



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

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

3     **Abstract**

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

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

17    **Results:** 25/46(54%) physiotherapists completed the first round, with 17 and 13  
18    completing round 2 and round 3 respectively. A total of 220 items were included,  
19    120 of which were deemed essential for a minimum standards of independent  
20    clinical practice in Irish critical care units. 56 items were considered not essential  
21    while consensus was not reached on 44 items.

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

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

27

28 **Key Words:**

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

30

31 **Introduction**

32

33 Critically ill patients are usually cared for in a High Dependency Unit (HDU) or  
34 Intensive Care Unit (ICU) [1]. Physiotherapists in Irish hospitals with critical care  
35 units deliver physiotherapy services 24 hours a day, 7 days a week [1]. This is  
36 achieved by provision of physiotherapists working on call during evenings and  
37 weekends. On call working requires all physiotherapy staff to maintain a level of  
38 competence in the management of patients in critical care, irrespective of clinical  
39 specialty or primary area of practice [1, 2]. Competence to work in critical care is  
40 subjective to both the physiotherapist undertaking the training and their educator.

41 [The authors](#) clinical experience and peer discussion through national respiratory  
42 groups indicates that both training to work in critical care and clinical practice may  
43 vary between hospitals. The perceived lack of consistency in the level of clinical  
44 competence, required skills and content of training between hospitals is  
45 compounded by the absence of a national policy, procedure or clinical framework  
46 for physiotherapists working in critical care. Previous research found clinically  
47 important differences in the treatment administered by the critical care  
48 physiotherapist compared with the on-call physiotherapists [including duration of](#)

49 [assessment, treatment selection and execution](#) [3]. [This](#) indicates a need to  
50 standardise training.

51

52 Existing research suggests there is international interest in exploring the  
53 minimum clinical standards required of physiotherapists to work in critical care  
54 with studies conducted in Australia and New Zealand, the United Kingdom (UK),  
55 Japan and South Africa [4-7]. Skinner et al [4] used a modified Delphi technique  
56 to investigate the minimum standards of clinical practice expected of  
57 physiotherapists working in critical care in Australia and New Zealand. An expert  
58 panel of physiotherapists completed three rounds of questionnaires to identify the  
59 required clinical skills. Twose et al [5] and Takahashi et al [6] replicated the study  
60 investigating the clinical standards expected in the United Kingdom and Japan  
61 respectively. The [study conducted in](#) South Africa [7] investigated the minimum  
62 standards required for physiotherapists working in critical cares, adopting  
63 qualitative methodology completing focus group sessions with experienced  
64 physiotherapists, both clinicians and academics [8]. While the [study conducted in](#)  
65 South Africa [7] differed in design to the Australasian, UK and Japanese studies  
66 [3-5] all studies identified the need to develop national standards and clinical  
67 frameworks to support education and reduce variability in clinical practice.

68

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

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

79

## 80 **Methods**

81

### 82 Ethical considerations

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

90

### 91 Research Design

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

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

103

#### 104 Recruitment and Participants

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

119

#### 120 Questionnaire

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

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

137

#### 138 Procedure

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

148

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

158

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

166

167 Analysis

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

173

174 **Results**

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

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



175

176 (Insert Figure 1 and Table 1 here)

177

178 Participants

179 54% of physiotherapists (25/46) who were invited to participate completed round  
180 1 to create the survey panel. Round 2 was completed by 68% of participants  
181 (17/25) and 52% (13/25) completed round 3. Participants represented all seven  
182 hospital groups in Ireland and 1 private hospital (Table 1). They had an average  
183 of 15 years post graduate experience, with 13 years in critical care. Post graduate  
184 education to Masters level had been completed by 24% (6/25).

185

186 (Inset Figure 2 here)

187

188 Consensus

189 Figure 2 shows the progress of items through the three rounds of the survey.  
190 Round 1 surveyed the participants on 214 items, of which consensus was not  
191 determined on 77 items. Round 2 consisted of these 77 items and an additional  
192 5 items suggested by participants in round 1. Round 3 consisted of 50 items  
193 where consensus had not been reached and one additional item. Following the 3  
194 rounds, 120 items were considered 'Essential' by the panel (Table 2), 56 'Not  
195 Essential' (Table 3) and consensus was not be reached on 44 items. Table 4  
196 shows the items where consensus was not reached as well as the percentage of  
197 participants who deemed the item 'Essential'.

