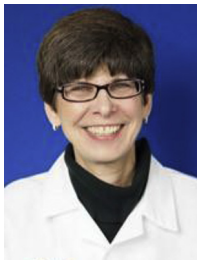
Preface

The Collaborative Pediatric Critical Care Research Network: Recent Progress and Future Directions



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The American Board of Pediatrics first recognized Pediatric Critical Care Medicine as a separate specialty in 1987. Since that time, the number of pediatric intensivists, pediatric intensive care units (PICUs), and PICU beds has continued to grow. Although mortality in PICUs has declined from more than 8% in 1987 to less than 3% today,[1,2] many survivors of pediatric critical illness suffer chronic illness or disability. Continued research will generate new paradigms of therapy and advance existing management in order to improve short- and long-term outcomes from pediatric critical illness.

Research in pediatric critical care has many barriers, including the wide range of critical illnesses and the small number of children with any one type of illness, insufficient knowledge regarding patient-centered and clinically relevant outcomes; limited research time and resources among intensivists, and lack of agreement within the critical care community regarding equipoise for some commonly used but unproven interventions.[3,4] Because of these and other research barriers, the practice of pediatric critical care has often relied on research findings from adult intensive care or other specialties without adequate investigation of benefit or harm to critically ill children.

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In an effort to advance pediatric critical care research and thereby provide a scientific basis for pediatric critical care practice, the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) established the Collaborative Pediatric Critical Care Research Network (CPCCRN) in 2004.[5] Clinical research sites and a data-coordinating center were identified through a competitive peer-review process. The CPCCRN was renewed in 2009 and 2014. As described in the initial request for applications, the purpose of the CPCCRN is to investigate the safety and efficacy of treatment and management strategies to care for critically ill children as well as the pathophysiologic basis of critical illness and injury in childhood.[5] The support provided by the NICHD has allowed the CPCCRN to conduct and participate in numerous multicenter studies, overcome many of the obstacles to critical care research, and foster a spirit of collaboration and mentoring among intensivists.

In this issue of *Pediatric Clinics of North America*, we have invited several investigators affiliated with the CPCCRN to provide an update on the current state of knowledge in their area of research. As might be expected from the wide range of illnesses and treatments encountered in PICUs, the range of research topics is also broad. Conditions reviewed in this issue include sepsis-induced multiple organ failure and associated inflammation pathobiology phenotypes, acute respiratory distress syndrome and its pathophysiology; trauma and the challenge of managing infrequent and diverse severe injuries in children; ventilator-associated pneumonia and the complex interaction between microbes, the environment, and the host immune response; immune paralysis due to critical illness and its detection and treatment; and delirium and its recognition, risk factors, and consequences. Treatment and supportive approaches reviewed include cardiopulmonary resuscitation and the utility of physiologic monitoring during resuscitation; transfusion decision making using a system dynamics model, mechanical ventilation and the use of computerized decision support, optimal sedation practices during critical illness, and corticosteroids and their role as adjunctive agents during pediatric sepsis. Outcomes reviewed include morbidity from critical illness and measurement tools, end-of-life and bereavement care in PICUs, and their potential long-term impact on parents and families.

As the specialty of Pediatric Critical Care Medicine continues to progress, so does its basic and applied research basis. Despite barriers, PICUs can be viewed as ideal settings for research, since they permit continuous physiologic monitoring of patients, routine use of invasive devices allowing biosample collection, and use of electronic medical records and are staffed by highly trained multidisciplinary personnel.[4] Some have proposed that PICUs become "learning health care systems" in which generation of new knowledge is integrated into usual clinical practice, and a culture of evidence-based learning and continual care improvement is fostered.[4] As investigators privileged to be affiliated with the CPCCRN, we hope the reviews presented in this issue inspire and energize the readers to continue to develop new hypotheses and novel approaches to address critical illness, conduct well-planned basic, translational, and clinical research, and disseminate and implement their research findings to advance our

profession's mission of improving health outcomes for critically ill and injured children.

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