Older Red Blood Cells Pose Risks for Children

VITALS

Major Finding: Transfusion of red blood cells stored 14 days or longer increases risk of multiple organ failure in critically ill children nearly twofold, compared with fresher RBCs.

Data Source: Secondary analysis of prospective, multicenter study of 296 patients.

Disclosures: Fonds de la Recherche en Santé du Québec sponsored this secondary analysis, planned a priori, of an initial, prospective, observational study funded by Johnson & Johnson. Dr. Karam disclosed that he has no financial conflict of interest.

BY DAMIAN McNAMARA

MIAMI BEACH — A significantly higher rate of multiple organ failure after transfusion with red blood cells stored 14 days or longer, compared with fresher cells, has been shown for the first time in pediatric critical care patients.

"We were surprised to find such a difference—twice as many patients develop a bad outcome—which is very important for something so frequently used," Dr. Oliver Karam said in an interview at his poster during the annual congress of the Society of Critical Care Medicine. The poster was selected as a Research Citation Finalist at the meeting.

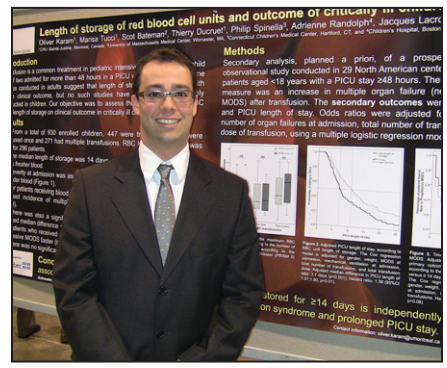
Transfusions are probably one of the most common treatments in the severely ill pediatric population, he said. About one in every two children admitted to a postoperative intensive care unit (PICU) receives at least one transfusion.

Previous studies in adults and animals yielded conflicting results regarding the safety of older versus newer stored red blood cells, Dr. Karam said. Although a retrospective study of 67 transfused children found no difference in outcomes related to the shelf life of RBCs (Intensive Care Med. 2009;35:179-80), "this has not been answered [prospectively] yet in pediatrics. We are the only ones, to my knowledge, to look at pediatric data."

Dr. Karam and his colleagues screened 930 consecutive patients younger than 18 years admitted to a PICU for 48 hours or longer at 1 of 29 centers in North America. Of the 447 children who received at least one transfusion, information on storage time was available for 296 patients. The median length of storage was 14 days, so this became the cutoff to define "older" versus "fresher" blood.

The maximum permitted length of storage in both the United States and Canada is 42 days, said Dr. Karam, chief medical fellow at CHU Sainte-Justine in Montreal.

Among patients who received blood stored 14 days or longer, the increased incidence of new or progressive multiple organ failure was almost double (adjusted odds ratio, 1.87), based on a multiple logistic regression that adjusted for gender, weight, number of organ failures at admission, total transfusion number, and total transfusion dose. Clinical severity at admission was associated with more RBC transfusions but not with use of older versus fresher blood, Dr. Karam said.



DAMIAN McNAMARA/ELSEVIER GLOBAL MEDICAL NEWS

"We were surprised to find such a difference" in outcomes related to blood storage, Dr. Oliver Karam said.

Although not significant, there was a trend for the older blood group to develop new or progressive multiple organ failure faster than the other patients (hazard ratio, 1.43).

Mortality over 28 days and PICU length of stay were secondary outcomes. There was no significant difference in this mortality rate between groups.

"The good news is pediatric patients do not die as much" as transfused adults in a critical care setting, Dr. Karam said. They generally have a greater resiliency and more functional reserve, which "may be why we did not see a difference in deaths."

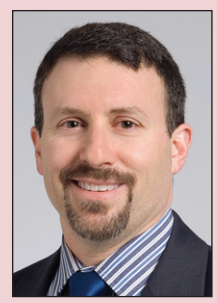
However, patients who received older blood stayed significantly longer in critical care—an adjusted median difference of 3.7 more days than did the fresher blood group. "We were surprised length of stay was so different—almost 4 days, which is huge and costs a lot," he said.

"There are lots of hypotheses in the literature" about the effects of older stored RBCs, Dr. Karam said, such as activity by cytokines, active biolipids, or thrombotic factors. "It is probably a mix of things, but the clinical effect is there."

