Filtering donor blood reduces heart, lung complications

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Researchers at the University of Rochester Medical Center (URMC) have discovered yet another reason to filter the foreign white cells from donor blood: The resulting blood product is associated with dramatically fewer cardiopulmonary complications for patients who received a transfusion.

The study is published in the journal, Transfusion. It is the latest in a large body of work led by Neil Blumberg, M.D., who for 25 years has been investigating the benefits of filtering or washing blood to create safer, simpler approaches to transfusion therapy.

The observational study was conducted during the seven years before and after 2000, when URMC introduced universal leukoreduction, a process that filters the white cells from blood to be used for transfusions. Researchers looked at the number of reports of transfusion reactions during the 14-year period, and divided them by the total number of blood components transfused (778, 559).

Rates of acute, transfusion-related lung injury dropped 83 percent in the years after filtering took place, and transfusion-associated circulatory overload declined 49 percent, when compared to the rates prior to the year 2000. Both conditions are rare, but are among the most common causes of death following a transfusion.

"These data are very exciting because we described two unexpected and unexplained associations between adverse reactions and leukoreduction,

"Blumberg said. "However, our observations do not prove cause and effect, and therefore require further investigation before we can say with certainty that leukoreduction is responsible for so many fewer cardiopulmonary complications."

The Centers for Disease Control is introducing a new blood surveillance system to track severe transfusion reactions, Blumberg said, which should provide more detailed information to support or refute the URMC study.

About five million people a year in the United States receive transfusions to replenish blood lost during surgery, serious injury or illness. While transfusions can be life-saving, they also lead to health complications.

In previous studies, Blumberg's team has shown that the odds of post-surgical infection and death are greatly reduced by leukoreduction. White cells from donor blood can attack the immune system of the blood recipient; removing them diminishes the chances of an inflammatory response or infection, according to Blumberg's research.

Transfusion-related lung injury is believed to happen when antibodies or other molecules from the donor's white blood cells or plasma react in an adverse way with the recipient's white blood cells. Circulatory overload is presumed to occur when the volume of blood given in a transfusion is too much for the recipient's cardiovascular system. Researchers hypothesized that leukoreduction, which removes the white cells, would reduce those complications.

In 1998 Strong Memorial Hospital, a 754-bed facility that is part of URMC, became one of the first hospitals in the nation to use leukoreduced blood during heart surgeries. Two years later Strong extended its leukoreduction practices to all patients. Work done at

URMC also has supported keeping transfusions to an absolute minimum. Blumberg's evidence-based stance on the judicious use of transfusions and safer techniques has contributed greatly to the national and international dialogue on reducing in-hospital infections rates and controlling costs.

Provided by University of Rochester Medical Center