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### Physiotherapy Services in the Australian ICU



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Physiotherapists are key members of the Australian intensive care unit multidisciplinary team, providing respiratory management, exercise and mobilisation. Here, evidence underpinning the roles of physiotherapists and future challenges are highlighted.

Physiotherapists have provided services to intensive care units from the early period of their establishment within the Australian healthcare system. They are an integral member within intensive care units that provide complex critical care for patients. Through their university education and registration, physiotherapists are able to be primary contact practitioners, giving them a foundation for autonomous, evidence-based practice in patient assessment and patient care, with or without medical or nursing referral.

Within the ICU of an Australian hospital, physiotherapists often maintain this autonomy while working together within the ICU multidisciplinary team and recognising the "closed" model of care that is often practised, where the intensivist leads the management and delivery of all care provided to the patient (Hackner et al. 2009).

Physiotherapists possess an extensive knowledge of human anatomy, physiology and movement that allows them to provide comprehensive patient assessment and treatment across a large range of clinical areas. In the ICU a physiotherapist's education and skills can be extended to include the conduct of comprehensive multi-system assessments of the neurological, respiratory, cardiovascular and musculoskeletal systems to formulate individualised treatment plans for patients across the spectrum of admission categories and throughout the various stages of critical illness.

ICU Level	Capability	Capacity and caseload
<b>Level III</b>	A tertiary referral unit capable of providing comprehensive critical care including complex multi-system life support for an indefinite period. Level III units should have a demonstrated commitment to academic education and research.	At least eight staffed/equipped beds, providing → 400 mechanically ventilated patients per annum.
<b>Level II</b>	Capable of providing a high standard of general intensive care, including complex multi-system life support, which supports the hospital's delineated responsibilities. Provides mechanical ventilation, renal replacement therapy and invasive cardiovascular monitoring for an indefinite period providing appropriate speciality support is available within the hospital.	At least six staffed/equipped beds, providing → 200 mechanically ventilated patients per annum.
<b>Level I</b>	Capable of providing immediate resuscitation and short-term cardiorespiratory support for critically ill patients. Major role in monitoring and prevention of complications in "at risk" medical and surgical patients. Capable of providing mechanical ventilation and simple invasive cardiovascular monitoring for a period of at least several hours.	The number of ICU beds and number of patient admissions should be sufficient to maintain clinical skills by both medical and nursing staff.

**Table 1.** Minimum Standards for Intensive Care Units in Australia  
**Source:** College of Intensive Care Medicine of Australia and New Zealand (2011)

The focus of physiotherapy treatment has traditionally included the provision of respiratory treatment to ventilated and non-ventilated patients and the generalised provision of exercise, mobilisation and rehabilitation. In recent years, the importance of early mobilisation and rehabilitation has been highlighted (Kayambu et al. 2013; Needham et al. 2010; Schweickert et al. 2009), leading to a greater emphasis on this component of clinical practice.

### Respiratory Physiotherapy Management

The main goals of respiratory physiotherapy management in the ICU are to promote airway clearance and optimise ventilation, lung volume and oxygenation in order to prevent or manage respiratory complications. To meet these goals a range of treatment options may be used, often in combination. This includes patient positioning, breathing exercises, percussion and vibrations, and positive expiratory therapy (Pryor 1999; Thomas et al. 2006). To facilitate secretion clearance, physiotherapists use techniques that assist or stimulate coughing, including the use of mechanical insufflation-exsufflation, and perform nasal, oral and endotracheal suctioning. In the intubated, mechanically ventilated patient, manual hyperinflation (MHI) has traditionally been utilised, and more recently ventilator hyperinflation has emerged as an alternative to MHI, with surveys suggesting it is practised within 20% - 40% of tertiary hospitals within Australia (Dennis et al. 2010; Hayes et al. 2011). MHI when combined with positioning/postural drainage can increase sputum yield (Hodgson et al. 2000). Positioning and MHI combined with percussion, vibration and suctioning can be an effective treatment for acute lobar atelectasis (Stiller et al. 1990), and possibly used as an alternative to bronchoscopy (Marini et al. 1979). However, it is difficult to determine the effect of respiratory physiotherapy on clinical outcomes like the incidence of or duration of ventilator-associated pneumonia, ventilator-free days and intensive care or hospital length of stay, due to the limited research conducted specifically in ventilated patients (Ntoumenopoulos et al. 1998; Ntoumenopoulos et al. 2002; Patman et al. 2009). However, respiratory physiotherapy is widely practised in Australia and is considered safe (Zeppos et al. 2007).

In many hospitals, physiotherapists will independently review all ICU patients and participate in daily ward rounds. In order to maximise the potential benefits gained from physiotherapy, resources are often directed towards patients with actual evidence of pulmonary complications like atelectasis or nosocomial pneumonia, patients with increased sputum load, or interventions are targeted at certain high-risk populations. For example, in patients with acute quadriplegia, extubation and intensive physiotherapy treatment, including use of an overnight after-hours service may reduce ICU length of stay compared to performing a tracheostomy in these patients (Berney et al. 2002). The knowledge and skills in respiratory management held by physiotherapists are also recognised through their inclusion in tracheostomy outreach teams (Cameron et al. 2009) and roles in delivering noninvasive ventilation (Holland et al. 2003; Menadue et al. 2010).

