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Usual Care Physiotherapy During Acute Hospitalization in Subjects Admitted to the ICU: An Observational Cohort Study

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BACKGROUND: Physiotherapists play an important role in the provision of multidisciplinary team-based care in the ICU. No studies have reported usual care respiratory management or usual care on the wards following ICU discharge by these providers. This study aimed to investigate usual care physiotherapy for ICU subjects during acute hospitalization. METHODS: One hundred subjects were recruited for an observational study from a tertiary Australian ICU. The frequency and type of documented physiotherapist assessment and treatment were extracted retrospectively from medical records. RESULTS: The sample had median (interquartile range) APACHE II score of 17 (13–21) and was mostly male with a median (interquartile range) age of 61 (49–73) y. Physiotherapists reviewed 94% of subjects in the ICU (median of 5 [3–9] occasions, median stay of 4.3 [3–7] d) and 89% of subjects in acute wards (median of 6 [2–12] occasions, median stay of 13.3 [6–28] d). Positioning, ventilator lung hyperinflation, and suctioning were the most frequently performed respiratory care activities in the ICU. The time from ICU admission until ambulation from the bed with a physiotherapist had a median of 5 (3–8) d. The average ambulation distance per treatment had a median of 0 (0–60) m in the ICU and 44 (8–78) m in the acute wards. Adverse event rates were 3.5% in the ICU and 1.8% on the wards. CONCLUSIONS: Subjects received a higher frequency of physiotherapy in the ICU than on acute wards. Consensus is required to ensure consistency in data collection internationally to facilitate comparison of outcomes. *Key words: physiotherapy; respiratory therapy; critical illness; critical care; mobilization; physical therapy.* [Respir Care 0;0(0):1–•. © 0 Daedalus Enterprises]

Introduction

In the past decade, intensive care research has shifted from an emphasis on short-term physiological change to a focus on improving longer-term morbidity, particularly early rehabilitation and maintenance of functional mobility.[1-4] Historically, physiotherapists in Australia and New Zealand have provided modalities of treatment in 2 broad categories in the ICU, rehabilitation and respiratory therapy (or chest physiotherapy),[5,6] with the majority of physiotherapists self-reporting the provision of respiratory care activities in Australia,[7,8] Europe,[9] and India.[10] In contrast, in North America, rehabilitation and respiratory therapy/chest physiotherapy techniques are attributable to physical therapists and respiratory therapists, respectively, and chest physiotherapy

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is less likely to be used by physical therapists in the ICU.[11]

There has been difficulty in developing a clear international consensus on the physiotherapists' role and standardization of task performance,[12,13] although the role of physiotherapy within the ICU is well-established.[5,14,15] Few studies have collected empirical data on the frequency of exposure to physiotherapy intervention in the ICU, which has led to a historical reliance on the use of self-reported national practice surveys[7-11,16-23] and anecdotal experience or expert opinion to define and describe the role of physiotherapy. Considerable variation in critical care physiotherapy practice is an important and potentially undesirable consequence.[24] A major limitation of clinician surveys in establishing usual care is the bias of measuring one's own perception of practice (often theoretical best practice) rather than actual practice.[25]

Although several key international trials have demonstrated benefits for early rehabilitation,[1,2,26,27] the lack of empirical data pertaining to usual physiotherapy care makes it difficult to accurately compare, interpret, or implement the findings of international trials, where usual care itself is not standardized across settings or centers.[28] For example, in North America, usual practice often does not include a high frequency of physical therapy assessment and treatment[29,30] compared with Australia, where 86% of ICUs have a blanket referral system (physiotherapists routinely review every person in the ICU daily).[18] Three studies have published details of usual care physiotherapy rehabilitation in Australia in the context of usual care during a clinical trial,[31,32] point prevalence data,[33] and observational data.[34] However, no studies have reported on usual care provided by physiotherapists in their broad role in the Australasian context. It is therefore necessary that observational data on physiotherapy practice continue to be published[33] to facilitate examination of the consistency in international practice and potential differences between the evidence base and translation of findings into practice.[35] The objective of this study was to report the incidence of usual care physiotherapy, specifically treatment and modalities used, in a sample of subjects admitted to a single tertiary Australian ICU.

