

In this article...

- Possible reasons for wastage of red blood cell units
- Rationale behind the use of single-unit transfusions
- Description of an improvement project to reduce donor blood wastage

Reducing the wastage of blood products by changing clinical practice



Nursing Times
Journal Club

Key points

1 Red blood cells are a precious resource, so minimising blood unit wastage is crucial

2 Red blood cell wastage can happen when clinical staff request more units than they need on a 'just-in-case' basis

3 Single-unit transfusions, recommended in stable, non-bleeding patients, reduce the risk of transfusion reactions and complications

4 Ongoing training and good teamwork with blood bank staff, nurses and doctors across specialties can help reduce blood wastage

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Abstract Before 2013, Aneurin Bevan University Health Board had one of the highest levels of red blood cell unit wastage in Wales. An improvement project led by a transfusion practitioner and former critical care nurse was launched to reduce that wastage by decreasing the number of inappropriate requests for blood products and encouraging requests for single blood units. This article describes the project, its outcomes, the tools used to implement change, and the next challenges in minimising wastage and promoting the use of single-unit transfusions.

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Red blood cells are a precious resource, and often in short supply. Maintaining optimum stock levels in hospital blood banks is a challenge, as staff try to balance supply and demand while minimising wastage. Users of blood products must therefore ensure requests of blood for transfusion are appropriate and wastage is kept to a minimum.

When working as a critical care nurse, I was trained and authorised to prescribe blood products, so I was aware of the benefits of restrictive transfusion strategies. However, I had no idea of the issues encountered in blood product management, and would request red blood cells with an expectation that they would always be available. Then I started working as a transfusion practitioner at Aneurin Bevan University Health Board (ABUHB), and one of my first jobs was to examine the high levels of wastage of red blood cell units in one of the main hospitals within the health board. This article describes an initiative carried out to reduce that wastage and encourage restrictive transfusion strategies.

Peaks, troughs and wastage

Although UK blood transfusion centres have introduced strategies to minimise variations in supply, there are still peaks and troughs in availability. The number of donations is subject to extreme swings due, for example, to bank holidays or the whims of the British weather. When stocks fall to unacceptably low levels, media campaigns encouraging donors to attend sessions are often needed to replenish them.

Donated blood only has a shelf life of 35 days, after which it is 'time expired' and can no longer be transfused. Through process mapping, we discovered that, in some cases, medical staff were working on a 'just-in-case' basis and requesting more blood units than they needed. Blood bank staff would order more stocks to meet the demand, but as not all requested units were being used, the amount of time-expired blood would increase (Fig 1).

This type of wastage is related to clinicians' rationale when requesting blood for transfusion, but there are other types of avoidable wastage; for example, when blood components have been 'out of temperature control' due to errors in procedures.

A project to reduce wastage

In 2013, when we set up our project, we had two aims:

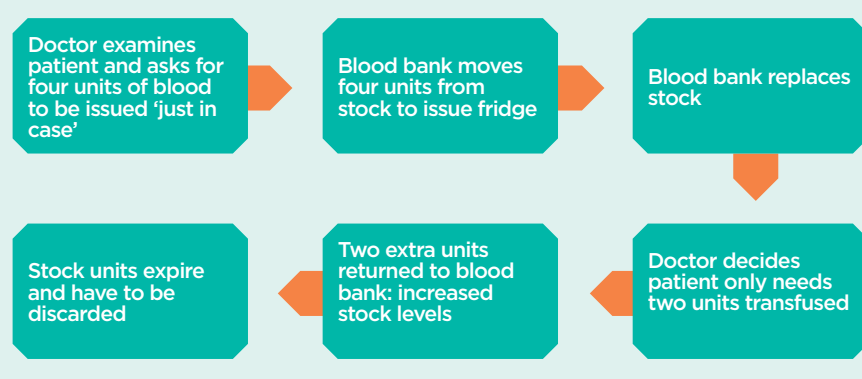
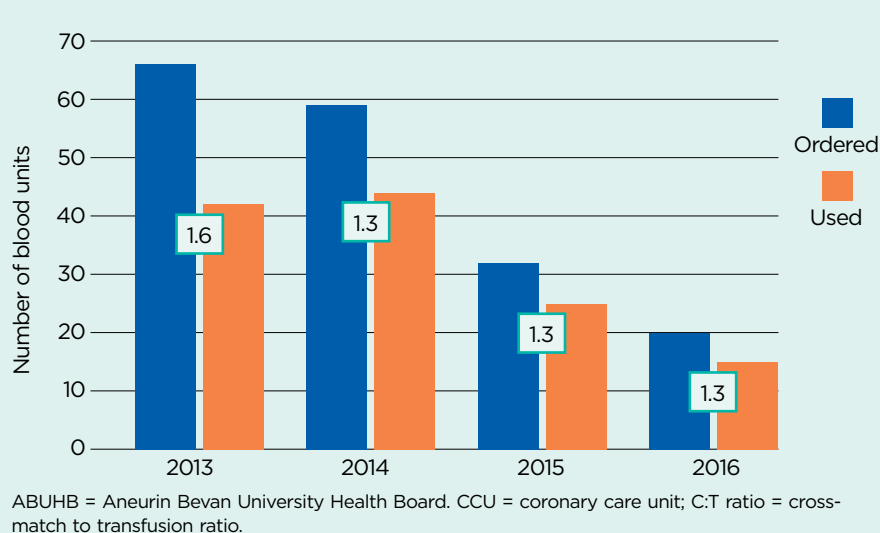
- To reduce our wastage from 8% at its worst (approximately one in 12 units supplied by the Welsh Blood Service) to <4%;
- To keep our wastage below 25 units a month regardless of the number of units ordered.

