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Rehabilitation of the Critically Ill: The Role of Allied Health Professionals

Rehabilitation and recovery following ICU admission aims to improve patient outcomes, optimising function and recovery. Allied health professionals are key members in the multidisciplinary team, positively contributing to the rehabilitation pathway.

Survivorship after admission to intensive care (ICU) has moved beyond mortality. Reducing associated morbidity, and improving the quality of physical, cognitive, and psychological recovery for patients is the primary focus and goal of the multidisciplinary team (MDT). The COVID-19 pandemic has increased utilisation of ICU beds globally (Grasselli et al. 2020; Richardson et al. 2020), highlighting the need to plan and implement rehabilitation services on a larger scale, during and after ICU discharge (Ceravolo et al. 2020; Hosey and Needham 2020). This narrative review aims to describe the essential role of allied health in the recovery and rehabilitation of adults across the arc of care from ICU admission through to post-hospital settings.

Allied health professionals (AHP) work within the multidisciplinary team, to provide expertise in the assessment and diagnosis of functional, biological and psychosocial impacts of illness and rehabilitation of patients admitted to ICU. Although there are a number of diverse professions within allied health, published evidence has reported the benefits of dietetics, physiotherapy, social work, and speech pathology within provision of ICU care to enhance patient rehabilitation and outcomes (Berney et al. 2012; Freeman-Sanderson et al. 2016; Hodgson et al. 2016; Tipping et al. 2017). Recently with the global pandemic, ICU workforce planning with AHP inclusion is a pivotal component of ICU recovery pathways (Marshall et al. 2020;

National Post-Intensive Care Rehabilitation Collaborative 2020; Ridley et al. 2020b). Workforce training and skill development are indicated to provide this specialist level of care (Intensive Care Society 2018). The provision of patient-centred care from AHPs aims to reduce impairment, to increase activities and participation that considers and reflects individuals' needs and goals during and after their admission to ICU.

Admission to the ICU can result in both short and long-term physical, psychological, and cognitive changes to an individual's function - recognised as post-intensive care syndrome (Needham et al. 2012). Increased severity of illness and necessitation of prolonged mechanical ventilation can result in physical impairments including decreased mobility, muscular strength, endurance, and reduced nutrition intake. Yet the ability to predict post-ICU impairments is currently limited (Haines et al. 2020). A combination of physical and cognitive impairments after ICU admission impact on an individual's activities beyond hospital discharge, with one third of ICU survivors unemployed 60 months post-admission (Kamdar et al. 2020; McPeake et al. 2019b).

The World Health's Organization International Classification of Functioning, Disability and Health (ICF) is a framework for measuring an individual's health status across the domains of function, participation and activity, and in various environments and contexts (World Health Organization 2001). Measuring health status needs to

consider the impact beyond impairment itself, and consider impact on function and wider social and community participation. Additional to measurement of function and disability, quality of life is an important construct but is unique to each individual and their own conceptualisation. Within the critical care context, AHPs work to address future disability and to maximise patient participation, which has societal impacts. Our patient-centred approach to care delivery specifically addresses key elements of the WHO's ICF framework.

Dietetics

The role of the dietitian within critical care varies internationally depending on the country of training and practice. In many settings, Dietitians specialising in critical care provide expert recommendations based on many aspects of nutrition care including use of medical nutrition therapy for various clinical conditions and modification of dietary strategies to improve nutrition intake.

As the focus of the MDT moves to survivorship and quality of recovery, we are also learning about nutrition and the challenges during critical illness. Thus, the role of the dietitian is expanding to encompass more of the varied skills dietitians can offer, but which were not utilised previously in critical care. In previous years, the focus of nutrition was during the ICU period alone, and specifically on the provision of nutrition via a gastric tube (enteral nutrition) or intravenously (parenteral nutrition). Literature has shown in the past that dietitians spend the most amount of time with patients who are within ICU receiving enteral nutrition (Chapple et al. 2016). But, as the population within critical care, medical care and our understanding of nutrition has evolved, it is becoming clear that those who eat oral food and/or are non-mechanically ventilated may be at greatest nutrition risk. Multiple studies have now shown that oral nutrition intake both within and outside of ICU in criti-

cally ill survivors is well below clinician estimates (Peterson et al. 2010; Ridley et al. 2020a; Ridley et al. 2019; Rougier et al. 2020) and the issues faced by patients in relation to ability to eat are far more complex than originally appreciated and can be loosely divided in patient, clinical and system factors (Ridley et al. 2020a). It is now vitally important that effective models for nutrition care that will assist in patient recovery are explored.