QUICK LOOK

Current knowledge

In the past decade, intensive care research has shifted from an emphasis on short-term physiological change to a focus on improving outcomes, particularly early rehabilitation and maintenance of functional mobility. Physiotherapists in Australia and New Zealand have provided 2 primary therapies in the ICU: rehabilitation and chest physiotherapy. In North America, rehabilitation and respiratory therapy/chest physiotherapy techniques are provided by both physiotherapists and respiratory therapists. However, in the ICU, chest physiotherapy is primarily the responsibility of the respiratory therapist.

What this paper contributes to our knowledge

Subjects admitted to an Australian ICU received a higher frequency of treatment/d in the ICU than on the ward. The median time from ICU admission to sitting out of bed was 3 d. The most common mobilization techniques employed by physiotherapists in the ICU were ambulating away from the bed and transferring the individual out of bed. The frequency of mobilization or rehabilitation increased from 47% in the ICU to 75% on the wards, and 80% of subjects ambulated on the acute wards. The most frequent type of activity used by physiotherapists in the acute wards was mobilization.

Methods

Design, Setting, and Subjects

This study was nested within a prospective observational cohort study assessing health-related quality of life in ICU survivors with a sample size of 100 subjects determined by convenience. The study protocol and results were published previously.[36] Trial recruitment was undertaken in the 18-bed general ICU of a single tertiary university-affiliated teaching hospital in Melbourne, Australia, and the study was conducted from October 2006 to March 2007. The institutional ethics review board approved the study, and informed consent was obtained from either the individual or a substitute decision maker.

Procedures

Two investigators (EHS and KJH) retrospectively screened subjects' medical records, searching for documented assessment and/or treatment entries completed by physiotherapists, exercise physiologists, or allied health assistants. In the institution, exercise physiologists or allied health assistants provide functional maintenance (ie, specific [eg, arm and leg] exercises and/or mobility, including ambulating or marching on the spot) activities as directed and supervised by physiotherapists on acute wards (not the ICU). Entries in the patient progress notes of the medical record were required to be titled physiotherapy or exercise physiology or to be recorded on the designated physiotherapy or functional maintenance program documentation forms. All progress notes and physiotherapy/functional maintenance program

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forms in each medical record were searched by hand for such entries. Relevant data were extracted from subjects' medical records. Five medical records were randomly selected to undergo a single episode of repeat data extraction to authenticate and verify the data.

The typical physical therapy service in the ICU during the period of the study consisted of 4 physiotherapists working 8 h/d during weekdays and 2 physiotherapists working on weekend days (6 h each) in an 18-bed ICU. The typical physical therapy service on the acute wards consisted of one physical therapist working 8 h/d during weekdays per ward (on average, 28 beds/ward) and with one physiotherapist working 8 h/d on weekend days covering all acute hospital wards (not the ICU).

Outcomes

The total number of physiotherapy, exercise physiology, or allied health assistant entries and the specific details of respiratory therapy and mobility/rehabilitation activities performed were retrieved from the medical records for each subject. An entry was defined as a record of a patient contact, dated and signed by a treating therapist. Outcomes of relevance were defined by comparison with existing literature[1,29,30,37] (eg, time to sitting out of bed, time to standing and walking away from the bed, and mean/median distance walked). Other modalities of mobilization/rehabilitation treatment (eg, passive slide transfer out of bed, sitting on edge of bed, and ambulating) were recorded. The incidence of adverse events was also extracted. Adverse events were not defined a priori but were considered to have occurred when physiotherapists documented that they ceased their treatment on the basis of the event.

Data Analysis

Frequency and descriptive data are presented in table format. Data are reported as median (interquartile range [IQR]) unless otherwise specified. Statistical analysis was performed using SPSS 15.0 (SPSS, Chicago, Illinois), and statistical significance was accepted as $P < .05$. Due to the nature of the study (retrospective data extraction from the medical record), there were no missing data; however, it is possible that additional treatments may have been provided to the included subjects but not documented by the treating therapist in the medical records. There was no way to quantify or address this possibility. No sensitivity analyses were relevant or performed.

