

Secondary Logo

Journal Logo



Advanced Search

Consensus Recommendations for RBC Transfusion Practice in Critically Ill Children From the Pediatric Critical Care Transfusion and Anemia Expertise Initiative

Valentine, Stacey L. MD, MPH, FCCP¹; Bembea, Melania M. MD, PhD²; Muszynski, Jennifer A. MD, MPH^{3,4}; Cholette, Jill M. MD⁵; Doctor, Allan MD⁶; Spinella, Phillip C. MD⁶; Steiner, Marie E. MD⁷; Tucci, Marisa MD⁸; Hassan, Nabil E. MD⁹; Parker, Robert I. MD¹⁰; Lacroix, Jacques MD⁸; Argent, Andrew MD, MBBCh¹¹; Carson, Jeffrey L. MD¹²; Remy, Kenneth E. MD⁶; Demaret, Pierre MD, MSc¹³; Emeriaud, Guillaume MD, PhD⁸; Kneyber, Martin C. J. MD, PhD, FCCM¹⁴; Guzzetta, Nina MD¹⁵; Hall, Mark W. MD^{3,4}; Macrae, Duncan MBChB¹⁶; Karam, Oliver MD, PhD¹⁷; Russell, Robert T. MD, MPH¹⁸; Stricker, Paul A. MD¹⁹; Vogel, Adam M. MD²⁰; Tasker, Robert C. MA, MBBS, MD²¹; Turgeon, Alexis F. MD, MSc²²; Schwartz, Steven M. MD²³; Willems, Ariane MD²⁴; Josephson, Cassandra D. MD²⁵; Luban, Naomi L. C. MD²⁶; Lehmann, Leslie E. MD²⁷; Stanworth, Simon J. MD²⁸; Zantek, Nicole D. MD²⁹; Bunchman, Timothy E. MD¹⁷; Cheifetz, Ira M. MD³⁰; Fortenberry, James D. MD²⁵; Delaney, Meghan DO, MPH³¹; van de Watering, Leo MD³²; Robinson, Karen A. PhD³³; Malone, Sara LCSW⁶; Steffen, Katherine M. MD³⁴; Bateman, Scot T. MD¹; for the Pediatric Critical Care Transfusion and Anemia Expertise Initiative (TAXI), in collaboration with the Pediatric Critical Care Blood Research Network (BloodNet), and the Pediatric Acute Lung Injury and Sepsis Investigators (PALISI) Network

Pediatric Critical Care Medicine: September 2018 - Volume 19 - Issue 9 - p 884-898

doi: 10.1097/PCC.0000000000001613

Special Article

Abstract **Author Information** **Authors** **Article Metrics** **Metrics**

Objectives: To date, there are no published guidelines to direct RBC transfusion decision-making specifically for critically ill children. We present the recommendations from the Pediatric Critical Care Transfusion and Anemia Expertise Initiative.

Design: Consensus conference series of multidisciplinary, international experts in RBC transfusion management of critically ill children.

Setting: Not applicable.

Intervention: None.

Subjects: Children with, or children at risk for, critical illness who receive or are at risk for receiving a RBC transfusion.

Methods: A panel of 38 content and four methodology experts met over the course of 2 years to develop evidence-based, and when evidence lacking, expert consensus-based recommendations regarding decision-making for RBC transfusion management and research priorities for transfusion in critically ill children. The experts focused on nine specific populations of critically ill children: general, respiratory failure, nonhemorrhagic shock, nonlife-threatening bleeding or hemorrhagic shock, acute brain injury, acquired/congenital heart disease, sickle cell/oncology/transplant, extracorporeal membrane oxygenation/ventricular assist/ renal replacement support, and alternative processing. Data to formulate evidence-based and expert consensus recommendations were selected based on searches of PubMed, EMBASE, and Cochrane Library from 1980 to May 2017. Agreement was obtained using the Research and Development/UCLA Appropriateness Method. Results were summarized using the Grading of Recommendations Assessment, Development, and Evaluation method.

Measurements and Results: The Transfusion and Anemia Expertise Initiative consensus conference developed and reached consensus on a total of 102 recommendations (57 clinical [20 evidence based, 37 expert consensus], 45 research recommendations). All final recommendations met agreement, defined a priori as greater than 80%. A decision tree to aid clinicians was created based on the clinical recommendations.

Conclusions: The Transfusion and Anemia Expertise Initiative recommendations provide important clinical guidance and applicable tools to avoid unnecessary RBC transfusions. Research recommendations identify areas of focus for future investigation to improve outcomes and safety for RBC transfusion.

