

Contents

Preface: Looking Forward: Contemporary and Emerging Issues in Pediatric Critical Care Medicine	xv
Lauren R. Sorce and Joy D. Howell	
Beyond Conventional Hemodynamic Monitoring—Monitoring to Improve Our Understanding of Disease Process and Interventions	243
Michelle Ramírez, Mjaye L. Mazwi, Ronald A. Bronicki, Paul A. Checchia, and Jacqueline S.M. Ong	
<p>Monitoring the hemodynamic state of patients is a hallmark of any intensive care environment. However, no single monitoring strategy can provide all the necessary data to paint the entire picture of the state of a patient; each monitor has strengths and weaknesses, advantages, and limitations. We review the currently available hemodynamic monitors used in pediatric critical care units using a clinical scenario. This provides the reader with a construct to understand the progression from basic to more advanced monitoring modalities and how they serve to inform the practitioner at the bedside.</p>	
Extracorporeal Membrane Oxygenation Then and Now; Broadening Indications and Availability	255
Blythe E. Pollack, Roxanne Kirsch, Rachel Chapman, Robert Hyslop, Graeme MacLaren, and Ryan P. Barbaro	
<p>Extracorporeal membrane oxygenation (ECMO) is a life support technology provided to children to support respiratory failure, cardiac failure, or cardiopulmonary resuscitation after failure of conventional management. Over the decades, ECMO has expanded in use, advanced in technology, shifted from experimental to a standard of care, and evidence supporting its use has increased. The expanded ECMO indications and medical complexity of children have also necessitated focused studies in the ethical domain such as decisional authority, resource allocation, and equitable access.</p>	
Cytokine Release Syndrome in the Pediatric Population and Implications for Intensive Care Management	277
Juliana Romano, Eric Wilsterman, Megan Toal, and Christine Joyce	
<p>Cytokine release syndrome represents a spectrum of disease varying from fever alone to multiorgan system failure. Most commonly seen following treatment with chimeric antigen receptor T cell therapy, it is increasingly being described with other immunotherapies as well as following hematopoietic stem cell transplant. As its symptoms are nonspecific, awareness is key to timely diagnosis and initiation of treatment. Given the high risk of cardiopulmonary involvement, critical care providers must be familiar with the cause, symptoms, and therapeutic options. Current treatment modalities focus on immunosuppression and targeted cytokine therapy.</p>	

Transfusion Strategies in the 21st Century: A Case-Based Narrative Report 287

Jennifer Shenker, Hiba Abuelhija, Oliver Karam, and Marianne Nellis

The transfusion of all blood components (red blood cells, plasma, and platelets) has been associated with increased morbidity and mortality in children. It is essential that pediatric providers weigh the risks and benefits before transfusing a critically ill child. A growing body of evidence has demonstrated the safety of restrictive transfusion practices in critically ill children.

Voices of Pandemic Care: Perspectives from Pediatric Providers During the First SARS-CoV-2 Surge 299

Lisa DelSignore, Phoebe Yager, Kimberly Whalen, Jenna Pacheco, Tamara Vesel, and Sara Ross

Pediatric providers were called on to care for adult patients well beyond their typical scope of practice during the first surge of the SARS-CoV-2 pandemic. Here, the authors share novel viewpoints and innovations from the perspective of providers, consultants, and families. The authors enumerate several of the challenges encountered, including those faced by leadership in supporting teams, balancing competing responsibilities to children while caring for critically ill adult patients, preserving the model of interdisciplinary care, maintaining communication with families, and finding meaning in work during this unprecedented crisis.

Pediatric Critical Care Outcomes: State of the Science 309

Mallory A. Perry-Eaddy, Leslie A. Dervan, Joseph C. Manning, R. Scott Watson, and Martha A.Q. Curley

Children who survive the pediatric intensive care unit (PICU) are at risk of developing post-intensive care syndrome in pediatrics (PICS-p). PICS-p, defined as new physical, cognitive, emotional, and/or social health dysfunction following critical illness, can affect the child and family. Historically, synthesizing PICU outcomes research has been challenging due to inconsistency in study design and in outcomes measurement. PICS-p risk may be mitigated by implementing intensive care unit best practices that limit iatrogenic injury and by supporting the resiliency of critically ill children and their families.

