

In this article...

- The main indications for platelet transfusion
- Correct procedures in the platelet transfusion process
- Practical tips and strategies to avoid wasting platelets

Strategies to reduce inappropriate use of platelet transfusions



Nursing Times
Self-assessment

Key points

- 1 Platelets are the most expensive, commonly used blood component, and their use is steadily increasing**
- 2 There is evidence that platelet transfusions are not always used appropriately**
- 3 There are specific indications for platelet transfusions, which are triggered by platelet counts that differ according to each clinical situation**
- 4 Following the correct transfusion process helps avoid errors, thereby reducing platelet waste**
- 5 Patient blood management can help hospitals to avoid inappropriate use of blood components**

Author Katy Cowan is patient blood management practitioner, NHS Blood and Transplant, Devon.

Abstract Platelets are expensive and their use is increasing, so the question of their supply is becoming an issue. In some instances platelet transfusions are administered unnecessarily, wasting a precious resource. This article explores ways of making sure platelets are used appropriately. It covers the most basic methods, such as respecting the indications for use and following transfusion procedures, to newer and more-innovative strategies, such as applying the principles of patient blood management, using indication codes or sharing stocks.

Citation Cowan K (2017) Strategies to reduce inappropriate use of platelet transfusions. *Nursing Times* [online]; 113: 2, 18-21.

Over the past decade, the number of platelet units issued by NHS Blood and Transplant (NHSBT) to hospitals has steadily increased; it has risen by just over 25% in the nine years to April 2016 (Fig 1; Estcourt et al, 2016). Platelets are the most expensive commonly used component supplied by NHSBT; one unit costs £193.15 (NHSBT, 2016) and, according to NHSBT figures, issuing platelets cost the NHS at least £52m in 2015/16.

There are many reasons for the increasing use of platelets, including an ageing population, improved treatments for people with cancer and improved trauma management. However, there is also evidence that the inappropriate use of platelets is an ongoing problem (Moss, 2015; North West Regional Transfusion Committee, 2013). The national comparative audit estimated that, in 2010, 28% of platelet transfusions could have been avoided (NHSBT, 2011).

Platelets can only be obtained from donors willing to go through donation process that can be last up to 90 minutes, so maintaining an adequate supply of

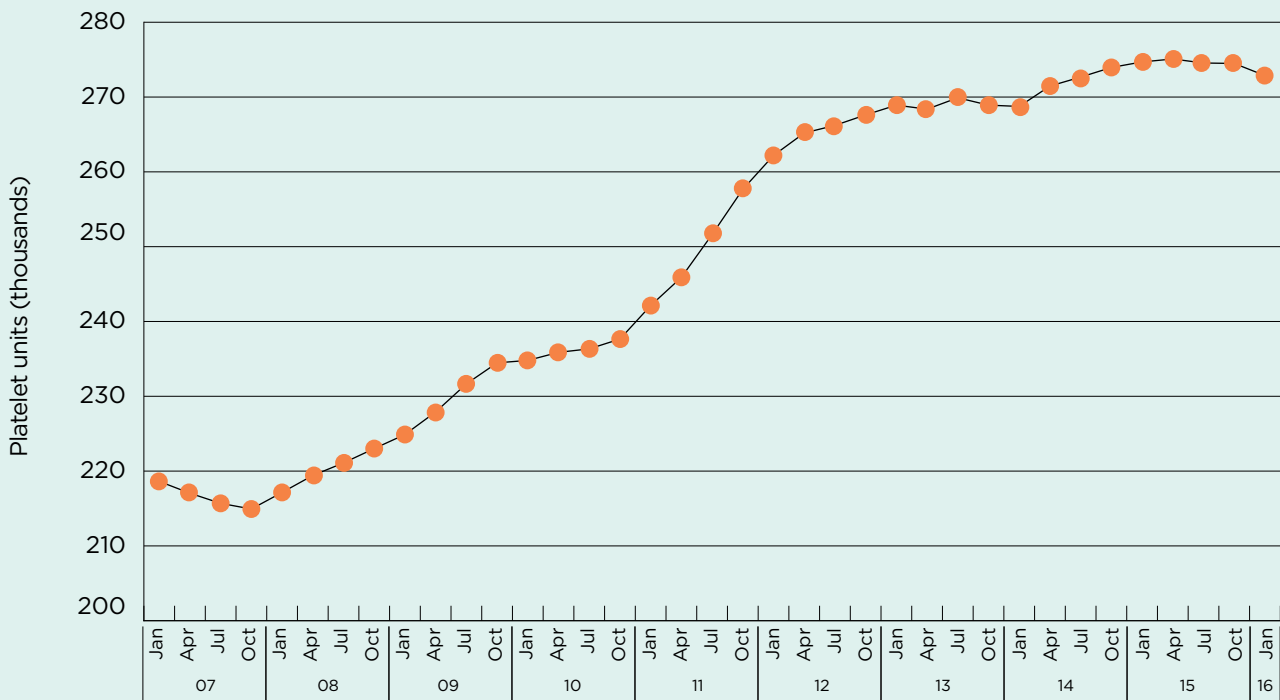
these blood components – and using them in the patient's best interest – has become a priority. This article discusses the appropriate use of platelets, referring to existing guidance as well as guidelines written by Estcourt et al (2016) and published by the British Society for Haematology – formerly the British Committee for Standards in Haematology.