### Mobilisation and Rehabilitation

The use of mobilisation strategies has long been held as a core component of physiotherapy, particularly for mobilisation of postoperative, spontaneously breathing patients. While pulmonary complications and postoperative mortality may not be lowered by the provision of routine physiotherapy (Patman et al. 2001; Reeve et al. 2010), early ambulation is considered a core component of respiratory care, and in postoperative caseloads is safe and reduces hospital length of stay (Browning et al. 2007; O'Connor and Walsham 2009). Exercise, mobilisation and rehabilitation strategies are also frequently employed in other ICU caseloads, and Australian physiotherapists have shown leadership in research and education on this topic (Berney et al. 2013; Hodgson et al. 2014; Kayambu et al. 2013; Pary et al. 2014; Skinner et al. 2008; Stiller 2007; Thomas et al. 2014; Thomas et al. 2006).

Mobilisation and rehabilitation strategies that are used include the prescription of bed exercises, mobilisation out of bed into a chair either

passively or functionally, sitting balance activities, tilt table standing, and the use of functional activities (e.g. standing, walking, squatting) (Berney et al. 2013; Chang et al. 2004; Denehy et al. 2013; Skinner et al. 2008; Thomas et al. 2014). Recently, novel approaches like functional electrical stimulation combined with cycle ergometry have also been trialled (Parry et al. 2014). With international research emphasising the importance of exercise in preventing long-term sequelae in survivors of critical illness (Kayambu et al. 2013; Needham et al. 2010; Schweickert et al. 2009), Australian physiotherapists continue to review their practice and perceptions around exercise in the critically ill to ensure its safe, yet assertive implementation (Berney et al. 2013; Hodgson et al. 2014; Stiller 2007).

The services provided by physiotherapists in the Australian healthcare setting are similar to those in the United Kingdom, but often differ from other parts of Europe and America (Hodgin et al. 2009; Norrenberg and Vincent 2000). While evidence-based practice is embedded within the Australian physiotherapy curricula, there is some variability between Australian states and centres in ICU clinical practice. This may be due to the quality of available evidence, but also differences in physiotherapy staffing levels and education and training for ICU practice.

The minimum standards for intensive care units produced by College of Intensive Care Medicine (2011) outline medical, nursing and ancillary staff requirements according to three levels of ICU services (see Table 1). While medical and nursing workforce recommendations include patient to staff ratios and education requirements, recommendations for physiotherapy services are limited. For Level II and III ICUs, the minimum recommendation outlined is access to physiotherapists on request 24 hours. No other nationally accepted or professional affiliated guidelines exist. Empirical evidence linking specific allocations of staff resources to patient outcomes is often limited across health professions (West et al. 2009), and official recommendations for physiotherapy staffing of ICUs or for services to be delivered in rehabilitation in the ICU are also lacking internationally (Nava and Ambrosino 2000). It is important for each profession in ICU to establish staffing recommendations based on expert clinical practice, research and recognised professional responsibilities, including education, quality and administrative requirements. Considerations about patient safety, the quality of care, the clinical effectiveness and efficiency of healthcare interventions are paramount in this. Hospital-based healthcare in Australia is provided by both private and government institutions that includes a universally free hospital system. In the private sector physiotherapy services are often not covered, and the patient must pay for services or it may be covered under private health insurance. Most Level 3 intensive care units are within the public sector, and while physiotherapy services are generally available, without specific guidelines to standardise staffing levels the services provided to ICUs are varied. Future guidelines need to expand recommendations for physiotherapy resources to ensure the benefits of these services are realised.

Additional factors that can impact on the service provided within Australian ICUs include the level of experience, education and training of physiotherapy staff. While comprehensive workforce data for Allied Health professionals in Australian ICUs is lacking, most Level 3 ICUs have at least one senior physiotherapist on staff, who often has more than five years of critical care experience. The remaining ICU workforce tends to consist of less experienced staff, who often rotate through varied rosters within the hospital. Junior staff are often required to contribute to ICU services, due to the size and caseload of each unit and need to provide after-hours services.

While entry-level physiotherapy education and training is comprehensive across the fields of cardiorespiratory, musculoskeletal and rehabilitation practice, it is generally acknowledged that the entry-level qualification does not provide adequate skills to enable junior staff to work autonomously in ICU, and therefore further education and training is required. Despite this, there is no specific training programme for physiotherapists to work in ICU in Australia. Physiotherapy departments frequently provide internal training for staff, and/or staff may access lectures, seminars or formal courses, including simulation-based education delivered by professional bodies or clinical leaders. This varied training and education further contributes to the differences in the role and practice of physiotherapists across Australia, and may impact on the ability to achieve desired outcomes from respiratory and rehabilitation therapies.

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