Results

During the study period, 100 subjects were recruited (Fig. 1). Demographic, admission, and mortality details of the cohort are presented in Table 1, with 74% of the sample requiring mechanical ventilation. Following acute hospital discharge, 36% returned home without additional support, 30% returned with home-care support, 22% were discharged to in-patient rehabilitation, 8% were transferred to other hospitals, and 4% were transferred to other destinations. The median (IQR) number of treatment entries per subject was 5 (3–9) in the ICU (median ICU stay of 4.3 [3–7] d) and 6 (2–12) on the acute wards (median ward stay of 13.3 [6–28] d). Documented physiotherapy treatment provision in the ICU and on the wards is presented in Figure 2. Twenty-four adverse events (3.5%) were recorded in the ICU physiotherapist entries (drop in blood pressure, $n = 15$), of which 10 (1.5%) resulted in treatment cessation and 3 (0.4%) required medical intervention (noradrenaline commenced/restarted [2] and increase in noradrenaline infusion rate [1]). Seventeen adverse events (1.8%)

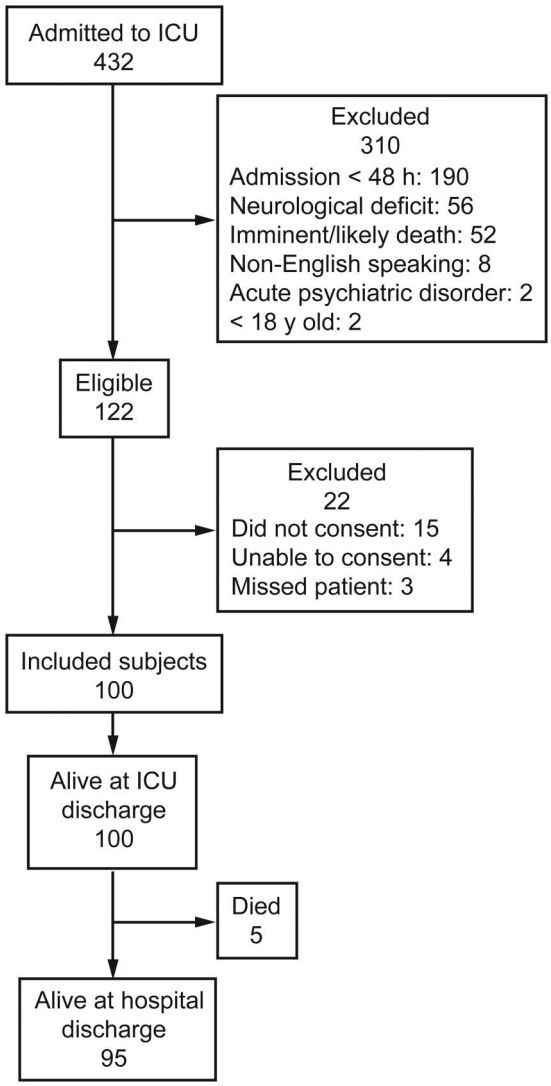

Fig. 1. Flow chart.

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Table 1. Demographic, Admission, and Mortality Details of the Cohort

Variable	Cohort ($N = 100$)
Age, y	61 (49–73)
Males, %	59
Medical/surgical diagnosis, *n*	41/59
Cardiac	28
General surgery	16
Medical	16
Respiratory	12
Sepsis	12
Organ transplant	7
Thoracic surgery	6
Vascular/orthopedic surgery	3
APACHE II score	17 (13–21)
ICU stay, d	4.3 (3–7)
Required mechanical ventilation, %	74
Mechanical ventilation duration, h	39.2 (19–84)
ICU mortality, %	0
ICU readmission, %	18
ICU stay ≥5 d, %	46
Hospital stay, d	18.5 (11–34)
Hospital mortality, %	5

Values are presented as median (interquartile range) unless otherwise specified.
APACHE II = Acute Physiology and Chronic Health Evaluation II