Indications for use

Platelets – or thrombocytes – are blood components derived from megakaryocytes in the bone marrow; the normal platelet count in healthy individuals is 150-400x10⁹/L. They circulate in the blood in an inactive state and become activated in response to a breach in the lining of a blood vessel wall. Their main function is to stop bleeding at the site of an injury.

When an injury occurs, a series of reactions is initiated: platelets stick to the damaged endothelium, change shape and release chemicals into the circulation that encourage more platelets to adhere, resulting in a platelet plug at the site of injury. The coagulation cascade is activated and a fibrin mesh forms around the

Fig 1. Platelet units issued by NHS Blood and Transplant to hospitals 2007-2016



platelet plug, trapping red and white cells, which further strengthens the plug.

Although transfusions can be necessary for a variety of reasons the three main indications for platelet transfusions in adults are:

- Prophylactic use – to prevent spontaneous bleeding in people with a low platelet count;
- Pre-emptive use – in patients with a low platelet count who are undergoing an invasive procedure;
- Therapeutic use – to treat active bleeding in patients who have a low platelet count or platelets that do not function properly.

The new BSH guidelines for platelet use contain a more comprehensive list of indications for platelet transfusions (Estcourt et al, 2016). To help clinicians make decisions when prescribing blood components, NHSBT has produced a bookmark ([Bit.ly/NHSBTComponentBookmark](http://bit.ly/NHSBTComponentBookmark)), based on the National Blood Transfusion Committee's indication codes for transfusion.

Prophylactic use

Certain individuals should receive a transfusion when their platelet count is $<10 \times 10^9/L$. These are:

- Patients with reversible bone marrow failure – for example, those receiving treatment for acute leukaemia;

- Those with chronic bone marrow failure receiving intensive treatment – for example, who have aplastic anaemia and are receiving an allogeneic stem-cell transplant;
- Those in intensive care who are critically unwell.

In people who have bone marrow failure and additional risk factors for bleeding (for example, sepsis or additional abnormalities of haemostasis), health professionals should consider a platelet transfusion when the platelet count is $10-20 \times 10^9/L$.

However, patients with chronic bone marrow failure (for example, myelodysplastic syndrome) who are not receiving intensive treatment – such as intensive chemotherapy or a stem-cell transplant – should not routinely receive a prophylactic platelet transfusion. It is also inappropriate to give a platelet transfusion simply to raise the platelet count in patients with immune thrombocytopenia, disseminated intravascular coagulation (DIC) or platelet dysfunction (whether inherited or acquired). Patients with these conditions who are experiencing active bleeding or are about to undergo a procedure are discussed in the next section.

Pre-emptive use

The following platelet counts should trigger a transfusion to reduce the risk of

bleeding associated with invasive procedures:

- Central venous line: $<20 \times 10^9/L$;
- Lumbar puncture/spinal anaesthetic: $<40 \times 10^9/L$;
- Liver biopsy or major surgery: $<50 \times 10^9/L$;
- Epidural anaesthesia: $<80 \times 10^9/L$;
- Critical-site surgery (for example, central nervous system or eyes): $<100 \times 10^9/L$ (Estcourt et al, 2016). Platelet transfusion is not required before a bone marrow biopsy.

Therapeutic use

The following platelet counts should trigger a transfusion to treat active bleeding:

- Major haemorrhage: $<50 \times 10^9/L$;
- Critical site bleeding (for example, central nervous system or eyes): $<100 \times 10^9/L$;
- Clinically significant bleeding: $<30 \times 10^9/L$.

