Bacterial Contamination of Blood Products
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With the remarkable reductions in viral transmission risks that have been achieved over the last two decades, the focus of blood safety efforts has rightly shifted to bacterial pathogens. Though infrequent, bacterially contaminated components continue to be a potentially fatal risk of transfusion. The risk of fatality from a bacterially contaminated platelet unit, at 7 per million units, is 20-fold greater than the risk of HIV transmission. The fatality rate from a bacterially contaminated red cell unit, at about 1 per million units, also exceeds the HIV transmission rate. From 1986 to 1991 in the United States, 29 deaths were reported as caused by transfusion of bacterially-contaminated blood products: 21 from platelets and 8 from red blood cells. Most experts agree that this is an underreporting. Approximately 10-12 patients are thought to die annually in the US from bacterially contaminated red cell units. Annual deaths from bacterially contaminated platelets is likely even higher.

The room temperature storage of platelets provides ideal growth opportunities for bacteria; refrigerated red cell unit storage supports bacterial growth less well. The rate of bacterial contamination of platelets is estimated at 1 in 2,000 units. The risk of a severe septic reaction after a platelet transfusion is estimated at 1 in 50,000 units. The majority of contaminants are gram-positive bacteria (Staphylococcus species) introduced during phlebotomy at the time of donation. However, gram-negative bacteria introduced from asymptomatic donor bacteremia are more often implicated in life-threatening and fatal infections.

Both the American Association of Blood Banks (AABB) and College of American Pathologists (CAP) have applied measures aimed at decreasing the transfusion of bacterially contaminated platelets. On March 1, 2004, the AABB implemented a new standard that requires methods to limit and detect bacterial contamination in all platelet components. CAP has included a question on the blood bank inspection checklist for laboratory accreditation that addresses this issue since 2002. Several methods are available for the detection of bacteria in platelets. Commonly utilized methods include (1) visual inspection for clumping or loss of swirling, (2) culture systems, such as the BacT/Alert (BioMerieux) and eBDS (Pall) and (3) the use of glucose or pH indicators, as both of these metabolic parameters are decreased by the growth of bacteria. A recent study indicated
that checking pH, even with a meter, detected only about a third as many contaminated units as might have been anticipated.\textsuperscript{7} The majority of blood collection centers only test apheresis (single donor) platelets, usually by culture, leaving the hospital transfusion service responsible for testing pooled platelet units (platelet units from multiple donors). Most hospital transfusion services, due to inventory and manpower issues, utilize non-culture-based methods, although these are not as sensitive or specific. Culture is the gold standard for detecting bacterially contaminated units.

While detection of bacterial contamination has garnered the most attention, other strategies aimed at lessening the risk of platelet-associated sepsis exist. Among these are (1) reducing the risk of contamination by improved donor screening, improved venipuncture site disinfection and diversion of the initial blood draw, (2) reducing recipient exposure to platelet products by lowering transfusion triggers and using apheresis platelets, (3) and pathogen inactivation.\textsuperscript{3,4} Although some of these strategies can be readily implemented, others require further research and development before introduction into collection centers and transfusion services.

The goal in transfusion medicine is to make the blood supply as safe as possible for our patients. Though none of the approaches discussed are 100\% effective, they are important steps if optimal safety is to be achieved.

Reference List