Physician Compliance With Platelet Usage Criteria

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Context—Platelet transfusions are used in clinical practice as prophylaxis or to treat bleeding thrombocytopenic patients. This procedure also carries risks and costs and must be allocated appropriately.

Objective—To evaluate physician compliance with the platelet transfusion criteria in our tertiary care academic institution.

Design—We evaluated platelet unit releases from the transfusion service for 4 months, and we retrieved pre-transfusion platelet counts. Reasons for transfusion were obtained by reviewing patient charts and talking to clinicians. Compliance with hospital criteria for platelet use was determined.

Results—Platelets were given to 113 patients in 282 transfusion episodes. Criteria were not met for 32 (11%) of 282 platelet transfusions. Justifiable reasons for transfusion at platelet counts of greater than 10 × 10^9/μL included bleeding risk from oral ulcers, other risks of bleeding in patients who were transfused before discharge, and antiplatelet drug use in cardiac surgery patients. Reasons for transfusion at platelet counts greater than 10 × 10^9/μL that were not justified include transfusion at a platelet count of 110 × 10^9/μL to a lung cancer patient with no platelet dysfunction and transfusion to 4 septic patients with platelet counts of 70 to 90 × 10^9/μL.

Conclusions—This study showed 89% physician compliance with hospital platelet transfusion criteria. Transfusion-medicine specialists concurred that strict adherence to hospital blood usage criteria was not applicable for 9.2% of these patients; however, 5 (1.8%) of 282 platelet transfusions were not indicated and could have been prevented by transfusion medicine physician intervention.

( Arch Pathol Lab Med. 2008;132:1321–1324)
is 5000 units, with a projected cost of $685 per unit. The intent of the study is to limit inappropriate transfusion of platelets.

**MATERIALS AND METHODS**

All platelet-release data for 4 months (October and November 2003, October 2004, and October 2005), spanning 3 years, were retrospectively reviewed. For each platelet transfusion, the pretransfusion platelet count was retrieved from the hospital database. The diagnosis for each patient and the reason for transfusion were determined by reviewing patient charts. Patients were then placed into 3 categories: group 1, patients with hematologic malignancies; group 2, patients with nonhematologic malignancies; and group 3, all other cases. For cases with unclear reasons for transfusion, the case was discussed, and the information was retrieved by telephone from the ordering physician. Compliance with the hospital’s established criteria for platelet usage was determined. The hospital policy for platelet use† (1 single-donor platelet or 6 random-donor platelet concentrates per transfusion episode) is summarized in Table 1.

## RESULTS

During the 4 months studied, 113 patients underwent platelet transfusion, with a total of 282 transfusion episodes. The distribution of platelet transfusions and percentage of noncompliance per group are shown in Table 2 and Figure 1. The established criteria of our institution were not met in 32 (11%) of 282 platelet transfusions in 18 patients (Figure 2).

### Table 1. Hospital Criteria for Platelet Usage

| Patients with significant active bleeding | Melena, hemoptysis, or internal bleeding involving a vital organ and platelet count of ≤50 × 10^9/μL |
| For surgery or platelet dysfunction | Preparation for brain, eye, or spinal surgery: platelet count ≤ 100 × 10^9/μL |
| Transfusion of the alloimmunized patient | One single-donor platelet or 6 random-donor platelet (RDP) concentrates is expected to increase the platelet count in a 70-kg adult by 50 to 100 × 10^9/μL |

### Table 2. Distribution of Patients With Number of Noncompliant Cases in Each Group

<table>
<thead>
<tr>
<th>Group</th>
<th>Platelet Transfusions, No.</th>
<th>Noncompliant Cases, No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>199</td>
<td>23 (11.6)</td>
</tr>
<tr>
<td>2</td>
<td>25</td>
<td>1 (4)</td>
</tr>
<tr>
<td>3</td>
<td>58</td>
<td>8 (13.8)</td>
</tr>
</tbody>
</table>
The 23 cases of noncompliance in group 1 involved transfusion to patients with hemato-oncologic malignancies and platelet counts between 10 and $30 \times 10^3/\mu L$. Reasons for transfusion included neutropenic fever, mucositis, and the need for transfusion prior to discharge. The platelet transfusion trigger was higher for patients with acute leukemia with concurrent mucositis because these patients have an increased risk of bleeding from oral ulcers. Certain patients at high risk for bleeding were transfused prior to discharge at platelet counts between 10 and $30 \times 10^3/\mu L$. On consultation with the oncologist (ordering physician) and transfusion medicine specialists, there was a consensus that these transfusions were indicated.

The single case of noncompliance in group 2 involved transfusion to a patient who had lung carcinoma with bone metastases and a platelet count of $110 \times 10^3/\mu L$ prior to an orthopedic procedure. There was no evidence of platelet dysfunction, and it was decided that this transfusion was not indicated.