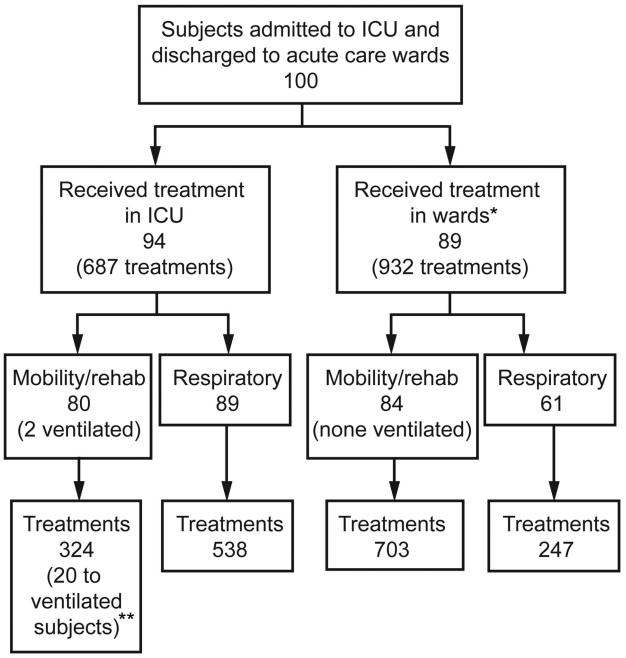

Fig. 2. Documented physiotherapy treatment provision in the ICU and on the wards. * One received treatment only as part of the functional maintenance program (a daily program consisting of either a group class or 1:1 review coordinated by physiotherapists and conducted by allied health assistants). ** Number of treatments delivered while subjects were ventilated ($n = 2$ in the ICU, $n = 0$ on the acute wards). Six subjects of 100 (6%) and 11 subjects of 100 (11%) were not documented to have received physiotherapy assessment or treatment in the ICU or on the acute wards.

were recorded in the ward entries (desaturation after or during ambulation, $n = 16$), of which only one (0.1%) resulted in treatment cessation, with no treatments requiring medical intervention (3 events [0.3%] resolved with application of supplemental oxygen via nasal cannula).

Treatments Including Respiratory Techniques

The most common tasks performed by physiotherapists for subjects who were intubated and mechanically ventilated were positioning ($n = 188$; predominantly side-lying [$n = 178$] and head-down tilt [$n = 109$]), ventilator hyperinflation ($n = 145$), and suctioning ($n = 184$). The techniques of head-down tilt and ventilator hyperinflation were performed as described previously.[38,39] PEEP was increased on 11 occasions, and manual hyperinflation was used on only 2 occasions. The most common tasks performed for subjects who were not intubated were positioning ($n = 92$; predominantly side-lying [$n = 48$] and sitting up in bed [$n = 43$]; also head-down tilt [$n = 16$]), CPAP ($n = 41$), and deep breathing/coughing and exercise/active-cycle-of-breathing techniques ($n = 119$ and $n = 50$, respectively), with encouragement of deep breathing and cough delivered on 59 occasions. The most common respiratory modalities used on the acute wards were deep breathing and coughing ($n = 93$), deep breathing only ($n = 63$), directed coughing only ($n = 42$), active-cycle-of-breathing techniques ($n = 43$), positioning ($n = 40$; predominantly side-lying and sitting up in bed [$n = 18$, respectively]), positive expiratory pressure ($n = 30$), and normal saline nebulization ($n = 17$). Physiotherapists altered the oxygen concentration/mode of delivery or removed subjects from positive pressure devices on 25 occasions.

Treatments Including Mobility Techniques

The median (IQR) number of ICU treatments that included mobility tasks was 3 (1–4). Mobilizing the individual in and out of bed was the most frequent activity performed by physiotherapists in the ICU (Table 2). Of these subjects, 54 (68%) had 102 treatments that included more than one task (eg, sliding out of bed and sitting to standing, step transferring out of bed and ambulating). Two subjects (2.0%) received mobility/rehabilitation techniques while ventilated via tracheostomy (no individuals received these techniques while ventilated via an endotracheal tube), with each individual receiving 1 and 19 treatments, respectively (specifically, standing and/or march-

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Table 2. Mobility Techniques in ICU

Mobility Technique ($N = 441$)	Total No. of Therapies
Transferring in/out of bed ($n = 220$), *n*	
Sliding out of bed	113
Sliding into bed	2
Step transferring out of bed	77
Step transferring into bed	14
Sitting out of bed (unknown)	7
Returning to bed (unknown)	6
Stepped up bed	1
Standing ($n = 25$), *n*	
Repeated sitting to standing	15
Standing (sustained)	10*
Mobilization ($n = 196$)	
Marching in place, *n*	86
Duration, median (IQR) min	0 (0–3)
Duration, mean ± SD min	2.3 ± 5.2
Ambulating, *n*	110
Average distance per treatment, median (IQR) m	0 (0–60)
Total distance, median (IQR) m	0 (0–120)
Total distance, mean ± SD m	76.0 ± 127.1

$n = 80$ subjects.
* Includes weight shift while standing ($n = 2$).