With this in mind, we reviewed the cross-match to transfusion (C:T) ratios (Box 1) across specialties. I was familiar with the clinical areas and felt that some C:T ratios were unusually high. For example, in the coronary care unit (CCU), there were few emergency situations requiring the cross-matching of several units of blood – most patients were being cross-matched for three to four units and only receiving one or two.

Training cardiology staff

Study sessions were organised for the cardiology trainee doctors and all nurses in the CCU. Wastage figures were shared, the appropriate use of blood was discussed, and staff were referred to guidance from the British Committee for Standards in Haematology (Retter et al, 2013) and to information on the 'three pillars' of patient blood management ([Bit.ly/NBAAu3Pillars](http://bit.ly/NBAAu3Pillars)) and blood conservation ([Bit.ly/ARCBSBloodConservation](http://bit.ly/ARCBSBloodConservation)).

In the study sessions, we also discussed the recommendations of the UK Serious Hazards Of Transfusion (SHOT) haemo-

Fig 1. How a 'just-in-case' rationale can lead to wastage**Fig 2. C:T ratio and number of blood units used at ABUHB CCU****Box 1. What is the cross-match to transfusion ratio?**

Cross-matching is the compatibility testing of blood for transfusion. The cross-match to transfusion (C:T) ratio shows the number of red blood cell units cross-matched as a ratio of the number of units transfused. It is used to gauge appropriate use of blood units supplied by blood banks. The value is obtained as follows:

$$\text{C:T ratio} = \frac{\text{Total number of cross-matched red cell units}}{\text{Actual red cell units transfused}}$$

A high C:T ratio indicates excessive cross-matching, which leads to wastage as cross-matched units are not always all used before reaching the end of their shelf life.

vigilance scheme on single-unit transfusions (Bolton-Maggs et al, 2014). Studies comparing restrictive with liberal transfusion strategies in several different patient groups have consistently shown either no difference in harm or, in some cases, improved outcomes in the restrictive arm (Holst et al, 2015). In patients with cardiovascular disease, transfusion is only recommended if their haemoglobin has dropped below 80g/L (Docherty et al, 2016).

Single-unit transfusions are recommended for stable, non-bleeding patients as they reduce the patient's exposure to donor blood, which, in turn, reduces the risk of reactions. Single-unit transfusions can also help avoid complications such as transfusion-associated circulatory overload.

Since the start of project, the CCU's C:T ratio has dropped from 1:6 to 1:3 and units used have decreased year on year (Fig 2).

Promoting single-unit transfusions

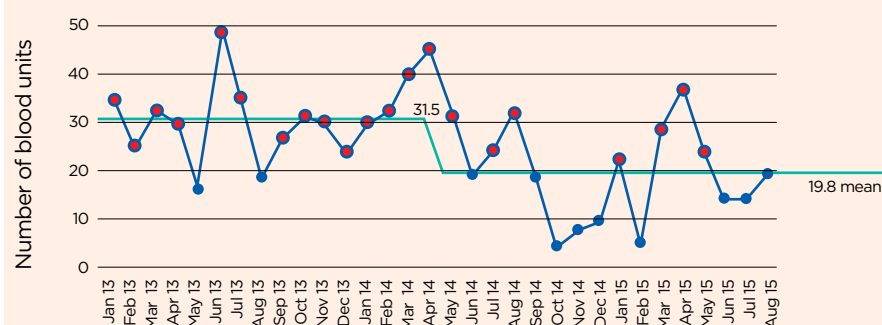
Following the study sessions for CCU staff, we added transfusion to the 'safe teaching

sessions' already in place for nursing staff, and went on to train doctors in other specialties. We also empowered nurses to encourage medical colleagues to make more appropriate requests for blood components.