198

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

200

201 Comments

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

213

## 214 **Discussion**

215

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

226

227 In accordance with previous research [5], three survey rounds were used to  
228 achieve final consensus. This was to ensure the final result would not be biased  
229 by 'unsure' responses or unanswered questions. The decision to use 70% as the  
230 criteria for consensus was based on previous studies [4-6]. A number of items  
231 came close to achieving essential or not essential consensus but did not meet  
232 70% on all three calculations, and therefore were classed as not reaching  
233 consensus. The threshold of 70% was a potential limitation of the study. For  
234 example, 'End Tidal Carbon Dioxide', 'Neutrophil Count' and 'An ability to perform  
235 a neurological examination of motor and sensory functions' achieved 69%  
236 consensus in the third round and was determined as 'consensus could not be  
237 reached'. Choosing a threshold is helpful for providing direction about the  
238 essential items. However as with this example, when consensus cannot be  
239 reached this result does not direct a definitive decision to exclude items from  
240 training.

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

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

255

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

270

#### 271 Limitations

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

277 of the questionnaire was open for three weeks. However, the study was  
278 conducted during the Covid-19 pandemic (February 2021 – May 2021), in which  
279 physiotherapists working in critical care were burdened with significant demands,  
280 exhaustion and burnout [16]. Response fatigue may have been a factor [17] due  
281 to the length of the questionnaire (214 items in Round 1). The largest drop off in  
282 participants was observed from Round 1 to Round 2 [18]. The Delphi process  
283 requires continued commitment from participants to maintain involvement until  
284 the process is completed [12]. Increasing non response is common in panel  
285 surveys and decreased engagement can increase with subsequent rounds [19,  
286 20]. Respondents may give less thoughtful answers or withdraw participation  
287 prior to completion of the study [21]. It was observed that fewer comments were  
288 received in the later rounds of this study.

289

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

297

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

302 **Conclusion**

303

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

310

311

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314 sharing the questionnaire and research design. The authors would like to  
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317 like to thank all those who gave their time to complete the questionnaire surveys.

318

319 **Ethical Approval**

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

323

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327

### 328 **Conflicts of Interests**

329 The authors declared no potential conflicts of interests.

330

331

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333

334

335

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482 **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)

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

	Round	Round	Round
	1	2	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	Round	Round
	1	2	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 paralyzing 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
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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
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	Round	Round	Round
	1	2	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 FiO <sub>2</sub>	92
The levels of PEEP	92
The levels of PS	92
Peak inspiratory pressure	92

	Round	Round	Round
	1	2	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	
PaCO <sub>2</sub>	92	
PaO <sub>2</sub> , SpO <sub>2</sub> , SaO <sub>2</sub>	92	
PaO <sub>2</sub> /FiO <sub>2</sub> ratio	80	
HCO <sub>3</sub>	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	Round	Round
	1	2	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	Round	Round
	1	2	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 inxsufflator-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	Round
		1	2
		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		

490 (\* item added during subsequent round)

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

	Round	Round	Round
	1	2	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	Round	Round
	1	2	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	Round
		1	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
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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
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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	Round	Round
	1	2	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)

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523 **Table 4: Items where consensus could not be reached**

	Round	Round	Round
	1	2	3
	%	%	%

As a minimum standard a physiotherapist can understand equipment (including recognition of equipment), use/safely 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	Round	Round
	1	2	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 (CaO <sub>2</sub> )	68	47	38
Venous blood gas interpretation (including SvO <sub>2</sub> )	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	Round	Round
	1	2	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	Round	Round
	1	2	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
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524 (\* item added during subsequent round)

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**Figure 1: Panel Selection and Completion Rates**