Table 3. Mobility Techniques in the Acute Wards

Mobility Technique ($N = 924$)	Total No. of Therapies
Transferring in/out of bed	
Step transferring out of bed	183
Step transferring into bed	24
Sitting out of bed/returning to bed	11
Sitting out of bed (unknown)*	4
Transfer practice	3
Slide board out of bed	1
Standing	
Sitting to standing	22
Standing frame	4
Standing balance	1
Mobilization	
Ambulating	390
Average distance per treatment, median (IQR) m	44 (8–78)
Total distance, median (IQR) m	100 (40–305)
Total distance, mean ± SD m	249.6 (389.1)
Marching in place	26
Stairs/step assessment	26
Sitting on edge of bed	6
Gait assessment	2
Sitting balance	2
Rehabilitation	
Functional maintenance program (ward-based exercise group/program)	215†
Gym	4‡

$n = 84$ subjects.
* Method unspecified.
† Seen by an exercise physiologist ($n = 13$).
‡ Cycling for 10 min and cycling for 5 min.

ing on the spot). The median number of days from ICU admission to sitting out of bed with a physiotherapist was 3 (1–5). The median number of days to standing and walking away from the bed was 3 (2–6) and 5 (3–8), respectively, and 47.0% of people ambulated in the ICU (none while ventilated).

The proportion of entries involving mobility or rehabilitation increased from 47% in the ICU to 75% on the wards (see Fig. 2), and 80% of subjects ambulated on the acute wards. The most frequent type of activity used by physiotherapists in the acute wards was mobilization (Table 3). Fifty-eight subjects (69%) received 182 treatments that included multiple tasks (eg, step transferring out of bed and ambulating) on the wards. A comparison of ambulation distances of the current cohort with those in previously reported studies is presented in Table 4.

Discussion

Auditing of usual care is not commonly reported in the critical illness literature. However, there are many benefits to documenting usual or standard care. First, exposure to usual care (in this case, early activity or mobility) may influence disease outcomes or regulate or modify the outcomes of critical illness.[27] For example, there is some evidence that early mobility reduces the duration of delirium.[1] Therefore, being able to explain the exposure to mobility and activity would be important in quantifying outcomes of delirium. Second, documentation of usual care allows comparisons of standard care between national and international ICUs. This may be important in considering the dose effect of various treatments, the effect of treatment (if any) on outcomes, and the effect of treatment on different patient populations or in different cultural settings. Third, high numbers of Australian physiotherapists report using mobilization techniques for people admitted to the ICU.[17] However, it is known that therapist self-reporting is not necessarily reflective of practice,[25] which highlights the importance of regular auditing. Finally, audits of usual care allow a comparison between standard care and the existing evidence base, which is critically important in the ultimate goal of translating research findings into practice.

A much higher proportion of physiotherapy service was directed to the provision of respiratory care and respiratory techniques in the ICU compared with mobilization and rehabilitation. This finding was reversed on the acute wards, where the focus shifted to the provision of mobilization and rehabilitation. Historically, the evidence base for phys-

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Table 4. Comparison of Ambulation Distances With Those in Other Rehabilitation Studies

