

'Old blood' linked to infection

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Blood stored for 29 days or more, nearly 2 weeks less than the current standard for blood storage, is associated with a higher infection rate in patients who received transfusions with the blood. In a new study presented at CHEST 2008, the 74th annual international scientific assembly of the American College of Chest Physicians (ACCP), researchers found that patients who received transfusions with blood stored for 29 days or more were twice as likely to suffer from nosocomial infections, including pneumonia, upper respiratory infections, and sepsis, with the oldest blood being associated with the most infections. Currently, federal regulations allow red blood cells to be stored up to 42 days, after which they must be discarded.

"Stored red blood cells undergo changes that promote the release of a number of biochemical substances called cytokines, which can depress the recipients' immune function and leave them more susceptible to infection," said study author Raquel Nahra, MD, who conducted her research while at Cooper University Hospital, Camden, NJ. "Those changes start around 14 days of storage and reach a maximum after the blood is discarded at 42 days."

Researchers from Cooper University Hospital examined the association between the age of packed red blood cells and the development of nosocomial infections (NOSO) in 422 patients receiving blood transfusions who were admitted to an ICU from July 2003 to September 2006. Researchers performed an analysis of the age of the first unit of blood, age of the "oldest" unit of blood (OL), the average age of the unit of blood, and the outcome of NOSO.

"Previous data indicate that the average age of transfused blood is around 17 days old," said Dr. Nahra. "In our study, the average age of blood was 26 days, and 70 percent of all the blood transfused was older than 21 days, suggesting that a large pool of available blood is old blood with higher levels of cytokines and more potential for an immunosuppressive effect."

The analysis showed that 11 percent of patients died, while 57 patients (13.5 percent) developed NOSO: 32 patients developed one NOSO, 21 developed two NOSO, and 4 developed 3 NOSO. Patients who developed NOSO had a significantly higher OL (28.5 days vs. 32 days), and a significantly greater number of units of blood (2 U vs. 3 U). Patients who received transfusions with blood that was 29 days or older were twice as likely to develop NOSO as those receiving transfusions with blood stored for 28 days or less. When the outcome of "at least one infection" was analyzed, a higher number of units of blood (>5 U) was found to be an independent predictor of infection. Furthermore, while the age of the first unit of blood transfused appeared to be associated with the development of infection, the age of the oldest unit showed the strongest relationship.

Many institutions, including Dr. Nahra's, use the oldest available blood first, to ensure that it does not go to waste. Researchers speculate that if strict regulation of blood storage were to occur (ie, shorter maximum storage allowance), the overall blood supply may decrease.

"More cautious utilization of blood might help to alleviate, at in least part, a diminished blood supply that might result from such a change in policy," said study director and senior investigator David Gerber, DO, Cooper University Hospital. "More studies are needed, and the overall implications of any such potential changes need to be formally assessed before any major changes in blood storage policy can be proposed."

"The results of this study raise questions about current blood storage standards and transfusion practices and suggest additional research is needed in these areas," said James A. L. Mathers, Jr., MD, FCCP, President of the American College of Chest Physicians.

Source: American College of Chest Physicians

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