



Platelets



Prophylactic platelet transfusions

Remember

Do not transfuse platelets where the cause of thrombocytopenia has been determined to be due to immune destruction (ITP) or from uncontrolled microvascular thrombosis (TTP, HITS) unless in exceptional circumstances with active bleeding.

Platelets can either be transfused prophylactically to minimise the risk of bleeding in a non-bleeding patient with severe thrombocytopenia or therapeutically to control bleeding. There is evidence to indicate that patients require only approximately $7.1 \times 10^9/L$ platelets per day to maintain haemostasis. Bleeding is common in patients with therapy-induced (e.g. chemotherapy, HSCT) hypo-proliferative thrombocytopenia with the incidence higher among children.¹ The bleeding can occur at any platelet range, However, the risk is significantly amplified at platelet counts below $5 \times 10^9/L$. Patients receiving prophylactic platelets have delayed onset of bleeding and reduced days with bleeding although the frequency of bleeding episodes are not significantly affected.^{2,3} Several randomised control trials and systematic

reviews have established the clinical utility of prophylactic platelet transfusion in the severely thrombocytopenic patient. Prophylactic platelet transfusions significantly reduce the risk for spontaneous WHO grade II or greater bleeding.^{4,5} Higher platelet count threshold for transfusion ($10 \times 10^9/L$ vs. $20-30 \times 10^9/L$) in patients with therapy-induced hypo-proliferative thrombocytopenia is not associated with lower incidence of grade II or greater bleeding.^{6,7} The $10 \times 10^9/L$ threshold is generally recognized as clinically appropriate and is associated with lower platelet usage and fewer transfusion reactions. Low dose platelets (2×10^{11}), as used in this hospital is equally efficacious for haemostatic control in this group of patients as compared to higher ($3-6 \times 10^{11}$) dose.^{2,8,9}

<p>Hospitalised patient with hypoproliferative thrombocytopenia secondary to therapy or marrow failure</p> <ul style="list-style-type: none"> ⊕ Clinically stable, not bleeding, temperature < 38°C: Transfuse if < 10 x 10⁹/L^{4,5,10} ⊕ Recent haemorrhage or temperature > 38°C: Transfuse if < 20 x 10⁹/L ⊕ If patient is on heparin or has a coagulopathy: Transfuse if < 20 x 10⁹/L ⊕ Patient is actively bleeding (WHO Grade II or more): Transfuse if < 50 x 10⁹/L 	<p>Patient undergoing an elective surgical procedure</p> <ul style="list-style-type: none"> ⊕ Minor procedures (central venous line insertion, lumbar puncture): Transfuse if < 20 x 10⁹/L¹¹ ⊕ Neuraxial anaesthesia: Transfuse if < 80 x 10⁹/L¹¹ ⊕ Major elective surgery (non-neurosurgical or ophthalmic): Transfuse if < 50 x 10⁹/L ⊕ Neurosurgical or ophthalmic surgery: Transfuse if < 100 x 10⁹/L ⊕ Cardiac surgery with cardiopulmonary bypass: Transfusion may be indicated in patients who develop perioperative bleeding irrespective of platelet count¹² 	<p>Actively bleeding patient</p> <ul style="list-style-type: none"> ⊕ Disseminated intravascular coagulation (DIC): Transfuse platelets (target – 50 x 10⁹/L) as part of the overall management, which shall include treating the precipitating process and correcting coagulation factor deficiencies ⊕ Massive haemorrhage: Transfuse platelets as part of a Massive Transfusion Protocol (MTP)
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Monitoring response to platelet transfusions

Repeated platelet transfusions may result in suboptimal response with poor recovery of platelets in circulation. As a general rule, transfusion of 200 x 10⁹ platelets (equivalent to one apheresis or four random platelet units) to an adult (60 kg, BSA: 1.73 m²) should raise the platelet count by at least 25 x 10⁹/L.

The platelet count peaks at 10 minutes post-infusion and gradually declines over the next 72 hours. Platelet count increments should be measured within 24 hours of transfusion in patients who are transfused prophylactically. For actively bleeding patients, cessation of bleeding is likely a more important clinical endpoint than post-transfusion platelet count. If prophylactically transfused patients

do not show an expected increment, refractoriness to platelet transfusion should be suspected. In most cases, the contributing cause is non-immune such as infection, splenomegaly, GVHD and medications. In a proportion of patients, alloimmunisation may contribute to the refractoriness. These patients usually demonstrate poor increments even at 10 minutes to 1-hour post-transfusion.

TOPPS⁴

(Trial of prophylactic vs. no prophylactic platelet transfusion)

Patients randomized to receive or not receive prophylactic platelet transfusions when morning platelet counts $< 10 \times 10^9/\text{L}$

Patients in the no-prophylaxis group had more days of bleeding and shorter time to first bleeding episode as compared to the prophylaxis group. Higher trend for WHO grade II or greater bleeding also noted in the no-prophylaxis group ($p=0.06$ for non-inferiority).

Wandt H., et al.⁵

(Therapeutic platelet transfusion vs. routine prophylactic transfusion)

Patients undergoing autologous HSCT or intensive chemotherapy for acute myeloid leukemia, randomized to receive either platelet transfusions when bleeding occurred (therapeutic strategy) or when platelet counts $< 10 \times 10^9/\text{L}$ (prophylactic strategy)

The therapeutic arm showed no increased risk of major haemorrhage in patients who had autologous HSCT but increased risk of non-fatal grade IV haemorrhage (mostly CNS) was noted in those with AML.

SToP⁹

(Standard and low-dose strategies for transfusion of platelets)

Thrombocytopenic adults requiring prophylactic platelet transfusions randomized to receive low-dose ($1.5 - 3.0 \times 10^{11}$) or standard-dose ($3.0 - 6.0 \times 10^{11}$) platelets

Risk of WHO grade II or higher bleeding was not significantly increased in the low-dose as compared to standard dose arm (RR: 0.737-1.502). A higher rate of grade IV bleeding in patients receiving low-dose platelets however resulted in the termination of the trial. It was uncertain if this finding was due to chance or represented a real difference.

PLADO⁸

(Effects of prophylactic platelet dose on transfusion outcomes)

Patients with hypoproliferative thrombocytopenia and morning platelet counts $< 10 \times 10^9/\text{L}$, randomized to receive low, medium or high-dose ($1.1, 2.2, 4.4 \times 10^{11}/\text{m}^2$ BSA) platelet transfusions.

No difference in the rate of WHO grade II or higher bleeding among the three arms. The incidence of higher grades of bleeding and other adverse events were also similar. Low-dose prophylactic platelet transfusions led to decreased number of platelets transfused per patient but an increased frequency of transfusion. Total bleeding days was higher when morning counts were $< 5 \times 10^9/\text{L}$ as compared to when they were $6 - 80 \times 10^9/\text{L}$.

Selected references

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