Reference	Setting	Group	*n*, % Physical Therapy	Ambulation Distance
Current study	Australian medical and surgical ICU	Usual care	80	ICU: total mean 75.9 m, median 0 (0–120) m
				Average distance/treatment: mean 31.1 m, median 0 (0–60) m
			83	Ward: total mean 249.6 m, median 100 (40–305) m
				Average distance/treatment: mean 51.2 m, median 44 (8–78) m
				ICU discharge: median 0 (0–58) m, 47% ambulated. Ward discharge: median 50 (5–100) m, 80% ambulated.
Pohlman et al[30]	US MICU	Intervention	49	ICU mechanical ventilation: 15% ambulated; in those capable, median 15 (15–20) feet
Zanni et al[29]	US MICU*	Usual care	60†	ICU discharge: 1 (6%) ambulated with unlimited distance; median 0 (0–11) feet (limited)
				Hospital discharge: 3 (19%) ambulated with unlimited distance; median 2 (0–200) feet (limited)
Schweickert et al[1]	US ICU	Usual care	55	Hospital discharge‡: median 0 (0–30.4) m
		Treatment	49	Time from intubation to: out of bed 6.6 (4.2–8.3) d, standing 6.0 (4.5–8.9) d, marching in place 6.2 (4.6–9.6) d, transferring to a chair 6.2 (4.5–8.4) d, walking 7.3 (4.9–9.6) d
				Hospital discharge‡: median 33.4 (0–91.4) m
				Time from intubation to: out of bed 1.7 (1.1–3.0) d, standing 3.2 (1.5–5.6) d, marching in place 3.3 (1.6–5.8) d, transferring to a chair 3.1 (1.8–4.5) d, walking 3.8 (1.9–5.8) d
Chiang et al[40]	Taiwanese RCC	Usual care	19§	None ambulating at end of 6-wk training period
		Treatment	20§	After 6 wk of training: 5 (29%) able to walk around bedside with moderate assistance, 4 (24%) able to walk for minimum of 50 m under supervision or with minimal contact assistance
Martin et al[41]	US VRU	Usual care	49§	On admission: 0 (0%) able to walk, all bed-bound
				On discharge: 40 (81%) able to ambulate, mean ± SD distance 52 ± 18 feet
Bahadur et al[42]	UK ICU	Usual care	30‖	ICU: 63% sitting out of bed, median no. of mobilizations¶ 2 (0–11), 176 mobilizations in 19/30 subjects who mobilized (77 sitting on edge of bed, 99 sitting out of bed), median *n* subjects sitting on edge of bed 2 (1–7), median *n* subjects sitting out of bed 4 (2–8)
Thomsen et al[43]	US RICU	Usual care	104*	48 h pre-RICU transfer: 6% of subjects ambulated
				24 h pre-RICU transfer: 11% of subjects ambulated
				24 h post-RICU transfer: 28% of subjects ambulating
				48 h post-RICU transfer: 41% of subjects ambulating
		Treatment	91	On last day of RICU admission: mean ± SD ambulation distance 238 ± 191 feet, median 200 (0–800) feet

Values are express as median (interquartile range) unless indicated otherwise.
* Subjects receiving mechanical ventilation for >4 d.
† Physical therapy and/or occupational therapy.
‡ Greatest walking distance at hospital discharge.
§ Subjects receiving mechanical ventilation for >14 d.
‖ Subjects with a tracheostomy.
¶ Mobilization includes sitting out of or on edge of bed.
MICU = medical ICU
RCC = respiratory care center (post-ICU unit)
VRU = chronic ventilator-dependent rehabilitation unit (post-ICU unit)
RICU = respiratory ICU

iotherapy in the ICU has largely supported respiratory care, particularly multimodal care such as postural drainage and manual hyperinflation,[44] head-down tilt,[39] manual techniques, and suction.[45] However, conflicting evidence has demonstrated the limited value of lateral positioning[46] and little effect of physiotherapy respiratory care on clinically important outcomes such as ventilation duration and ICU and hospital stay in certain populations,[47,48] such that its benefit remains uncertain.[49] Since this study was conducted, several studies demonstrating beneficial effects of early mobilization and rehabilitation on clinically important outcomes have been published,[1,2,27] and it is possible that translation of these findings into practice may have increased the subsequent provision of rehabilitation and mobilization in critical care units in Australia. Although a single multi-center observational study has been conducted

to investigate early mobilization,[34] further multi-center empirical studies are required to examine the broad provision of usual care by physiotherapists because this is the first study to report on respiratory care activities provided by physiotherapists in Australia.