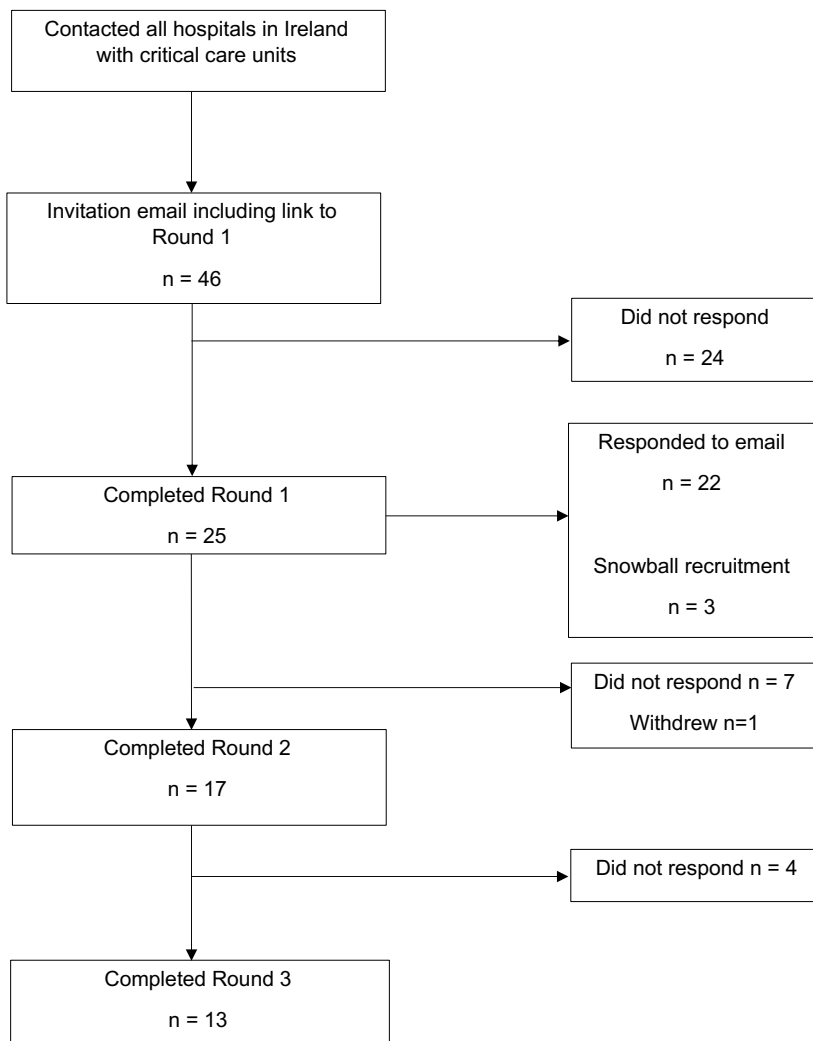


Figure 1: Panel Selection and Completion Rates

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**

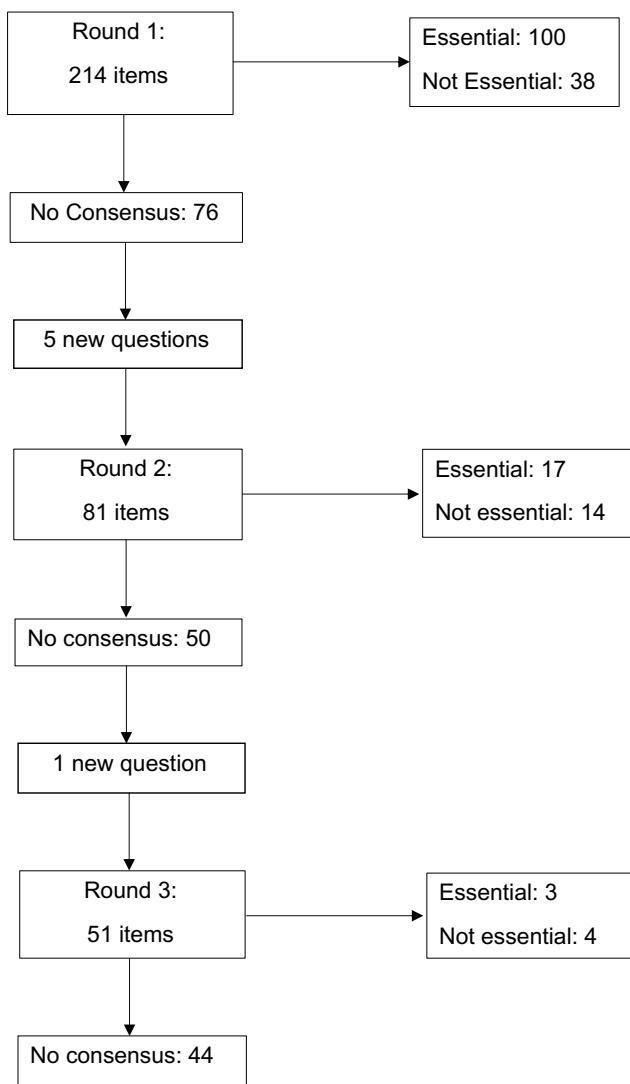


Figure 2: Inclusion and exclusion of questionnaire items

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**

	<u>Units</u>	<u>Panel (n=25)</u>
<u>Hospitals</u>	<u>n (%)</u>	
<u>Public Hospitals</u>		<u>24 (96)</u>

