimum standard a physiotherapist is aware of the actions and implications for physiotherapy of the following medications:			
Calcium channel blockers, cerebral diuretics, hypertonic saline	48	65	38
Nitric oxide	44	41	38

As a minimum standard a physiotherapist can independently interpret findings from imaging investigations (excluding the imaging report) including:			
Skeletal x-rays	44	59	62
As a minimum standard a physiotherapist can interpret the results from neurological equipment/examinations and functional tests including:			
Intra-cranial pressure (ICP) monitors and cerebral perfusion pressure (CPP)	48	18	23
An ability to perform a Glasgow Coma Score (GCS)	64	54	62
An ability to interpret an assessment of sedation levels	68	65	54
An ability to perform a neurological examination of motor and sensory functions	68	47	69

	Round 1 %	Round 2 %	Round 3 %
Ability to interpret a delirium assessment e.g. the Confusion Assessment Method for ICU	56	59	62
As a minimum standard a physiotherapist understand the key principles of providing the following differing modes of mechanical/assisted ventilation including:			
Airway Pressure Release Ventilation (APRV)	56	29	31
As a minimum standard a physiotherapist can assess and interpret mechanical ventilation settings/measurements including:			
Maximum inspiratory pressure (MIP) measurements	64	35	31
As a minimum standard a physiotherapist can:			

Interpret respiratory function tests	64	41	38
Measure peak cough flow on or off mechanical ventilation	52	35	54
Perform a cuff volume and/or pressure test on an endotracheal tube or tracheostomy	52	53	62
As a minimum standard a physiotherapist can interpret indices from blood gas measurement including:			
Base Excess (BE)	56	41	46
Oxygen content (CaO2)	68	47	38
Venous blood gas interpretation (including SvO2)	60	24	31
As a minimum standard a physiotherapist has knowledge of methods for advanced haemodynamic monitoring, can interpret the measurements and understands the implication of these for physiotherapists:			
Implanted or external pacemakers and determine presence of pacing on ECG	56	35	31
As a minimum standard a physiotherapist can complete musculoskeletal and/or functional assessments including:			
Objective measures of cardiopulmonary exercise tolerance	64	65	54
Objective measures of quality of life	44	53	46

	Round 1 %	Round 2 %	Round 3 %
As a minimum standard a physiotherapist understands pathophysiology and presenting features, likely medical management and implications for physiotherapy for a range of conditions including:			
Pancreatitis	52	47	46

Metabolic/electrolyte disturbances	44	59	46
Fat embolism	44	59	38
Brain death and organ procurement	56	35	31
Organ transplantation	64	29	31
Burns	44	29	15
As a minimum standard a physiotherapist can provide the following techniques, including an understanding of the implications, contraindications, evidence for the technique and progressions:			
Autogenic drainage	60	29	46
Assisted coughing - subcostal thrusts for spinal cord injuries	52	47	54
Cough stimulation - tracheal rub	64	24	31
Cough stimulation - oropharyngeal catheter stimulation	48	59	62
Manual hyperinflation (MHI) via an endotracheal tube or tracheostomy	48	47	54
Instillation of normal saline into the endotracheal tube	52	53	46
Treadmill, cycle ergometry or stationary bike	50	59	62
As a minimum standard a physiotherapist can appropriately request/co-ordinate the following:			
Titration of sedation to achieve physiotherapy goals	64	53	54
Titration of inotropes to achieve physiotherapy goals	56	47	54
As a minimum standard a physiotherapist can:			
Determine the appropriateness of a patient for extubation	48	53	54
Determine the appropriateness of a patient for tracheostomy decannulation	56	24	23

(* item added during subsequent round)