¹Division of Pediatric Critical Care, Department of Pediatrics, University of Massachusetts Medical School, Worcester, MA.

²Department of Anesthesiology and Critical Care Medicine, Johns Hopkins University, Baltimore, MD.

³Division of Critical Care Medicine, Nationwide Children's Hospital, Columbus, OH.

⁴The Research Institute at Nationwide Children's Hospital, Columbus, OH.

⁵Department of Pediatrics, University of Rochester, Rochester, NY.

⁶Division of Pediatric Critical Care Medicine, Department of Pediatrics, Washington University School of Medicine, St. Louis, MO.

⁷Department of Pediatrics, University of Minnesota, Minneapolis, MN.

⁸Department of Pediatrics, University of Montreal, Montreal, QC, Canada.

⁹Department of Pediatrics, University of Illinois College of Medicine, Peoria, IL.

¹⁰Department of Pediatrics, Stony Brook University, Stony Brook, NY.

¹¹Department of Pediatrics, University of Cape Town, Cape Town, South Africa.

¹²Department of Internal Medicine, Rutgers Robert Wood Johnson Medical School, New Brunswick, NJ.

¹³Department of Pediatrics, CHC, Liege, Belgium.

¹⁴Department of Pediatrics, University of Groningen, Groningen, The Netherlands.

¹⁵Department of Anesthesiology, Emory University School of Medicine, Children's Healthcare of Atlanta, Atlanta, GA.

¹⁶Pediatric Critical Care, Royal Brompton Hospital, London, United Kingdom.

¹⁷Department of Pediatrics, Professor and Director Pediatric Nephrology, Childrens Hospital of Richmond, Virginia Commonwealth University, Richmond, VA.

¹⁸Department of Surgery, University of Alabama Birmingham, Birmingham, AL.

¹⁹Department of Anesthesiology and Critical Care, University of Pennsylvania, Philadelphia, PA.

²⁰Division of Pediatric Surgery and Pediatrics, Baylor College of Medicine, Houston, TX.

²¹Departments of Neurology and Anesthesia (Pediatrics), Harvard Medical School, Boston, MA.

²²Department of Anesthesiology and Critical Care Medicine, Univesite Laval Research Center, Quebec City, QC, Canada.

²³Department of Critical Care Medicine and Paediatrics, University of Toronto, ON, Canada.

²⁴Pediatric Intensive Care Unit, University of Brussels, Brussels, Belgium.

²⁵Department of Pediatrics, Emory University School of Medicine, Children's Healthcare of Atlanta, Atlanta, GA.

²⁶Department of Pediatrics and Pathology, George Washington University, Washington, DC.

²⁷Department of Pediatrics, Harvard Medical School, Boston, MA.

²⁸Department of Medicine, University of Oxford, Oxford, United Kingdom.

²⁹Department of Laboratory Medicine and Pathology, University of Minnesota, Minneapolis, MN.

³⁰Department of Pediatrics, Duke University, Durham, NC.

³¹Division of Pathology and Laboratory Medicine, Children's National Health System, Washington, DC.

³²Sanquin-Leiden University Medical Center, Leiden, The Netherlands.

³³Department of Medicine, Johns Hopkins University School of Medicine, Baltimore, MD.

³⁴Department of Pediatrics, Stanford University School of Medicine, Palo Alto, CA.

Pediatric Critical Care Transfusion and Anemia Expertise Initiative (TAXI) members are listed in **Appendix 1**.

The Transfusion and Anemia Expertise Initiative was supported, in part, by the National Institutes of Health *Eunice Kennedy Shriver* National Institute of Child Health and Human Development and National Heart, Lung, and Blood Institute under award number 1 R13 HD088086-01, the Society for the Advancement of Blood Management (SABM)-Haemonetics Research Starter Grant, the CHU-Sainte-Justine Foundation, the Washington University Children's Discovery Institute (CDI-E1-2015-499), and the University of Massachusetts Medical School.