Within ICU, dietitians play an important role in the advocacy and monitoring of nutrition progress within the context of the individual patient's clinical condition, as well as providing expert advice regarding strategies to manage any problems encountered. In the late ICU and post-ICU period, the role for dietitians should be to tailor individualised nutrition plans

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to patients based on the specific barriers each patient is facing regarding nutrition intake. This should include dedicated individual assessment, nutrition interview and counselling with patients and families to come up with a personalised plan. Other important considerations for the future that will contribute to our understanding about the impact of nutrition and dietitians in recovery include; education of medical and nursing in the understanding and appreciation of nutrition care, as well as the complex issues experienced (Merriweather

et al. 2014); advocacy for improvements in hospital food service systems to better meet patients nutrition needs (McCray et al. 2018), and ensuring a dedicated nutrition handover is provided on transfer from one hospital location to another (Merriweather et al. 2014). In the future, understanding the impact of extension of nutrition care beyond hospital discharge, to rehabilitations and/or home, as well as the model of care dietitians could use in these periods is a vital gap for investigation.

Physiotherapy

Physiotherapists are commonly embedded within the ICU team. Within some countries such as Australia, physiotherapists are primary contact practitioners (Berney et al. 2012). An advantage of the Australian model is that physiotherapists within the ICU can independently and comprehensively screen, assess, and treat physiotherapy amenable problems (Berney et al. 2012), without relying on other clinicians to make a referral to physiotherapy (where there is potential for some problems to be missed). Treating muscular weakness and restoring physical function via exercise rehabilitation, are primary aims of physiotherapy in the ICU setting, and across the spectrum of care.

Moderate to high quality evidence supports the use of physical rehabilitation interventions early in critical illness, although there is limited evidence of effects of interventions delivered post-ICU discharge (Connolly et al. 2016). Key exercise rehabilitation interventions can include functional retraining such as sitting, standing, marching on the spot or walking - all tasks with high-specificity to achieve a level of function to support discharge from hospital. Other newer modalities in the ICU include use of functional neuromuscular electrical stimulation, in-bed cycling (Nickels et al. 2020), and use of technological adjuncts such as Nintendo Wii video gaming. Families are also an integral aspect of supporting the rehabilitation process within and beyond the ICU, and should be invited to

be engaged in rehabilitation dependent on both patient and family preferences, and the ability of clinicians to support family members in this process (Haines 2018).

Post-ICU discharge, physiotherapists continue to care for patients across the arc of care. ICU-based physiotherapists often have experience working across this arc of care, which makes them uniquely positioned within the ICU team to provide this 'whole of health service' view, that is distinct from other members of the ICU team who often practice solely in the ICU setting. Such knowledge, experience, and skills may be leveraged to help support patients and their families across the transitions of care, which can be a source of high stress for patients and families.

Goals of ward-based care are to continue to restore the patient's function to a level that is commensurate with returning home or to supported living facilities, and to facilitate hospital discharge and referral onto community-based rehabilitation services. Post-ICU programmes such as ICU follow-up clinics and peer support groups are currently being explored as a strategy to mitigate post-intensive impairments (McPeake et al. 2019a). Such programmes are often designed replicating the interprofessional ICU team (Haines et al. 2019), and should include physiotherapists as experts in physical rehabilitation.

Social Work

Social workers consider the psychological, social, economic, cultural and environmental factors which impact the health and wellbeing of patients and their supports during an ICU admission. Social work in ICU aim to maximise independence, self-determination and the wellbeing of patients (Australian Association of Social Workers 2016; Simpson et al. 2016). A myriad of services are provided by social workers to patients and their support networks throughout their ICU admission and rehabilitation including psychosocial assessments, facilitation of complex communication between parties,

grief and bereavement support, adjustment to illness/reduced function, counselling, risk assessments, crisis intervention, practical assistance and education. Child focused approaches to care are also championed by social workers, where the impact of the ICU admission on the children's wellbeing and long term health is considered (Laurent et al. 2019). Locating social work in ICU allows for the identification of complex psychosocial needs, delivery of trauma informed interventions and initiation of complex discharge planning. Alongside the multidisciplinary team, social work expertly navigate the interface between health and community services (e.g. National Disability

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Insurance Scheme, Centrelink, housing services) throughout the patient's hospital admission and advocate for sustainable, patient centred care.

Decision making

In the ICU, social workers aim to optimise patient's capacity to make informed decisions, practice self-determination and receive equitable access to health care. Social workers play a key role in facilitating patient led decision making, particularly when decision making capacity is impaired. Expertise in relevant legislation and ability to navigate complex psychosocial situa-

tions allows social workers to maintain focus on patient's wishes and preferences, facilitate supported decision making and respond to risk during ICU admission and throughout rehabilitation. Furthermore, social workers in ICU provide support to patient's loved ones who face challenging decisions regarding medical treatment and shift to palliative approaches. Furthermore, social workers in ICU provide support to patient's loved ones who face challenging decisions regarding medical treatment and shift to palliative approaches.