Among the 8 cases of noncompliance in group 3, 4 cases were transfused to patients with cardiovascular disease and platelet counts between 90 and $210 \times 10^3/\mu L$. These patients were receiving clopidogrel after undergoing coronary artery bypass grafting and received the platelet transfusions postoperatively. These transfusions were deemed justified. The other 4 cases involved transfusion to septic patients with platelet counts between 70 and $90 \times 10^3/\mu L$. The critical care physician concurred that platelet transfusion was not indicated for nonbleeding septic patients with platelet counts greater than $50 \times 10^3/\mu L$.

**Comment**

Our study showed strict compliance by ordering physicians with the established criteria in our institution in 89% of platelet transfusions. This increased to 98.2% on retrospective consultation when the transfusion-medicine specialists agreed that in 27 of these cases (patients had concurrent risk factors for bleeding, including mucositis or oral ulcers) strict adherence to hospital blood usage criteria was not applicable. Other reasons for platelet transfusion at a higher threshold include the presence of neutropenic fever. Further, most clinicians feel more comfortable maintaining platelet counts of greater than $30 \times 10^3/\mu L$ for hemato-oncologic patients who are about to be discharged, especially if a further decrease in platelet count is anticipated. Platelet transfusions also were given at platelet counts higher than the hospital's criterion ($\leq 50 \times 10^3/\mu L$) to patients receiving antiplatelet drugs after undergoing major cardiac surgery. This was deemed appropriate after consultation with the transfusion medicine physician.

Eikenboom et al investigated compliance with a platelet transfusion trigger of $10 \times 10^3/\mu L$ in hemato-oncologic patients with thrombocytopenia in their study that evaluated 1447 platelet transfusions. In half of the transfusions, there was compliance with the trigger of $10 \times 10^3/\mu L$. About three fourths of all platelet transfusions were given at platelet counts of less than $20 \times 10^3/\mu L$. Transfusions at levels greater than $20 \times 10^3/\mu L$ were performed because of bleeding, scheduled interventions, or concurrent anticoagulation therapy. The authors concluded that deviations from the trigger threshold were justified by the presence of additional risk factors for bleeding. Thus, our justification for transfusion at lower thresholds was similar to that of their study.

Arnold et al conducted a retrospective cohort study of thrombocytopenic patients in a medical-surgical intensive Care Unit and found that 11% of platelet transfusions were noncompliant, with a trigger of $10 \times 10^3/\mu L$. They concluded that a threshold of $20 \times 10^3/\mu L$ was more appropriate for nonbleeding patients with thrombocytopenia.
care unit setting. Of the 76 transfusions administered, 52 (68.4%) were prophylactic, administered at a median platelet transfusion trigger of $41 \times 10^3 / \mu L$, and 24 (31.6%) were therapeutic with a median platelet transfusion trigger of $51 \times 10^3 / \mu L$. Prophylactic transfusions indicated for the prevention of spontaneous bleeding were administered at a median platelet transfusion trigger of $33 \times 10^3 / \mu L$; prophylactic platelet transfusions for the prevention of procedure-related bleeding were administered at a median platelet count trigger of $46 \times 10^3 / \mu L$.

In a similar study done in a tertiary care hospital, Cameron et al. showed that 78% of platelet transfusions involved patients with platelet counts greater than $10 \times 10^3 / \mu L$; 38% of patients had platelet counts of greater than $20 \times 10^3 / \mu L$. The mean pretransfusion platelet counts for surgery and the heart institute were 84.5 and $102.3 \times 10^3 / \mu L$, respectively, compared with $16.6 \times 10^3 / \mu L$ for the bone marrow transplant and hematology-oncology departments. Seventy-eight percent of platelet transfusions in the bone marrow transplant and hematology-oncology departments were given at counts of greater than $10 \times 10^3 / \mu L$. These transfusions were justified by a concurrent risk of bleeding in these patients. Cardiac surgery patients in their hospital had a mean pretransfusion platelet count of greater than $100 \times 10^3 / \mu L$. Although scientific evidence is against transfusion at these high platelet counts, a higher trigger was justified in coronary patients receiving anticoagulants. This rationale for justification of transfusion is the same as in our study. To date, there are no published guidelines on platelet transfusion triggers in an intensive care unit setting. Randomized controlled trials for evaluating platelet transfusion strategies for patients in intensive care units are warranted.

In our study, there were 5 cases (1.8%) of platelet transfusion, most involving transfusion to septic patients without concurrent risks of bleeding, that were considered to be not indicated. These transfusions could have been prevented by concurrent audit and transfusion medicine physician intervention, saving $61,650 annually (savings on 1.8% of 5000 units transfused annually at a cost of $685 per unit). Dialogue between the transfusion medicine and ordering physicians can reduce inappropriate use of blood products and decrease hospital costs for their use. This type of dialogue would optimize available supplies of a scarce resource, avoid significant risks involved in platelet transfusion, such as infection, and promote appropriate triage of blood products to patients who need them.

References