What is the utility of selecting platelets by cross-matching?

What is this research about?

Hypoproliferative thrombocytopenia (HT) occurs when the production of blood platelets by the bone marrow is reduced. HT may occur in patients with leukemia, aplastic anemia or in cancer patients after chemotherapy. In patients with HT, platelets are transfused to increase the platelet count to prevent excessive bleeding. Immune system recognition of mismatches between the platelet donor and recipient can cause ineffective responses to platelet transfusion. Cross-matching platelets is a method of selecting compatible platelets for patients with HT, in particular, in hospitals where access to large panels of HLA-typed platelet donors is limited. Many methods have been developed for cross-matching platelets. This systematic review was conducted to determine if cross-matched platelet transfusion decreases the number of patients with bleeding or death, improves platelet counts, prevents transfusion refractoriness (i.e., poor platelet count increases after transfusion) or alloimmunization (i.e., development of antibodies against transfused platelets). The review also aimed to estimate the test characteristics and clinical utility (i.e., value to the patient) of the various cross-matching tests.

What did the researchers do?

Medical literature was examined in search of studies involving HT patients who received transfusions of cross-matched platelets. The search, updated to December 2012, included published studies of the electronic databases MEDLINE, Cochrane Central Register of Controlled Trials, EMBASE, and PubMed from 1948 to September 2011. Results were independently assessed by three reviewers to determine which studies should be included in the systematic review. Data from the included studies were independently extracted by three reviewers. Extracted data included HT population information, clinical outcomes and estimates on test characteristics and clinical utility of the cross matching tests. The quality of each study was assessed using validated tools or checklists to help interpret the findings.

What did the researchers find?

- A total of 31 reports were eligible for review, representing a total of 29 discrete patient studies.
- The impact of cross-matched platelets on the development of refractoriness, bleeding or death could not be assessed from these studies. Two studies showed that alloimmunization was not exacerbated with cross-matched platelet support.
- In 24 studies, higher platelet counts following transfusions were observed with compatible cross-matched platelets than incompatible or non-cross-matched platelets.
- Success at increasing counts with cross-matched platelets has been reported to be inferior in one and equivalent to transfusion of HLA-identical platelets in another, somewhat biased, comparative study.

**In brief...**

Transfusions of cross-matched platelets increase platelet counts but there is insufficient data to link this benefit with improved clinical outcomes such as reduced bleeding and mortality. It is essential that a comparative clinical study be completed to assess both laboratory and clinical outcomes of cross-matched platelet transfusion.
Although there was no way to compare test characteristics and clinical utility of the various commonly employed cross-matching methods, platelet cross-matching assays based on detection of bound recipient immunoglobulin present in the recipient plasma appear superior to lymphocyte cross-matching and older techniques.

How can you use this research?
While this systematic review analyzed many studies, most outcomes related primarily to an increase in platelet counts following transfusion rather than clinical outcomes such as bleeding or death. Yet through this review, the International Collaboration for Guideline Development, Implementation and Evaluation for Transfusion Therapies (ICTMG) was able to prioritize research opportunities in the utility of cross-matched platelet transfusion in patients with HT. The findings will be shared with transfusion specialists, physicians, healthcare providers, blood bankers, policy makers, and patients.

Improvements in identifying effective, compatible platelet units through cross-matching and HLA-selection have focused on surrogate laboratory results like platelet count increases instead of more clinically-relevant outcomes such as bleeding or death. It is essential that a comparative study focusing on both laboratory and clinical outcomes be conducted in order to guide future clinical practice.

About the research collaboration: The International Collaboration for Guideline Development, Implementation and Evaluation for Transfusion Therapies (ICTMG) has been convened to develop evidence-based transfusion guidelines, to promote evidence-based transfusion medicine, and to optimize transfusion care. The ICTMG consists of physicians and methodologists from Canada, the United States, United Kingdom, Belgium, Germany and Australia. The guideline group is expanding to include additional international members.

For the systematic review on cross-matched platelet transfusion, the lead was Dr. Ralph Vassallo. Dr. Vassallo is the Northeast Division Chief Medical Officer, American Red Cross Blood Services, Penn-Jersey Region.

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