This is the first Australian study to publish details of the physiotherapy care received by subjects on the acute wards, independent of the conduct of a clinical trial subject to the Hawthorne effect, where people receiving usual care physiotherapy completed an average of 22 min of mobility and rehabilitation/d.[31] The frequency of physiotherapy treatment in the studied cohort was much higher in the ICU (median of 5 treatments in just over 4 d) compared with the ward (median of 6 treatments in ~14 d). These results could be from differences in physiotherapy staffing ratios or subjects gaining independence in mobilization on the wards; however, the results may also reflect differences in patient priority as determined by physiotherapists in the acute ward setting. Clinical priorities on acute wards focus on hospital discharge, and patients with a longer hospital stay (eg, patients admitted to the ICU) may have physiotherapy treatment interspersed during their stay rather than delivered at high intensity. Ward physiotherapists may not value rehabilitation as highly in this cohort compared with non-ICU acute ward patients, particularly given the high in-hospital mortality,[50] or may feel that functional goals are best achieved or targeted in subacute rehabilitation rather than in the acute hospital, as evidenced by almost one fourth of the sample being discharged to in-patient rehabilitation. Further research should examine the factors that influence the frequency of physiotherapy in ICU patients on acute wards and its relationship to discharge destination.

Upon simple comparison, it appeared that this cohort was mobilized more compared with other published international cohorts. The overall number of treatments in the ICU (median of 5 treatments/subject over a median of 4 d) compared favorably with other studies (eg, ambulation occurred on 16% of occasions compared with 4% with a median of 2 treatments/subject).[29] Another North American study reported that 27% of subjects suffering acute lung injury received physical therapy in the ICU, with treatment occurring on only 6% of ICU days,[51] compared with the current study, in which 80% of subjects participated in mobility or rehabilitation activities in the ICU delivered by a physiotherapist. The current cohort ambulated an average distance per treatment of 44m (median) on the acute wards and sat out of bed in a median of 3.0 d compared with 2 landmark rehabilitation studies in which intervention subjects ambulated a median of 33 m upon hospital discharge,[1] and the usual care and intervention groups sat out of bed in 11.3 and 5.0 d.[26]

However, it is difficult to directly compare the amount of mobilization provided to this cohort with other studies internationally because considerable heterogeneity exists in inclusion criteria between studies. The current cohort were mostly male with a relatively low median APACHE II (Acute Physiology and Chronic Health Evaluation II) score of 17, recruited with an ICU stay of >48 h. Mechanical ventilation was not a requirement for inclusion, although 74% of the cohort received mechanical ventilation. Comparable studies recruited younger subjects ventilated for >24 h with higher median APACHE II scores and higher hospital mortality yet much shorter hospital stays (13.5 vs 18.5 d).[1] Although the lower severity of illness in the current cohort could influence the results, unit culture is a higher contributor to the likelihood of mobilization than APACHE II scores.[43] Recent Australasian data support the hypothesis that the mobilization provided is higher than internationally,[31,32] although mobilization levels are still low.[33,34] It should be noted that the unit in which this study was conducted may compare favorably with other Australasian units, where it was reported that subjects requiring prolonged ventilation sat out of bed in a median of 13 d.[37] Therefore, the single-center nature of this study is a limitation, and results may not be generalizable to all Australasian ICUs.

Models of care and population differences may also contribute to differences observed internationally. The model of physical therapy in North America differs considerably from that in Australia, where a majority of ICUs have a physiotherapy service led by senior physiotherapists with >5 y of experience working in the ICU.[17] Zanni et al[29] noted in their study that therapists were not exclusively available for the management of subjects admitted to ICU, and the median (IQR) time from ICU admission to initial ICU evaluation by physical therapy and/or occupational therapy was 10 (7–12) d. Furthermore, differences in organizational structure and the delivery of care (eg, open vs closed ICUs) may influence any observed variability in outcome from critical illness.