Dr. Karam is planning a study to confirm these findings and look for possible mechanisms. "We are starting a pilot randomized, controlled study called ABC, or Age of Blood in Children." ■

Transfusion Strategies for Children Merit More Study

MY TAKE



These study findings are useful to hospitalists and all pediatricians who care for inpatients. A growing body of literature highlights the inherent risks of blood product transfusion. The majority of the work has been done in adult patients, and it is therefore crucial to closely examine the safety and effectiveness of transfusion strategies in children.

If the study findings are reproducible, they may have a significant impact on patients and blood banks, but the topic needs to be studied further before changes are made in current clinical practice.

In a recent study of adult cardiac surgery patients, patients who received transfusions of packed red blood cells more than 7 days old had higher rates of many complications than did those who received fresher cells (N. Engl. J. Med. 2008;358:1229-39).

At our center, we have adopted a strategy of less-frequent transfusions for our pediatric cardiac surgery patients, although we have not specified the age of the packed red blood cells.

DR. STEVE DAVIS is chair of Pediatric Critical Care Medicine at the Cleveland Clinic Foundation. He reported no relevant conflicts of interest.

Hospitalized Children With IBD Face Thrombosis Risk

BY MIRIAM E. TUCKER

NATIONAL HARBOR, MD. — Hospitalized children and adolescents with inflammatory bowel disease had more than twice the risk for thrombotic events, compared with other hospitalized youth, in a retrospective cohort study that utilized a nationwide inpatient database.

Compared with the entire discharge population, the odds ratio for any thrombotic event among children and adolescents with inflammatory bowel disease (IBD) was 2.13. For those with ulcerative colitis, it was 1.72, and for Crohn's disease, it was 2.22. Among the individual events in all youth with IBD, the highest odds ratios were for Budd-Chiari syndrome (3.21), portal vein thrombosis (2.79), thrombophlebitis (2.75), and deep vein thrombosis (2.44).

IBD is associated with an increased risk for venous and arterial thrombosis in adults, but the risk of thrombosis in children with IBD has not been established previously, Dr. Cade M. Nylund and Dr. Lee A. Denson said in a poster at the annual meeting of the North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition.

Data were obtained from the Healthcare Cost and Utilization Project Kids' Inpatient Database—the first pediatric-specific inpatient database in the country—for the combined years 1997, 2000, 2003, and 2006 among children and teens aged 6-20 years. From a total weighted sample of 8,162,120 discharges, there were 34,298 thrombotic events and 49,280 children with IBD. Of the latter, 44,039 had Crohn's disease and 5,241 had ulcerative colitis, said Dr. Nylund and Dr. Denson of Cincinnati Children's Hospital Medical Center.

Thrombotic events were reported in 553 of the young people with IBD. They had a median age of 17 years (range 15-19), and a median length of stay of 8 days (5-15 days). More than half (55%) were male, 70% were white, and 17% were black. About two-thirds (68%) had peripherally inserted central catheter (PICC) lines, and 20% underwent surgery.

The overall absolute risk for any thrombotic event was 112.4/10,000 hospitalized IBD patients, compared with 44.5/10,000 for discharges overall. The rate of all thrombotic events was 87.8/10,000 for ulcerative colitis patients and 115.4/10,000 for Crohn's disease patients. IBD patients had significantly increased rates of deep vein thrombosis, thrombophlebitis, pulmonary embolism, portal vein thrombus, and Budd-Chiari syndrome, but not of cerebral vascular disease or arterial thrombus.

Demographic risk factors that significantly increased the risk for thrombotic events were the presence of a PICC line (3.6), age greater than 15 years (1.8), black vs. white race (1.4), and other races vs. white (1.3). Female gender was protective (0.49) among those with IBD, while surgery was not a risk factor, Dr. Nylund and Dr. Denson reported.

Dr. Nylund noted in an interview that the findings do not justify universal pharmacologic prophylaxis in hospitalized children and adolescents with IBD who have rectal bleeding, given the low absolute risk of thrombotic events in young people.

"However, in those more severe IBD children—such as those with prolonged hospitalization length of stay, and those requiring PICC lines—physicians should be aware of this increased risk of thrombotic events and seriously consider initiation of pharmacologic prophylaxis anticoagulation therapy," he said. "Despite lacking evidence in the pediatric population for thromboembolism prevention techniques, conservative thrombotic prophylaxis such as frequent mobilization and pneumatic compression should at least be considered in all hospitalized children with IBD." ■

***Disclosures:** Dr. Nylund and Dr. Denson had no conflicts of interest to report.*