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

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

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



<u>Basic ECGs</u>	<u>64</u>	<u>59</u>	<u>77</u>
<u>SpO2 / pulse oximetry</u>	<u>100</u>		
<u>Fluid intake and output</u>	<u>80</u>		

As a minimum standard a physiotherapist can accurately interpret findings from laboratory investigations including:

<u>Haemoglobin</u>	<u>100</u>		
<u>Platelets, APTT, INR</u>	<u>88</u>		
<u>Troponin</u>	<u>88</u>		
<u>White cell count</u>	<u>100</u>		
<u>C-reactive Protein</u>	<u>84</u>		
<u>Sputum cultures</u>	<u>72</u>		
<u>D Dimers</u>	<u>*</u>	<u>71</u>	

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	<u>Round</u>	<u>Round</u>	<u>Round</u>
	<u>1</u>	<u>2</u>	<u>3</u>
	<u>%</u>	<u>%</u>	<u>%</u>

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As a minimum standard a physiotherapist is aware of the actions and implications for physiotherapy of the following medications:

<u>Vasopressors / inotropes</u>	<u>100</u>		
<u>Anti-hypertensives</u>	<u>88</u>		
<u>Anti-arrhythmia</u>	<u>92</u>		
<u>Sedation and neuromuscular paralyzing agents</u>	<u>100</u>		
<u>Bronchodilators</u>	<u>96</u>		
<u>Mucolytics</u>	<u>84</u>		
<u>Anti-coagulants</u>	<u>*</u>	<u>88</u>	

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

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	<u>Round</u>	<u>Round</u>	<u>Round</u>
	<u>1</u>	<u>2</u>	<u>3</u>
	<u>%</u>	<u>%</u>	<u>%</u>

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As a minimum standard a physiotherapist can assess and interpret mechanical ventilation settings/measurements including:

<u>Respiratory rate</u>	<u>92</u>	
<u>Tidal volume</u>	<u>92</u>	
<u>Breath types (spontaneous, mandatory, assisted)</u>	<u>92</u>	
<u>The levels of FIO<sub>2</sub></u>	<u>92</u>	
<u>The levels of PEEP</u>	<u>92</u>	
<u>The levels of PS</u>	<u>92</u>	
<u>Peak inspiratory pressure</u>	<u>92</u>	

As a minimum standard a physiotherapist can:

<u>Assess the effectiveness / quality of a patient's cough</u>	<u>92</u>	
<u>Change the inner cannula of a tracheostomy</u>	<u>*</u>	<u>88</u>

As a minimum standard a physiotherapist can interpret indices from blood gas measurement including:

<u>pH</u>	<u>92</u>	
<u>PaCO<sub>2</sub></u>	<u>92</u>	
<u>PaO<sub>2</sub>, SpO<sub>2</sub>, SaO<sub>2</sub></u>	<u>92</u>	
<u>PaO<sub>2</sub>/FIO<sub>2</sub> ratio</u>	<u>80</u>	
<u>HCO<sub>3</sub></u>	<u>80</u>	
<u>Lactate</u>	<u>56</u>	<u>76</u>

As a minimum standard a physiotherapist can complete musculoskeletal and/or functional assessments including:

<u>Manual Muscle testing</u>	<u>88</u>	
<u>Dynamometry</u>	<u>64</u>	<u>71</u>
<u>Range of motion</u>	<u>88</u>	
<u>Ability to assess tone and reflexes</u>	<u>88</u>	

<a href="#">Deep vein thrombosis screening</a>	<a href="#">80</a>	
<a href="#">Peripheral oedema</a>	<a href="#">76</a>	
<a href="#">Objective measures of physical function</a>	<a href="#">64</a>	<a href="#">71</a>

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

<a href="#">Respiratory failure Type I and II</a>	<a href="#">92</a>
<a href="#">Community acquired/nosocomial/hospital-acquired pneumonia</a>	<a href="#">88</a>

