

## Foreword

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# Hematopoietic stem cell transplantation in pediatric critical care

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Hematopoietic stem cell transplantation (HSCT) offers hope as a potential curative therapy for a number of life-threatening malignant and non-malignant disease processes. Recent data suggest that over 2500 children undergo HSCT each year as a potential cure for leukemia, lymphoma and other malignant diseases as well as for a host of other disease processes including immuno-deficiencies, metabolic disorders, bone marrow failure syndromes, hemoglobinopathies and rheumatologic conditions [1].

However, HSCT can be associated with a variety of complications and significant morbidity. Recent data suggest that approximately one third of pediatric HSCT recipients will require admission to the pediatric intensive care unit [2]. Thus, for HSCT to continue to expand in both terms of success and breadth of application, effective supportive care to treat these complications and minimize morbidity is essential. A sound understanding of the pathophysiology associated with the unique morbidities of the HSCT process as well as the unusual courses of common complications is needed. Clearly, HSCT patients have worse outcomes for most organ failures than the general pediatric population requiring critical care services including the non-transplant oncology patients [3–5].

Encouragingly, outcomes appear to be improving for these children. For example, survival among pediatric HSCT patients requiring mechanical ventilation for lung injury has improved from approximately 10% in the early 1990s [6] to rates approximating 50% or better in some recent series [7–9]. Reduced intensity conditioning regimens, improved supportive care, and more aggressive antimicrobial prophylaxis have all been suggested as reasons for the improvement. In conjunction with these improved outcomes, research interest in this patient population appears to be growing. Once excluded from clinical trials because of overwhelmingly poor outcomes, these patients have now become accepted subjects in many such studies [10, 11]. Multicenter clinical trials specifically targeting pulmonary complications of the HSCT process are now being conducted [12, 13]. Moreover, therapies once not offered to this patient population because of an unfavorable risk-benefit balance, are now being offered with increasing frequency. For example, reports of the use of extracorporeal membrane oxygenation for the pediatric HSCT patient can now be found speckling the published literature and respective patient registries [14, 15]. The philosophic approach to critical illness in this patient population appears to be changing from one of futility and frustration to one of potential and promise.

In this special edition of the *Journal of Pediatric Intensive Care*, a historical perspective of the care and outcomes of the critically ill HSCT patient is presented to provide both a context of the recent advancements in the field and a foundation for further study.

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For outcomes to continue to improve, pediatric critical care medicine providers must work closely and collegially with their transplant colleagues in a multidisciplinary fashion that includes physicians, nurses, therapists, pharmacists, social workers and all other members of the health care team. They must strive to attain a basic understanding of the HSCT process and the underlying principles. In this edition, the basics of the HSCT process are described by a group of HSCT physicians to facilitate such an understanding among critical care providers. Moreover, pediatric critical care clinicians must possess a sound understanding of the complications and co-morbidities of the HSCT process that require their services. Manuscripts included in this special edition describe unique complications of HSCT including graft versus host disease and sinusoidal obstruction syndrome (formerly known as veno-occlusive disease); two life-threatening complications of this therapy. Graft versus host disease is the most frequent and serious complication following allogeneic HSCT occurring in approximately one fifth of these children admitted to the pediatric intensive care unit [7]. Pulmonary complications, both infectious and non-infectious, represent a particularly common and serious morbidity of HSCT, and thus, the topic is addressed in three separate articles. Other organ system dysfunction associated with HSCT that results in substantial morbidity and mortality including neurologic complications and acute kidney injury are also reviewed. Finally, in an attempt to provide appropriate balance, the ethics of caring for such a high-risk population are described and delineated.

With rejuvenated interest in the care of this high-risk patient population, it is hoped that further research will be initiated, improvements in outcome will continue and this potentially curative therapy will be made available to a wider spectrum of diseases and patients with greater propensity for success.

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