

BLOOD BULLETIN

SEPTEMBER 2015

PROVIDED BY YOUR INDEPENDENT,
NONPROFIT COMMUNITY BLOOD CENTER
In conjunction with America's Blood Centers®



Platelet Transfusions in Adults – A Review of AABB's 2015 Clinical Practice Guideline

By Annika M. Svensson, MD, PhD, Children's Hospital Colorado and Department of Pathology, School of Medicine, University of Colorado Denver, and the Scientific Publications Committee, America's Blood Centers

General Background. Platelet transfusions are indicated for the treatment and prevention of hemorrhage in thrombocytopenic patients and/or those affected by primary or secondary platelet dysfunction. In North America, apheresis (single donor) platelets are the predominantly used product, though platelets derived from whole blood remain available in some regions. Both products, which expire five days after collection, have a usable shelf life of only three-to-four days; the delay in availability is associated with the completion of required infectious disease (including bacterial) testing. The Food and Drug Administration will allow seven-day storage of some apheresis platelets if retested for bacteria late in storage with a rapid test approved as a "safety measure." Maintaining an appropriate, cost-efficient platelet inventory can be a logistical challenge and places a premium on appropriate use.

Leukoreduced (LR) platelets collected by apheresis contain $\geq 3 \times 10^{11}$ platelets and $< 5 \times 10^6$ leukocytes. LR has decreased but not eliminated the risk of cytomegalovirus (CMV) transmission and HLA alloimmunization, with the latter benefit minimizing the likelihood for consequent platelet transfusion refractoriness and/or transplant rejection.^{1,2} Irradiation of platelets reduces the risk of transfusion-associated graft-vs.-host disease without affecting the quality of the product. Following their transfusion into healthy individuals, fresh autologous platelets have an average lifespan of approximately three-to-five days.³ In patients with thrombocytopenia, however, platelet survival may be considerably shorter, often making it necessary to transfuse platelets at least every two to three days for patients with very low production.²

Risks from platelet transfusions include transfusion-related acute lung injury (TRALI), transfusion-associated circulatory overload (TACO), and febrile and allergic reactions, as well as transfusion-transmitted diseases (with the latter consisting most characteristically of bacterial

Key Points

- Prophylactic platelet transfusions, using a threshold of 10,000/ μ L, greatly reduce the risk of spontaneous bleeding in hospitalized adult patients.
- A threshold of 20,000/ μ L is recommended for minor invasive procedures.
- A threshold of 50,000/ μ L is recommended in preparation for lumbar puncture and for major elective nonneuraxial surgery.
- A threshold of 80-100,000/ μ L may be appropriate for surgery involving the central nervous system.

septic reactions related to the room temperature storage of these products). ABO-incompatible (including, in some cases, "plasma-incompatible") platelets are transfused routinely at many facilities, with significant hemolysis being seen very rarely.

AABB's Guideline. In February 2015, AABB issued a Clinical Practice Guideline for platelet transfusions.⁴ The panel's recommendations (summarized below) – all pertaining to transfusion thresholds in various clinical situations involving adult patients – were based on expert review of more than 1,000 randomized controlled clinical trials and observational studies culled from PubMed and/or the Cochrane Central Register of Controlled Trials. These studies, from January 1900 through September 2014, included prophylactic and/or therapeutic platelet transfusions. The first of these recommendations was grounded in "moderate-quality" evidence, whereas the remaining five were based on more limited data – i.e., "low" and "very low-quality" evidence.

Recommendation 1: For hypoproliferative thrombocytopenia, AABB recommended transfusion of

hospitalized adult patients with platelet counts of $\leq 10,000/\mu\text{L}$. Prophylactic transfusions at this threshold greatly reduce the risk of clinically relevant (e.g., World Health Organization grade 3 or 4), spontaneous microvascular bleeding. Moreover, such a reasonably restrictive approach also reduces overall platelet use and, as a result of fewer transfusions, the incidence of adverse transfusion reactions.^{5,6} Based on several studies examining the impact of platelet dose on bleeding, AABB supported the transfusion of one-half to one apheresis unit for prophylaxis in myelosuppressed patients. With lower (half-unit) doses, more frequent transfusions and increased donor exposure should be expected; however, this may be acceptable in the inpatient setting during periods of platelet inventory shortage. A more liberal transfusion threshold may be warranted in other populations, especially outpatients (for whom an optimal level of vigilance and a rapid response to bleeding events are more difficult).⁴