At that point, we discovered that when medical staff at Royal Gwent Hospital (ABUHB's main hospital site) requested only one unit of blood, the blood bank staff asked them to obtain agreement from the on-call consultant haematologist. We felt this was a barrier to single-unit transfusions and discussed the issue with the consultant haematologists, who agreed that this extra step could be removed. The blood bank manager ensured all staff were aware they could issue single units and understood the rationale behind this. This education and the subsequent changes in practice enabled the blood bank to reduce stock levels and therefore wastage (Fig 3).

We then decided to promote single-unit transfusions in stable, non-bleeding patients across ABUHB. We organised teaching sessions with staff in all

Fig 3. Wastage of red blood cell units at ABUHB



Box 2. Recommendations to reduce wastage of blood units

- Set clear, achievable, measurable aims
- Involve the whole team, including the blood bank manager and quality management team, clinical staff and transfusion practitioners
- Start small and build from there
- Use 'plan, do, study, act' (also known as PDSA) cycles to establish whether change is achievable and effective
- Gain the support of staff by emphasising the benefits to patients
- Continue monitoring and circulating data, and training staff

specialties and of all grades, including nurses, midwives and junior and senior doctors. This has resulted in an increase of requests for single blood units across our local health board (Fig 4).

Ensuring sustainability

Our wastage figures are now consistently below 25 units per month and, in 2016, wastage had fallen to 2.5% of red blood cell units issued by the Welsh Blood Service, which is considerably lower than our initial target. To ensure sustainability, we continue to monitor data, investigate anomalies, and review wastage figures and C:T ratios monthly at transfusion incident meetings. Figures are then cascaded to doctors and nurses at ongoing teaching sessions. Box 2 lists recommendations to ensure a project like ours is successful and sustainable.

Despite the project's success we still face challenges. One of these is to identify

whether single-unit transfusions resulted in improved patient outcomes. Measures that could be used for that purpose are length of stay, comorbidities and mortality rates, but there are so many variables affecting these outcomes that they would be extremely difficult to interpret. Also, the number of serious adverse reactions from transfusions has not gone down and, on the whole, we are still transfusing approximately the same number of units as we did in 2013.

My priorities will be to examine ways to cut the wastage of fresh frozen plasma, which is one area in need of improvement, and to explore how patients can become more involved in reducing wastage and supporting restrictive transfusion strategies. Both Canada (www.choosingwisely-canada.org) and Australia (National Blood Authority Australia, 2014) have adopted national single-unit transfusion policies;

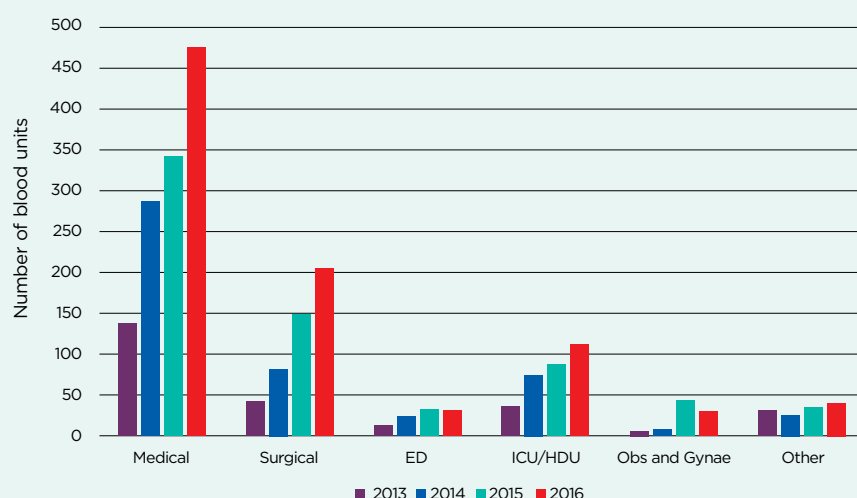
in the UK, a similar stance may help to improve patient outcomes.

● Sarah Beuschel won the 2015 RCN Nurse of the Year (Wales) Award in the Innovation in Nursing category for this project

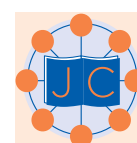
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Fig 4. Requests for single units of red blood cells at ABUHB



ABUHB= Aneurin Bevan University Hospital Board; ED = emergency department; HDU = high dependency unit. ICU = intensive care unit;

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