Adjustment and loss

An admission to ICU commonly results in physical, psychological and social changes for patients and their supports. For many an ICU admission induces feelings of terror, dread, uncertainty, loss of control and fear of death. Concurrently, patients and families face psychosocial stressors associated with extended hospitalisation and changed function, including financial stress, homelessness, unemployment, child safety concerns, disability issues, immigration and legal matters (King et al. 2019; Moon & McDermott 2020). The location of a social worker in the ICU multidisciplinary team allows for timely specialist psychosocial support and counselling for patients and their support network.

Education and information

The delivery of repeated, clear and accessible health information to patients and their support networks during an ICU admission may improve understanding, reduce distress, aid long term recovery and initiate adjustment to changed physical, psychological and social abilities (King et al. 2019; Lee et al. 2009; Simpson et al. 2016). Social workers regularly assist in coordinating and supporting the delivery of complex health and social care information to vulnerable patients and their supports, through leadership of family meetings, engagement of communication supports, and regular 1:1 meetings (Simpson et al.

2016). Social workers continue this role as patients transition throughout the health service and require support to enter into the complex social care system, in readiness for discharge.

Speech Pathology

Speech Pathologists provide management and rehabilitation for communication and swallowing functions for patients during, and in the post-ICU recovery period (McRae et al. 2019; Royal College of Speech & Language Therapists 2020). Scope of practice extends to the management of both ventilated and non-ventilated patients, however models of care and access to speech pathology services vary across ICUs (Cardinal et al. 2020).

Communication

Communication is multifaceted and can encompass production of voice, speech, and language comprehension and expression. Patients admitted to ICU can experience one, or many changes to their ability to effectively communicate. Physical and environmental factors including underlying medical aetiologies, or iatrogenic sources as artificial ventilation via endotracheal and tracheostomy tubes can result in decreased communication function (Freeman-Sanderson et al. 2019). Speech pathologists provide restoration and rehabilitation of communication function during and after ICU admission, education, training, and advocacy for communication rights across the arc of recovery (McLeod 2018).

Specific to the ICU population, speech pathology aims to increase effectiveness of patient communication via voice restoration (Freeman-Sanderson et al. 2016; McGrath et al. 2019) or through provision of alternative and augmentative communication systems (Hemsley et al. 2012), ultimately aiming to increase patient involvement in their care choices and decisions (Karlsen et al. 2020). Disordered voice quality, or dysphonia, is commonly reported in patients post-extubation (Brodsky et al. 2018) result-

ing in altered voice quality and loudness. Recovery of voice can be protracted beyond ICU admission (Miles et al. 2018), with impacts of dysphonia leading to reduced participation in social settings, and reduced quality of life (Golub et al. 2006). There is also increasing evidence of cognitive communication deficits following critical illness and ICU admission (Helms et al. 2020) with persistent deficits equivalent to moderate traumatic brain injury (TBI) and mild Alzheimer's disease (Pandharipande et al. 2013). Social inclusion, participation, and relationships are negatively impacted with cognitive communication disorders (Palmer et al. 2016), highlighting a need for ongoing rehabilitation. The benefits of inclusion and training of communication partners on communication effectiveness in TBI have been established (Togher et al. 2013), and further investigation of the impact and effectiveness of communication rehabilitation post-ICU is needed.

Swallowing

Changes to function including the ability to safely and effectively swallow, eat, and drink are commonly reported during and post ICU (Brodsky et al. 2020a; Macht et al. 2011). Disordered swallowing, termed dysphagia, is a common sequelae of ICU admission and is multifactorial in aetiology (Skoretz et al. 2020; Skoretz et al. 2010). Dysphagia has been described in ICU patients following artificial ventilation (Brodsky et al. 2017; Brodsky et al. 2020b) with severity of critical illness associated with protracted recovery post-ICU (Zielske et al. 2014). Patients can be at increased risk of silent aspiration, and require access to early speech pathology assessment and rehabilitation to maximise safety and reduce further associated morbidity such as aspiration pneumonia and malnutrition (Daly et al. 2016). Informed decision making for management of dysphagia during and post-ICU admission can be facilitated with the use of instrumental assessment (Dziewas et al. 2019) and multidisciplinary

team management (Brodsky et al. 2020b). The role of speech pathology in ongoing rehabilitation of swallowing function in the post-ICU patient includes optimisation of oral intake, use of compensatory strategies and rehabilitation of swallow function.

Conclusion

Allied health professionals provide specialised and targeted patient rehabilitation to patients across the arc of care – from ICU to through to post-hospital settings to optimise recovery. Rehabilitation aims to improve and increase function to reduce disability and subsequent impact on an individual's activities and participation. Rehabilitation goals aim to target physiological, physical, cognitive, and psychosocial facets of health and empower ICU survivors to thrive in their day to day life. Whilst the trajectory of post-ICU recovery is yet to be fully understood, inclusion and early access to AHP during ICU admission and along the ICU recovery pathway should be considered.

Conflict of Interest

EJR has received honorarium from Baxter Healthcare (United States and Australia), Nestle and Nutricia (Australia). ■

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