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

<a href="#">ICU Acquired weakness (ICU-AW)</a>	<a href="#">80</a>	
<a href="#">Guillain-Barre Syndrome</a>	<a href="#">64</a>	<a href="#">82</a>
<a href="#">Thromboembolic disease</a>	<a href="#">88</a>	
<a href="#">Intracerebral haemorrhage/Subarachnoid haemorrhage</a>	<a href="#">76</a>	
<a href="#">Traumatic Brain Injury</a>	<a href="#">76</a>	
<a href="#">Chest Trauma</a>	<a href="#">84</a>	
<a href="#">Polytrauma</a>	<a href="#">76</a>	
<a href="#">Spinal Cord Injury</a>	<a href="#">76</a>	
<a href="#">End of life</a>	<a href="#">*</a>	<a href="#">88</a>

[As a minimum standard a physiotherapist can provide the following techniques, including an understanding of the implications, contraindications, evidence for the technique and progressions:](#)

<a href="#">Oxygen therapy</a>	<a href="#">92</a>	
<a href="#">Humidification</a>	<a href="#">88</a>	
<a href="#">Active Cycle Breathing Technique</a>	<a href="#">92</a>	
<a href="#">Manual airway clearance techniques</a>	<a href="#">92</a>	
<a href="#">Positive pressure devices for airway clearance</a>	<a href="#">68</a>	<a href="#">82</a>
<a href="#">Oscillating positive expiratory pressure devices for airway clearance</a>	<a href="#">84</a>	

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

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

[\(\\* item added during subsequent round\)](#)

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

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

<a href="#">CT - Chest</a>	<a href="#">60</a>	<a href="#">76</a>
<a href="#">CT - Spine</a>	<a href="#">68</a>	<a href="#">76</a>
<a href="#">MRI - Brain</a>	<a href="#">68</a>	<a href="#">76</a>
<a href="#">MRI – Spine</a>	<a href="#">72</a>	
<a href="#">MRI - Chest</a>	<a href="#">68</a>	<a href="#">71</a>
<a href="#">Ultrasound – Chest</a>	<a href="#">84</a>	

[As a minimum standard a physiotherapist can interpret the results from neurological equipment/examinations and functional tests including:](#)

<a href="#">Electroencephalograms (EEG)</a>	<a href="#">92</a>
<a href="#">An ability to perform an assessment of sedation levels</a>	<a href="#">80</a>
<a href="#">An ability to interpret an assessment of cranial nerve function</a>	<a href="#">72</a>

	<a href="#">Round</a>	<a href="#">Round</a>	<a href="#">Round</a>
	<a href="#">1</a>	<a href="#">2</a>	<a href="#">3</a>
	<a href="#">%</a>	<a href="#">%</a>	<a href="#">%</a>
<a href="#">An ability to perform an assessment of cranial nerve function</a>	<a href="#">84</a>		
<a href="#">Ability to perform a delirium assessment e.g. the Confusion Assessment Method for ICU</a>	<a href="#">76</a>		

[As a minimum standard a physiotherapist understand the key principles of providing the following differing modes of mechanical/assisted ventilation including](#)

<a href="#">High Frequency Oscillatory Ventilation (HFOV)</a>	<a href="#">60</a>	<a href="#">71</a>
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[As a minimum standard a physiotherapist can assess and interpret mechanical ventilation settings/measurements including:](#)

<a href="#">Static and/or dynamic lung compliance measurements</a>	<a href="#">80</a>		
<a href="#">Upper and lower inflection points of P-V curves</a>	<a href="#">80</a>		
<a href="#">Maximum expiratory pressure (MEP) measurements</a>	<a href="#">68</a>	<a href="#">59</a>	<a href="#">92</a>



As a minimum standard a physiotherapist can:

<u>Perform respiratory function tests</u>	<u>76</u>
<u>Perform a spontaneous breathing trial</u>	<u>72</u>
<u>Interpret the rapid shallow breathing index (RSBI)</u>	<u>80</u>
<u>Perform a swallow assessment</u>	<u>80</u>

As a minimum standard a physiotherapist can interpret indices from blood gas measurement including:

<u>A-a gradient</u>	<u>84</u>
<u>P50</u>	<u>88</u>
<u>Anion gap</u>	<u>84</u>

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:

<u>___ Pulmonary arterial catheter measurements</u>	<u>76</u>
<u>___ PiCCO measurements</u>	<u>84</u>

