Letter to editor

Evaluation of bacterial contamination of blood components in a tertiary care centre

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Sir

Blood and blood components are a potential source of infection by a plethora of known and unknown organisms. Testing for transfusion transmitted infections has reduced the rate of viral transmission amongst patients transfused with blood. However, the low but definite risk of bacterial contamination has emerged as the residual but major threat of transfusion transmitted disease.

There is paucity of data in literature to document the exact frequency of transfusion transmitted bacterial infections, but reported values are around 0.1%.[1]

The study was conducted in Blood Bank, Lady Hardinge Medical College, New Delhi. Blood bags sent for sterility testing were evaluated for a period of 30 months. As per NACO guidelines, 1% of the blood units collected are sent to Department of Microbiology for sterility testing.[2] The blood bags were sent on the day of their expiry. Also, all blood bags received in the blood bank within one hour following transfusion reactions were also sent for culture.

Blood samples were collected from the satellite tubing after stripping them completely into the blood bags, thoroughly mixing and then cleaning with povidone iodine and methanol with full aseptic precautions. Ten ml of sample was added to the culture bottles and transported immediately to the Microbiology lab.

Blood culture is done for 15 days as per norms of Indian pharmacopoeia. [Drugs and Cosmetic Act 1940, Rules 1945 (Schedule F, Part XII-B), Government of India] The results were noted and strict measures were taken to note the cause and rectify it in case of any growth noted on culture of the blood bags.

A total of 154 blood components were sent for sterility testing during the period of the study. This included 52 units of whole blood, 85 units of red cell concentrate, 6 units of fresh frozen plasma, 93 units of platelets (63 units of platelet concentrate and 30 units of platelet rich plasma). [Table 1]

Table 1: Summary of the blood components tested for sterility.

Blood Component	Number of units tested	Number of units culture positive
Whole Blood	52	1 (1.92%)
Red cell concentrate	85	0 (0%)
Fresh Frozen Plasma	6	0 (0%)
Platelet concentrate + Platelet rich plasma	93	5 (5.38%)
Total	236	6 (2.54%)

One unit of whole blood showed culture of *Pseudomonas* on sterility testing, 2 units of PC showed positive cultures for *E.coli* and *Aspergillus* respectively, 3 units of platelet rich plasma showed positivity for *E.coli, Klebsiella* and *Acinetobacter*. All units of red cell concentrate and fresh frozen plasma were sterile. [Table 1]

None of the blood bags received in the blood bank following transfusion reactions, including 2 clinically suspected cases of transfusion-associated sepsis, showed any growth.

In the recent times, blood safety has improved

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considerably as far as blood borne viruses are concerned due to the use of fourth generation ELISA and Nucleic acid amplification tests. However, incidence of bacterial contamination has not changed significantly.[3]Transfusion of bacterially contaminated blood and blood products may have severe and even fatal consequences.[4-6]The index of bacterial contamination is a measure of transfusion safety in blood banks.

Platelets are stored at 22˚C-24˚C and as a result are more likely to support bacterial growth than are red cells which are refrigerated at 1˚C-6˚C. The estimated prevalence of bacterial contamination in past literature is 0.2% for whole blood[1], 0.002-1% for packed red cells and 0.04-10% for platelets depending upon processing, storage and the method of culture.[7]

The sources of contamination of blood bags are well known. Gram positive skin commensals like *Bacillus cereus*, Coagulase negative *Staphylococci, Streptococcus* sp., *Staphylococcus aureus, Propionibacterium acnes* and gram negative bacteria like *Klebsiella* sp., *Serratia* sp., *Escherichia coli, Acinetobacter, Enterobacter*sp., *Providenciarettgeri, Yersinia enterocolitica* are the organisms most commonly recovered from donated blood.[8] The contamination occurs during phlebotomy as a result of incomplete disinfection or skin core removal by the collection needle. Asymptomatic donors with transient bacteremia are responsible for most of the gram negative bacterial contamination.

The probable cause for growth of gram negative bacteria in our blood bank could be also due to lack of stringent precautions while sending the samples for culture. The other cause could be delay in transit of samples from the blood bank to the microbiology lab. Henceforth, it was ensured that stringency was maintained at these levels. It was ensured that there is minimal, if any, delay in sending the samples to the microbiology lab.

Also, strict precautions were taken during phlebotomies to ensure asepsis. "Diversion" that is discarding the first aliquot of donor blood removed was started. By this method, the skin core which may enter the collection from the hollow bore needle used in phlebotomy is removed.

Leuco reduction should be promoted as far as feasible since this removes the white blood cells from the blood unit and thus the contaminating bacteria which are phagocytosed by donor white cells in blood components are also removed. This minimizes clinical bacterial contamination.

Grossly, signs of bacterial contamination in blood bags are discolouration, hemolysis, gross color difference in the satellite tubing of the bags, clot or gas formation or appearance of turbidity in the supernatant plasma. Bags should be carefully checked for such changes before being issued.

Sepsis associated with transfusion of red cells contaminated with gram negative bacteria is typically severe and rapid in onset. Patients develop high fever and chills during or immediately following transfusion.[9]In our blood bank however, no case of transfusion reaction due to sepsis was reported in any of the recipients. The blood bags of cases with febrile transfusion reactions received turned out to be negative on culture. Also there were 2 cases with clinical suspicion of post transfusion sepsis, which also turned out to be negative on culture.

Knowledge of prevalence of bacterial contamination of blood transfusion and its causes is important. It helps in planning preventive measures at blood transfusion centers and in reducing the transfusion transmitted bacterial infections. Characterization of bacterial isolates and the types of blood components contaminated is of public health importance.[10]

Author's contribution:

Shivali Sehgal: Data collection, data analysis, writing the manuscript, editing the mansuscript

Lalita Jyotsna Prakhya: Study Plan, Editing the manuscript.

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