

# Blood usage in open heart surgery

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The rapid growth of open heart surgery has placed great demands on blood banks throughout the world. Several years ago, many of the leading cardiac centers in the United States were surveyed and it was found that cardiopulmonary procedures had more than doubled and an average of eight units of homologous blood had been used per patient. If this continues, a nation's entire blood resource could be consumed by cardiac surgery. The incidence of transfusion reaction, hepatitis, coagulation abnormalities, and hemolysis increases when more blood is given to the patient. Reducing the amount of blood used during open heart operations appears to be the most likely solution to this problem.

All known blood-conserving methods preoperatively, operatively, and postoperatively were employed in a group of 249 patients undergoing cardiac surgery. These include autotransfusion, total hemodilution, careful hemostasis, the use of postoperative volume expanders other than blood, and the treatment of anemia. With hemodilution it is not necessary to add blood to prime the heart-lung machine. Autotransfusion is a process of removing 500 to 2000 cc of blood from a patient before he goes on cardiopulmo-

nary bypass, and it is stored and returned after termination of perfusion and neutralization of heparin. Erythrocytes, platelets, and blood-clotting factors are spared the trauma from the heart-lung machine. It has been reported to decrease the amount of blood given postoperatively by 18% to 25%. Circulating volume deficits were replaced with a balanced electrolyte solution or plasmanate. Basic surgical technical factors that help to conserve blood, such as simple cannulation methods and careful hemostasis and the ways to prevent unnecessary wasting of blood, have been found to be crucial in decreasing blood loss.

These methods were employed in a group of 249 adult patients: 184 underwent coronary bypass, 43 had valve replacements, 14 had bypass grafts plus valve replacements and 8 had repair of congenital defects.

Twenty percent (51 patients) were not given any blood during their entire hospital stay, 11% (27 patients) received no blood during surgery,

and 20% (49 patients) received no blood in the postoperative period. The average blood requirement for the entire group was 2.25 units whole blood and packed cells for the entire hospital stay. Included were five patients (2%) who bled postoperatively and required a second operation. The average postoperative blood loss was 825 cc/patient.

Most patients have some anemia for 4 to 6 weeks following open heart surgery. The degree of anemia that a patient can safely tolerate has not been determined. We found that most of the patients tolerated hematocrits of 23% and 25%. The patients were treated with an oral iron preparation and recovered from their anemia in about 4 to 6 weeks postoperatively.

The amount of blood used has been minimized considerably in this group of patients without apparent additional risk. The cost is decreased considerably, and the incidence of hepatitis and transfusion reactions is lessened.