Population differences may also be significant and extend to other aspects of usual care (eg, intubation and ventilation practices). It is possible that patients mechanically ventilated via an endotracheal tube do not undergo a high frequency of mobilization in Australian ICUs, as observed in the current study, where the only 2 subjects mobilized during mechanical ventilation were tracheostomized and had the longest ventilation duration in the cohort. This was supported by 2 studies: mobilization occurred on only 17% of occasions in ventilated subjects in the first study,[34] and no individuals were mobilized during mechanical ventilation via an endotracheal tube during the study day in the second study.[33] There may be several possible reasons for this, including the possibility that patients are ventilated for shorter durations in Australian ICUs (or alternatively, time to tracheostomy may be shorter).[52-54] For example, existing data show that me-

chanically ventilated Australian and New Zealand subjects with H1N1 influenza were ventilated for a median (IQR) of 10 (4–23) d[55] compared with Canadian survivors with ARDS who were ventilated for a median of 21 (12–40) d.[56] It is also possible that there may be a higher perceived lack of benefit (and evidence) for mobilization during relatively short periods of intubation.[35] However, in the context of meta-analyses in support of the provision of mobilization and early rehabilitation in the ICU,[27] it is clear that increased focus should be on the translation of this evidence into practice.[35] Furthermore, it should be noted that few published studies have reported adherence to mobilization protocols during mechanical ventilation or the mobilization protocol levels achieved. It also remains unclear whether the time to first mobilization is more important than whether people mobilize during mechanical ventilation. The clinical importance of the dosage or achievement of any mobility level also remains unclear, and no studies to date have compared outcomes with specific mobility achievement(s), although ambulation distance has been associated with discharge destination in one study.[57] Future studies to investigate the relevant aspects of mobilization dosage (ie, timing, frequency, duration, and intensity) and their association with specific outcomes (eg, dose-response relationships) are required. We were unable to extract any data about clinical decision-making or reasons for treatment selection because physiotherapists in Australia do not routinely record these, although it should be noted that the context of physiotherapy intervention might differ from that in other international settings. Because a large majority (86%) of Australian ICUs operate under a blanket referral system, physiotherapists assess and deliver treatment in an autonomous manner (in consultation with the multidisciplinary team), in contrast to other international settings, where treatment selection may be made by other team members and prescribed for physiotherapists to carry out.

There were several limitations to this study. First, data extraction was retrospective, although the data were prospectively recorded in the medical records by the treating therapists. A medical record is considered the administrative and clinical record of patient care and is probably an accurate account of clinical management; however, it is possible that additional physiotherapy activities may have occurred that were not documented, particularly attempted mobilization, or that an additional volume of the reported activities was provided by other clinical disciplines (eg, nursing) or family. However, existing Australian data in acute care show that physiotherapists are responsible for almost 90% of occasions of first mobilization from the bed.[58] Therefore, it is likely that the majority of early mobilizations were captured. In this retrospective audit, it was also not possible to record reasons why subjects were not mobilized (ie, in this study, only 2% of subjects received mobilization/rehabilitation techniques during intubation with an endotracheal tube), nor was it possible to extract barriers to mobilization. Several published studies have prospectively collected these data,[31,34,59] and this information should be used in future implementation designs to maximize research translation of mobilization of ventilated patients into practice.[35] The results of other empirical studies should also be used to address longstanding barriers to early mobilization in the ICU, such as renal replacement therapy delivered via vascath.[59,60] It was also impossible to tell from the medical records whether the therapy that individuals received was the maximum intensity that they could tolerate, which may be important in the evaluation and interpretation of the effects of rehabilitation.[61]

A consensus is urgently needed to define mobility outcomes of interest that can be routinely collected by all ICUs within the clinical and research settings to facilitate comparison of data from multiple outcome sets more accurately. Future studies should also consider how to determine whether the timing, intensity, duration, and frequency of treatment are maximal or submaximal for individuals because it was not clear in this study whether subjects could or should have done more on any occasion that they received therapy. An empirical dose-response study of varying levels of therapy and service delivery would be beneficial both from a clinical and health-service delivery perspective.

Conclusions

Subjects admitted to an Australian ICU received a higher frequency of treatment/d in the ICU than on the ward. The median number of days from ICU admission to sitting out of bed with a physiotherapist was 3. The most common mobilization techniques employed by physiotherapists in the ICU were ambulating from the bed and transferring the subject out of bed. The frequency of mobilization or rehabilitation increased from 47% in the ICU to 75% on the wards, and 80% of subjects ambulated on the acute wards. The most frequent type of activity used by physiotherapists in the acute wards was mobilization. The amount of mobilization and physiotherapy treatment provided to the cohort was higher than that reported in international studies to date. A consensus is required to ensure consistency of data collection across international studies, and future studies should consider how to define whether the therapy delivered was optimal for the individual.

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