As a minimum standard a physiotherapist can complete musculoskeletal and/or functional assessments including:

<u>___ Bio impedance testing of body composition</u>	<u>88</u>
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	<u>Round</u>	<u>Round</u>	<u>Round</u>
	<u>1</u>	<u>2</u>	<u>3</u>
	<u>%</u>	<u>%</u>	<u>%</u>

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

<u>___ Hepatitis</u>	<u>56</u>	<u>59</u>	<u>77</u>
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As a minimum standard a physiotherapist can provide the following techniques, including an understanding of the implications, contraindications, evidence for the technique and progressions:

<u>Glottal stacking</u>	<u>76</u>	
<u>Feldenkreis</u>	<u>84</u>	
<u>Intermittent Positive Pressure Breathing (IPPB)</u>	<u>72</u>	
<u>Recruitment manoeuvres</u>	<u>72</u>	
<u>Bronchial Lavage</u>	<u>88</u>	
<u>Performing bronchoscopy independently</u>	<u>92</u>	
<u>Assisting bronchoscopy via delivery of secretion mobilisation techniques during the procedure</u>	<u>84</u>	
<u>Inspiratory muscle training</u>	<u>56</u>	<u>76</u>
<u>Splinting and/or casting for the upper limbs and lower limbs</u>	<u>80</u>	
<u>Collars</u>	<u>68</u>	<u>71</u>
<u>Braces</u>	<u>68</u>	<u>76</u>
<u>Electrical stimulation</u>	<u>80</u>	
<u>Additional rehabilitation techniques (e.g. hydrotherapy, Wii)</u>	<u>88</u>	

As a minimum standard a physiotherapist can:

<u>Intubate a patient</u>	<u>88</u>	
<u>Extubate a patient</u>	<u>84</u>	
<u>Lead the co-ordination of weaning protocols</u>	<u>76</u>	
<u>Lead the co-ordination of cuff deflation trials</u>	<u>64</u>	<u>65</u> <u>77</u>
<u>Lead the co-ordination of speaking valve trials</u>	<u>64</u>	<u>71</u>
<u>Decannulate a tracheostomy</u>	<u>88</u>	
<u>Tracheostomy exchange</u>	<u>76</u>	

(\* item added during subsequent round)

**Table 4: Items where consensus could not be reached**

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

[As a minimum standard a physiotherapist can independently interpret findings from imaging investigations \(excluding the imaging report\) including:](#)

<a href="#">Skeletal x-rays</a>	<a href="#">44</a>	<a href="#">59</a>	<a href="#">62</a>
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[As a minimum standard a physiotherapist can interpret the results from neurological equipment/examinations and functional tests including:](#)

<a href="#">Intra-cranial pressure (ICP) monitors and cerebral perfusion pressure (CPP)</a>	<a href="#">48</a>	<a href="#">18</a>	<a href="#">23</a>
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<a href="#">An ability to perform a Glasgow Coma Score (GCS)</a>	<a href="#">64</a>	<a href="#">54</a>	<a href="#">62</a>
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<a href="#">An ability to interpret an assessment of sedation levels</a>	<a href="#">68</a>	<a href="#">65</a>	<a href="#">54</a>
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<a href="#">An ability to perform a neurological examination of motor and sensory functions</a>	<a href="#">68</a>	<a href="#">47</a>	<a href="#">69</a>
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	<a href="#">Round</a>	<a href="#">Round</a>	<a href="#">Round</a>
	<a href="#">1</a>	<a href="#">2</a>	<a href="#">3</a>
	<a href="#">%</a>	<a href="#">%</a>	<a href="#">%</a>

<a href="#">Ability to interpret a delirium assessment e.g. the Confusion Assessment Method for ICU</a>	<a href="#">56</a>	<a href="#">59</a>	<a href="#">62</a>
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[As a minimum standard a physiotherapist understand the key principles of providing the following differing modes of mechanical/assisted ventilation including:](#)

<a href="#">Airway Pressure Release Ventilation (APRV)</a>	<a href="#">56</a>	<a href="#">29</a>	<a href="#">31</a>
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[As a minimum standard a physiotherapist can assess and interpret mechanical ventilation settings/measurements including:](#)

<a href="#">Maximum inspiratory pressure (MIP) measurements</a>	<a href="#">64</a>	<a href="#">35</a>	<a href="#">31</a>
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[As a minimum standard a physiotherapist can:](#)