The Current State of Workforce Diversity and Inclusion in Pediatric Critical Care 327

Yuen Lie Tjoeng, Carlie Myers, Sharon Y. Irving, Ivie Esangbedo, Derek Wheeler, and Ndidiyama Musa

Literature suggests the pediatric critical care (PCC) workforce includes limited providers from groups underrepresented in medicine (URiM; African American/Black, Hispanic/Latinx, American Indian/Alaska Native, Native Hawaiian/Pacific Islander). Additionally, women and providers URiM hold fewer leadership positions regardless of health-care discipline or specialty. Data on sexual and gender minority representation and persons with different physical abilities within the PCC workforce are incomplete or unknown. More data are needed to understand the true landscape of the PCC workforce across disciplines. Efforts to increase

representation, promote mentorship/sponsorship, and cultivate inclusivity must be prioritized to foster diversity and inclusion in PCC.

Screening for Social Determinants of Health in the Pediatric Intensive Care Unit: Recommendations for Clinicians **341**

Manzilat Akande, Erin T. Paquette, Paula Magee, Mallory A. Perry-Eaddy, Ericka L. Fink, and Katherine N. Slain

Social determinants of health (SDoH) play a significant role in the health and well-being of children in the United States. Disparities in the risk and outcomes of critical illness have been extensively documented but are yet to be fully explored through the lens of SDoH. In this review, we provide justification for routine SDoH screening as a critical first step toward understanding the causes of, and effectively addressing health disparities affecting critically ill children. Second, we summarize important aspects of SDoH screening that need to be considered before implementing this practice in the pediatric critical care setting.

Youth Firearm Injury: A Review for Pediatric Critical Care Clinicians **357**

Elinore J. Kaufman, Therese S. Richmond, and Katelin Hoskins

Firearms are now the leading cause of death among youth in the United States, with rates of homicide and suicide rising even more steeply during the SARS-CoV-2 pandemic. These injuries and deaths have wide-ranging consequences for the physical and emotional health of youth and families. While pediatric critical care clinicians must treat the injured survivors, they can also play a role in prevention by understanding the risks and consequences of firearm injuries; taking a trauma-informed approach to the care of injured youth; counseling patients and families on firearm access; and advocating for youth safety policy and programming.

Taking the Pulse of the Current State of Simulation **373**

Anisha Kshetrapal, Mary E. McBride, and Candace Mannarino

Simulation in health-care professions has grown in the last few decades. We provide an overview of the history of simulation in other fields, the trajectory of simulation in health professions education, and research in medical education, including the learning theories and tools to assess and evaluate simulation programs. We also propose future directions for simulation and research in health professions education.

Translating Guidelines into Practical Practice: Point-of-Care Ultrasound for Pediatric Critical Care Clinicians **385**

Mark D. Weber, Joel K.B. Lim, Sarah Ginsburg, Thomas Conlon, and Akira Nishisaki

Point-of-care ultrasound (POCUS) is now transitioning from an emerging technology to a standard of care for critically ill children. POCUS can provide immediate answers to clinical questions impacting management and outcomes within this fragile population. Recently published international guidelines specific to POCUS use in neonatal and pediatric critical care populations now complement previous Society of Critical Care Medicine

guidelines. The authors review consensus statements within guidelines, identify important limitations to statements, and provide considerations for the successful implementation of POCUS in the pediatric critical care setting.

Pediatric Critical Care in the Twenty-first Century and Beyond

407

Mary Dahmer, Aimee Jennings, Margaret Parker, Lazaro N. Sanchez-Pinto, Ann Thompson, Chani Traube, and Jerry J. Zimmerman

Pediatric critical care addresses prevention, diagnosis, and treatment of organ dysfunction in the setting of increasingly complex patients, therapies, and environments. Soon burgeoning data science will enable all aspects of intensive care: driving facilitated diagnostics, empowering a learning health-care environment, promoting continuous advancement of care, and informing the continuum of critical care outside the intensive care unit preceding and following critical illness/injury. Although novel technology will progressively objectify personalized critical care, humanism, practiced at the bedside, defines the essence of pediatric critical care now and in the future.