Recommendation 2: When transfusing in preparation for elective placement of central venous catheters (CVCs), the panel recommended a threshold of $20,000/\mu\text{L}$.^{4,7-9} This is lower than that defined in other published guidelines. For example, the Society of Interventional Radiology Guidance from 2012 recommended a threshold of $50,000/\mu\text{L}$ before CVC placement.¹⁰

Recommendation 3: AABB recommended a platelet transfusion threshold of $50,000/\mu\text{L}$ for diagnostic lumbar puncture (LP) procedures.³

Recommendation 4: For adult patients undergoing major elective, nonneuraxial surgery, the transfusion threshold recommended by AABB's panel was $50,000/\mu\text{L}$.⁴

Recommendation 5: The panel recommended that transfusions be considered for patients undergoing cardiac surgery involving cardiopulmonary bypass (CBP) where perioperative bleeding with thrombocytopenia (defined as "a platelet count below the lower limit of the normal range used by the laboratory performing the count") and/or signs of platelet dysfunction are detected. Presumably (but not stated by the authors) this bleeding must be microvascular – and not anatomic – in nature. Qualitative platelet defects are commonly seen following exposure to a CBP circuit, but significant bleeding is not.⁴

Recommendation 6: In adults receiving anti-platelet therapy who suffer traumatic or spontaneous intracranial bleeding, AABB's expert panel could not make a recommendation at this time due to a lack of conclusive supportive evidence. Clinical factors, including the size of the hemorrhage and the patient's level of consciousness, should guide the decision to transfuse in such cases. Many practitioners prepare patients for surgery of the central nervous system via prophylactic transfusions to achieve platelet counts between $80\text{--}100,000/\mu\text{L}$; however, there are only scant data to support this practice.⁴

The authors of this Clinical Practice Guideline call for more research into the clinical utility of point-of-care hemostasis testing and the ascertainment of platelet transfusion thresholds for major invasive procedures.

References

1. The Trial to Reduce Alloimmunization to Platelets Trial Study Group. Leukocyte-reduction and ultraviolet B irradiation of platelets to prevent alloimmunization and refractoriness to platelet transfusions. *N Engl J Med*. 1997; 337: 1861-69.
2. Fung MK, Grossman BJ, Hillyer C, et al, eds. Technical Manual, 18th ed., Bethesda, MD: AABB Press, 2014.
3. Holmes S, Heaton A. In vitro platelet ageing at 22 degrees C is reduced compared to in vivo ageing at 37 degrees C. *Br J Haem*. 1995; 91: 212-8
4. Kaufman RM, Djulbegovic B, Gernsheimer T, et al. Platelet Transfusion: A Clinical Practice Guideline from the AABB. *Ann Intern Med*. 2015; 162: 205-13.
5. Wandt H, Schaefer-Eckart K, Wendelin K, et al. Therapeutic platelet transfusion versus routine prophylactic transfusion in patients with haematological malignancies: an open-label, multicenter, randomized study. *Lancet*. 2012; 380: 1309-16.
6. Stanworth SJ, Estcourt LJ, Llewelyn CA, et al. Impact of prophylactic platelet transfusions on bleeding events in patients with hematologic malignancies: a subgroup analysis of a randomized trial. *Transfusion*. 2014; 54: 2385-93.
7. Zeidler K, Arn K, Senn O, et al. Optimal preprocedural platelet transfusion threshold for central venous catheter insertions in patients with thrombocytopenia. *Transfusion*. 2011; 51: 2269-76.
8. Haas B, Chittams JL, Trerotola SO. Large-bore tunneled central venous catheter insertion in patients with coagulopathy. *J Vasc Interv Radiol*. 2010; 21: 212-7.
9. Duffy SM, Coyle TE. Platelet transfusions and bleeding complications associated with plasma exchange catheter placement in patients with presumed thrombotic thrombocytopenic purpura. *J Clin Apher*. 2013; 28:356-8.
10. Patel IJ, Davidson JC, Nikolic B, et al. Consensus guidelines for periprocedural management of coagulation status and hemostasis risk in percutaneous image-guided interventions. *J Vasc Interv Radiol*. 2012; 23: 727-36.

Blood Bulletin is issued periodically by America's Blood Centers. Publication Committee Chair: Chris Gresens, MD. The opinions expressed herein are opinions only and should not be construed as recommendations or standards of ABC, ABC SMT Committee, or its board of trustees. Publication Office: 725 15th St., NW, Suite 700, Washington, DC 20005. Tel: (202) 393-5725; Fax: (202) 393-1282; E-mail: newsletter@americasblood.org. Copyright America's Blood Centers, 2015. Reproduction is forbidden unless permission is granted by the publisher. (ABC members need not obtain prior permission if proper credit is given.