<a href="#">Interpret respiratory function tests</a>	<a href="#">64</a>	<a href="#">41</a>	<a href="#">38</a>
<a href="#">Measure peak cough flow on or off mechanical ventilation</a>	<a href="#">52</a>	<a href="#">35</a>	<a href="#">54</a>
<a href="#">Perform a cuff volume and/or pressure test on an endotracheal tube or tracheostomy</a>	<a href="#">52</a>	<a href="#">53</a>	<a href="#">62</a>
<a href="#">As a minimum standard a physiotherapist can interpret indices from blood gas measurement including:</a>			
<a href="#">Base Excess (BE)</a>	<a href="#">56</a>	<a href="#">41</a>	<a href="#">46</a>
<a href="#">Oxygen content (CaO<sub>2</sub>)</a>	<a href="#">68</a>	<a href="#">47</a>	<a href="#">38</a>
<a href="#">Venous blood gas interpretation (including SvO<sub>2</sub>)</a>	<a href="#">60</a>	<a href="#">24</a>	<a href="#">31</a>
<a href="#">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:</a>			
<a href="#">Implanted or external pacemakers and determine presence of pacing on ECG</a>	<a href="#">56</a>	<a href="#">35</a>	<a href="#">31</a>
<a href="#">As a minimum standard a physiotherapist can complete musculoskeletal and/or functional assessments including:</a>			
<a href="#">Objective measures of cardiopulmonary exercise tolerance</a>	<a href="#">64</a>	<a href="#">65</a>	<a href="#">54</a>
<a href="#">Objective measures of quality of life</a>	<a href="#">44</a>	<a href="#">53</a>	<a href="#">46</a>
	<a href="#">Round</a>	<a href="#">Round</a>	<a href="#">Round</a>
	<a href="#">1</a>	<a href="#">2</a>	<a href="#">3</a>
	<a href="#">%</a>	<a href="#">%</a>	<a href="#">%</a>
<a href="#">As a minimum standard a physiotherapist understands pathophysiology and presenting features, likely medical management and implications for physiotherapy for a range of conditions including:</a>			
<a href="#">Pancreatitis</a>	<a href="#">52</a>	<a href="#">47</a>	<a href="#">46</a>

<u>Metabolic/electrolyte disturbances</u>	<u>44</u>	<u>59</u>	<u>46</u>
<u>Fat embolism</u>	<u>44</u>	<u>59</u>	<u>38</u>
<u>Brain death and organ procurement</u>	<u>56</u>	<u>35</u>	<u>31</u>
<u>Organ transplantation</u>	<u>64</u>	<u>29</u>	<u>31</u>
<u>Burns</u>	<u>44</u>	<u>29</u>	<u>15</u>

As a minimum standard a physiotherapist can provide the following techniques, including an understanding of the implications, contraindications, evidence for the technique and progressions:

<u>Autogenic drainage</u>	<u>60</u>	<u>29</u>	<u>46</u>
<u>Assisted coughing - subcostal thrusts for spinal cord injuries</u>	<u>52</u>	<u>47</u>	<u>54</u>
<u>Cough stimulation - tracheal rub</u>	<u>64</u>	<u>24</u>	<u>31</u>
<u>Cough stimulation - oropharyngeal catheter stimulation</u>	<u>48</u>	<u>59</u>	<u>62</u>
<u>Manual hyperinflation (MHI) via an endotracheal tube or tracheostomy</u>	<u>48</u>	<u>47</u>	<u>54</u>
<u>Instillation of normal saline into the endotracheal tube</u>	<u>52</u>	<u>53</u>	<u>46</u>
<u>Treadmill, cycle ergometry or stationary bike</u>	<u>50</u>	<u>59</u>	<u>62</u>

As a minimum standard a physiotherapist can appropriately request/co-ordinate the following:

<u>Titration of sedation to achieve physiotherapy goals</u>	<u>64</u>	<u>53</u>	<u>54</u>
<u>Titration of inotropes to achieve physiotherapy goals</u>	<u>56</u>	<u>47</u>	<u>54</u>

As a minimum standard a physiotherapist can:

<u>Determine the appropriateness of a patient for extubation</u>	<u>48</u>	<u>53</u>	<u>54</u>
<u>Determine the appropriateness of a patient for tracheostomy decannulation</u>	<u>56</u>	<u>24</u>	<u>23</u>

(\* item added during subsequent round)