Transfusion in specific conditions

There are also specific conditions or events when a platelet transfusion is indicated:

- Disseminated intravascular coagulation (DIC) in a patient who is about to undergo a procedure or is actively bleeding;
- Primary immune thrombocytopenia

(emergency treatment pre-procedure or for severe bleeding);

- Platelet dysfunction;
- Critical bleeding in a patient on antiplatelet medication (for example, aspirin or clopidogrel);
- Inherited platelet disorders (as directed by a specialist in haemostasis) (Estcourt et al, 2016).

Transfusion practicalities

Following the correct procedures in the transfusion process helps to avoid errors, thereby reducing platelet waste.

Using the core identifiers

The BSH guideline for the administration of blood components (Harris et al, 2009) states that, at every stage of the transfusion process, four core patient identifiers should be used:

- First name;
- Surname;
- Date of birth;
- Unique identification number (NHS number in England and Wales, Community Health Index number in Scotland and Social Care number in Northern Ireland).

The name and date of birth should be checked verbally with the patient wherever possible. This should be done by asking open questions such as "Can you please tell me your name and date of birth?", rather than closed questions such as "Is your name John Smith?". Patients are often nervous and confused, and so might inadvertently give the wrong answer to a closed question.

Preparing the patient

Before collecting any blood component from the blood bank, nurses should ensure the patient is prepared for the transfusion as follows:

- Make sure a patent intravenous cannula is in place;



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Box 1. Haemovigilance and the SHOT scheme

- Haemovigilance is "the systematic surveillance of adverse reactions and adverse events related to transfusion" (Norfolk, 2013); its aim is to improve transfusion safety.
- Serious Hazards of Transfusion (SHOT) is a UK-wide, professionally led and independent haemovigilance reporting scheme that was launched in 1996.
- Although voluntary, SHOT is widely used and, in 2014, all NHS trusts reported their adverse transfusion events (Bolton-Maggs et al, 2015).
- In 2014, a total of 3,017 reports were made to SHOT; 77.8% were a direct consequence of errors made during the transfusion process (Bolton-Maggs et al, 2015). Many of these errors were due to patient misidentification, either at the time of sampling or at the time of transfusion. In an attempt to reduce such errors, many trusts are introducing IT-led scanning and/or labelling systems designed for use at the patient's bedside.

- Ensure an authorisation and/or prescription has been made in writing and signed;
- Check that the patient has been made aware of the indications for, risks and benefits of, and alternatives to, the transfusion;
- Ensure informed consent is obtained, where possible, and has been documented in the patient's clinical record by the person who prescribed or authorised the transfusion.

Checking blood products

Before starting the transfusion, the blood component should be inspected by the nurse responsible for setting up the transfusion, with particular attention paid to the integrity of the pack. It is also good practice to check the ports and seams for any leaks, and to look for any unusual colour or lumpiness in the bag, which could indicate bacterial contamination (Harris et al, 2009).

Administering the platelets

Platelets should be administered through a standard blood- or platelet-giving set, but not through a giving set that has previously been used for blood. It is recommended that a unit of platelets is administered over the course of 30 minutes (Harris et al, 2009).

Observing the patient

In the hour preceding the transfusion, pulse, blood pressure, temperature and breathing should be checked and documented before the blood product is collected from the blood bank. This reduces the amount of time between the blood product being taken out of storage and the start of administration, and minimises potential waste due to unexpected changes in the patient's condition.

It is imperative that visual observation of the patient takes place throughout the transfusion. Pulse, temperature and blood pressure should be rechecked 15 minutes after the start of the transfusion, and then again within an hour of the end of the transfusion.

Monitoring adverse reactions

Allergic and febrile reactions, transfusion-related acute lung injury and bacterial infections are all more common with a platelet transfusion than with a red-cell transfusion (Bolton-Maggs et al, 2016). If a reaction is suspected during a platelet transfusion:

- Stop the procedure immediately;
- Summon medical help;
- Measure and record the patient's temperature, pulse and blood pressure.

All hospitals should have clear policies for the management of adverse transfusion reactions and events, and this will include reporting them locally and to the Serious Hazards of Transfusion scheme. (Box 1). Further management will depend on the type and severity of the reaction.

Reducing transfusion use

The NHSBT patient blood management team is continuously working with hospital transfusion committees and clinicians to reduce the number of inappropriate blood requests and transfusions. There are various strategies hospitals can employ to try to reduce the inappropriate use of platelet transfusions and preserve their stocks. Box 2 features 10 top tips, while some strategies are also described in more detail below.