Drs. Valentine, Bembea, Doctor, Steiner, Josephson, Luban, Zantek, Steffen, and Bateman received support for article research from the National Institutes of Health (NIH). Dr. Valentine also received support for article research from the Society for the Advancement of Blood Management (SABM) SABM-Haemonetics Research Starter Grant, CHU-Sainte-Justine Foundation, Washington University Children's Discovery Institute (CDI), and the University of Massachusetts Medical School. Dr. Bembea received support from the National Institute of Neurological Disorders and Stroke (NINDS) of the National Institutes of Health (NIH) under award number K23NS076674. Drs. Valentine's, Bembea's, and Steffen's institutions received funding from *Eunice Kennedy Shriver* National Institute of Child Health and Human Development (NICHD) and National Heart, Lung, and Blood Institute (NHLBI) under award number 1 R13 HD088086-01, the SABM SABM-Haemonetics Research Starter Grant, and Washington University CDI (CDI-E1-2015-499). Dr. Bembea received other support from NIH/NINDS K23NS076674, and she disclosed off-label product use of extracorporeal membrane oxygenation (not FDA approved for use longer than 6 hr). Dr. Doctor's institution received funding from the NIH, the Department of Defense, and KaloCyte. Dr. Steiner received funding from NIH R13. Dr. Argent received funding from N. Kelly Attorneys (medicolegal report) and travel and accommodation to attend several national and international conferences as an invited speaker, as well as a consensus meeting to discuss this article. Dr. Carson's institution received funding from the NHLBI, and he received funding from NICHD/NHLBI R13, Washington University CDI Grant (CDI-E1-2015-499), and the University of Massachusetts Medical School. Dr. Emeriaud's institution received funding from Fonds de Recherche du Québec - Santé (research award) and Maquet Critical Care (supports the financial costs of a clinical study evaluating a neonatal ventilator that he is leading). Dr. Hall received funding from Bristol Myers-Squibb. Dr. Schwartz received funding from Novartis AG. Dr. Josephson received funding from consulting for Immucor LLC, Biomet Zimmer, and Octapharma. Dr. Luban's institution received funding from the NICHD and NHLBI. Dr. Zantek's institution received funding (all unrelated to the current study) from Octapharma, Bayer HealthCare, and Terumo BCT; she received funding from NICHD/NHLBI R13 (1 R13 HD088086-012) (funds

from this grant were used for travel accommodations for one of the study's in-person group meetings); she disclosed her spouse is an employee of Boston Scientific and owns stock in Endo International PLC; and she disclosed other support from North American Specialized Coagulation Laboratory Association (member executive board), College of American Pathologists (CAP)—American Society for Apheresis Inbound Liaison to CAP Transfusion Medicine Resource Committee (reimbursed for travel expenses), and the Thrombosis and Hemostasis Societies of North America (reimbursed for travel and meeting registration as a speaker at the 2018 meeting). Dr. Chiefetz received funding from Philips (medical adviser) and UptoDate (contributor). Dr. Fortenberry received funding from the American Board of Pediatrics Critical Care Subboard and Davis and Snyder LLC. Dr. Delaney received funding from Favros (expert witness case review, unrelated) and RedMed Ed, University of Cincinnati (speaking for Continuing Medical Education course about specialized blood bank testing, unrelated). Dr. van de Watering disclosed that he is employed by Sanquin Blood Supply, a national blood bank foundation. Dr. Robinson's institution received funding from SABM/Haemonetics grant to fund the review work, and she received funding from Washington University CDI for travel to consensus meeting. Dr. Malone's institution received funding from Washington University CDI Grant (CDI-E1-2015-499). Dr. Steffen received support for article research from the CHU-Sainte-Justine Foundation and the University of Massachusetts Medical School. Dr. Bateman's institution received funding from NICHD/NHLBI and SABM. The remaining authors have disclosed that they do not have any potential conflicts of interest.

For information regarding this article, E-mail: Stacey.valentine@umassmemorial.org

Copyright © 2018 by the Society of Critical Care Medicine and the World Federation of Pediatric Intensive and Critical Care Societies

^ Back to top



Never Miss an Issue

Get new journal Tables of Contents sent right to your email inbox

Browse Journal Content

- Most Popular
- Current Issue
- Past Issues
- For Authors
- About the Journal
- Register on the website
- Subscribe
- Get eTOC Alerts

For Journal Authors

- Submit an article

- [How to publish with us](#)

Customer Service

- [Activate your journal subscription](#) [Activate Journal Subscription](#)
- [Help](#) [Browse the help center](#)
- [Contact us at:](#)

EMAIL:

TEL: (USA):

TEL: (Int'l):

customerservice@lww.com

800-638-3030 (within USA)

301-223-2300 (international)

- 
- 

[Privacy Policy \(Updated May 9, 2018\)](#) - [Legal Disclaimer](#) - [Terms of Use](#) - [Open Access Policy](#) - [Feedback](#) - [Sitemap](#) - [RSS Feeds](#) - [LWW Journals](#)

Copyright © 2019 by the Society of Critical Care Medicine and the World Federation of Pediatric Intensive and Critical Care Societies