Foreword

Acute Rehabilitation in Critically Ill Children

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J Pediatr Intensive Care 2015;4:171–173.

Life-saving strategies and our ability to deliver pediatric critical care have improved in the past 10 years such that mortality rates have decreased dramatically by half.¹ During this time, the number of children admitted with significant underlying premorbid conditions has *doubled*, and pediatric critical care unit (PCCU) readmission rates have *tripled*.² Up to 67% of children admitted to PCCUs in a developed country today have a preexisting complex chronic condition, and 50% have functional disabilities at baseline.^{2,3} These children suffer exacerbations of acute illness and repeated PCCU admissions, and the majority of them survive.⁴ However, the factors that influence their recovery, and their needs after surviving a critical illness and discharge from hospital, remain poorly understood. To date, pediatric critical care has focused largely on “front-end” management to improve short-term outcomes such as organ dysfunction and survival. While these outcomes are extremely important, there has been little attention paid to critical illness sequelae on the back-end, and how these may affect functional recovery and important longer-term outcomes in children and their families beyond the PCCU setting.

The majority of evidence regarding critical-illness-acquired morbidities is derived from the adult literature. Critical illness results in new, acquired physical, cognitive, and mental health impairments in adults that compounds the reasons for which they were originally admitted.⁵ For example, intensive care unit (ICU)-acquired weakness affects 25 to 100% of adult patients, and recovery may take years.^{6,7} Cognitive impairments, anxiety, depression, and posttraumatic stress disorder symptoms affect more than half of adult ICU survivors, and persist for up to 2 years following discharge.⁸ Only 50% of adult survivors resume work by 1 year, and 69% are restricted in performing daily activities.⁹ Family caregivers of critically ill patients are also affected, and personally suffer from challenges related to mental illness, community participation, and social supports.¹⁰ These phenomena, collectively referred to as the “postintensive care

syndrome,” affects up to 69% of adult ICU survivors, are often long lasting, negatively impact quality of life, and are a significant economic burden to patients as well as the health care system.¹¹ In response to these problems, there is a tremendous growth of research focused on improving the back-end of ICU care, and the prevention of these important critical illness morbidities.¹² For example, minimizing sedation, facilitating spontaneous breathing, delirium monitoring, and promoting early ICU-based rehabilitation have been shown to improve patient outcomes, and are therefore recommended as practice priorities in adult ICUs.^{13–15} This approach, coupled with post-ICU follow-up clinics and rehabilitation programs, is increasingly adopted in adult survivors to optimize posthospital recovery, community integration, and independent living.¹⁶

Unfortunately, outcome research in pediatrics significantly lags behind that in adults.¹⁷ It is, however, becoming increasingly apparent that children are also at risk of similar critical-illness-acquired morbidities observed in adults. Children are at risk of adverse physical, neurocognitive, and emotional sequelae as a direct result of their critical illness.¹⁸ There is emerging evidence that a significant proportion of children suffer new morbidities and significant functional deterioration following a critical illness.^{19–21} Critically ill children are at significantly greater risk of developing posttraumatic stress disorder, compared with other hospitalized children,²² and may experience persistent anxiety and depression long after they recover from their critical illness and leave the PCCU.²³ Families of affected children may also be affected and suffer mental health sequelae and dysfunction.²⁴ All of these sequelae may culminate in poor quality of life in affected children and their families.²⁵

Critical-illness-acquired morbidities, rehabilitation, and functional recovery are current, relevant, major areas of interest in adult critical care.⁸ In contrast, there are significant knowledge gaps given the paucity of pediatric-specific research in this area.²⁶ This special issue of the *Journal of*

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Issue Theme Physical Therapy
and Rehabilitation in Pediatric
Critical Care; Guest Editor: Karen
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Verlag KG, Stuttgart · New York

DOI <http://dx.doi.org/10.1055/s-0035-1563384>.
ISSN 2146-4618.

Pediatric Intensive Care is dedicated to the role of rehabilitation in the PCCU, and serves to draw attention to current evidence on physical, functional, and neurocognitive sequelae in critically ill children, and how a “bundled” approach focused on minimizing morbidities may facilitate rehabilitation, early mobilization, and recovery in the PCCU setting. The narrative reviews by Saliski and Skillman, respectively, inform us how sedation and nutrition may be optimized to promote acute rehabilitation in the PCCU. The majority of physical therapy in PCCUs is currently focused on nonmobility interventions such as chest physiotherapy.²⁷ Yet there is currently no clear evidence that chest physiotherapy improves outcomes in critically ill children. The article in this issue by Morrow provides the evidence for chest physiotherapy, including its indications, precautions, and specific techniques.

While clinicians support the rationale for early mobilization, there are numerous safety concerns and barriers at the institutional and provider level. Clinicians admit to a lack of knowledge on who, when, and how to execute early mobilization in critically ill children, and the need for practice guidelines.²⁸ Many PCCUs lack appropriate resources and may not have dedicated therapists to facilitate rehabilitation.² The systematic review of early mobilization by Wieczorek et al provides a comprehensive review of the current evidence in critically ill children, and study by Choong et al is the first to prospectively evaluate the safety and feasibility of in-bed mobilization in the PCCU. To “rehabilitate” is to restore functional ability and quality of life, and hence rehabilitation is not restricted only to physical or occupational therapy but requires a cultural shift and a collaborative approach toward minimizing morbidities and facilitating recovery. The psychological aspects of the care of the critically ill child should therefore be very much a part of our care in the PCCU. The review by Hopkins et al describes how the cultural paradigm within a PCCU may be transformed to facilitate rehabilitation in this setting.

While pediatric-specific research in this area is in its infancy, it is clear that children are not immune to the burden of critical illness, and there is good rationale that rehabilitation should also begin early in this population. The “front” and “back” ends of pediatric critical care should therefore not be treated sequentially, but rather managed as a continuum. As survival rates of critically ill children and infants continue to improve, PCCU-acquired morbidities and functional recovery have increasing relevance for care providers within and beyond the PCCU. Emerging research currently underway will serve to inform us on who, when, and how to implement early rehabilitation interventions in the critically ill children. Increased awareness and research on the role of rehabilitation during critical illness will enable us to develop strategies to improve the care of our sickest children, and strive to improve their outcomes beyond survival.

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