Patient blood management

The term 'patient blood management' refers to an evidence-based, multidisciplinary approach to the care of patients who

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Box 2. 10 top tips to reduce platelet use and avoid waste

- Determine whether your hospital should stock platelets – a tool created by the NHS Blood Stocks Management Scheme (bit.ly/NHSBloodStockAlgorithm) can help you.
- Determine whether your hospital could share platelets with another local hospital. Some smaller hospitals share platelet stocks with larger hospitals, and some trusts rotate stocks between their hospitals.
- Determine whether your hospital could introduce a de-reservation period for platelets allocated to a named patient. Some hospitals have changed clinical practice so platelets are now returned to stock after 4-12 hours if they have not been used.
- Consider swapping long-dated platelets for short-dated ones. If you know a patient is going to be transfused, give them the shortest-dated platelets possible.
- Consider using different ABO-group platelets in adults who are bleeding. ABO-matched platelets are better for prophylactic use because they survive longer, but platelets from any ABO group will be effective at stopping bleeding.
- Consider using RhD-positive platelets in adult males who are bleeding. You should give RhD-negative platelets to RhD-negative patients where anti-D would be a problem, but in adult males who are actively bleeding, you can use RhD-positive platelets if they are available.
- Introduce the National Blood Transfusion Committee's indication codes for platelets, so any request outside the criteria can be challenged if necessary. This can also help with the decision about when to get the haematology team to intervene.
- In most prophylactic situations, double-dose platelets are not necessary, so why use two when one will do? Standard-dose prophylactic platelets are just as effective as high-dose ones (Slichter et al, 2010).
- Check when the last platelet count was done. If possible use point-of-care testing and rapid turnaround of laboratory tests.
- Work at it, share practice with colleagues in other hospitals... and celebrate success!

may require transfusion of a blood component (National Blood Transfusion Committee, 2014). One of its principles is to put patients at the centre of decisions, which helps to ensure they receive optimum treatment, the inappropriate use of blood and/or blood components is avoided and, as such, waste is reduced. It also means that, in patients for whom there are no alternatives to platelet transfusion, the necessary blood components continue to be available.

NBTC indication codes

Encouraging the use of the NBTC's indication codes should help raise awareness, among clinicians, of appropriate prescribing and authorisation. It should also empower laboratory staff to question requests that seem inappropriate or to suggest that the advice of haematology specialists is sought.

Single rather than double dose

In most cases, when platelets are given prophylactically, there is no need for a double dose, and there is no rationale for the use of double-dose platelets for prophylaxis (Norfolk, 2013). In a randomised control trial of the effect of prophylactic platelet dose on transfusion outcomes, Slichter et al (2010) demonstrated that standard-dose prophylactic platelets were just as effective at reducing the risk of bleeding as high-dose prophylactic platelets.

Generally, in thrombocytopenic patients, a single unit or one adult therapeutic dose will induce a rise in platelet count of $20-40 \times 10^9/L$. It is recommended, therefore, that prophylactic platelets should be given in a single adult therapeutic dose. However, an audit conducted on behalf of the London Platelet Action Group showed that the practice of multiple (mostly double) dosing remains common (Moss, 2015). Adhering to the recommendation would reduce platelet use without compromising efficacy.

Test results and patient data

For patients requiring regular top-ups, platelets are often ordered in advance because their count is anticipated to be low. This can lead to waste as the platelets may be given without real need (transfused before a count is available, which turns out to be better than expected count) or ordered but not used (because the count turns out to be better than expected). When possible, it is better to base decisions on point-of-care testing and/or request a rapid test result turnaround from the laboratory.

For patients requiring platelets before an invasive procedure or to treat bleeding, it is recommended that the clinical team considers, alongside the target count it wishes to achieve, previous platelet counts and patient size. Finally, it is important to follow the recommended platelet counts that should trigger a transfusion (outlined earlier) and not go beyond these (Moss, 2015).

Conclusion

Platelet transfusions are an important part of modern medicine, but they are expensive and not always used appropriately. Demand for platelets is continuing to rise, and providing adequate supplies may become a challenge in the future.

Blood components are the safest they have ever been, but there are still risks associated with transfusions; this is another reason why it is important to use platelets wisely. Nurses play an important role in the transfusion process, and can help implement the principles of patient blood management and other 'platelet-saving' strategies in their work settings. **NT**

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- A pre-operative anaemia service to avoid unnecessary blood transfusions
[Bit.ly/NTPreOpAnaemiaService](http://bit.ly/NTPreOpAnaemiaService)