**Safe transfusion of blood components**

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**Abstract**

Administering the wrong blood component to the wrong patient can have serious clinical consequences, including death. Patients have a right to safe clinical practice in line with nurses’ professional standards and code of conduct, and other healthcare regulatory frameworks. Transfusion of blood components is no exception to this; therefore, it is important for healthcare organisations to have policies in place to support healthcare practitioners in ensuring patient safety throughout the transfusion process. This article outlines the clinical practice and administration required to undertake blood component transfusions safely and effectively. It also explains the rationale for checking processes, with reference to clinical guidelines.

**Keywords**

allogeneic transfusion, blood components, blood transfusion, haematology, patient safety

**Aims and intended learning outcomes**

The aim of this article is to guide the reader through the process for the safe administration of a blood component transfusion, while identifying the main risks associated with this process. After reading this article and completing the time out activities you should be able to:

- Explain how to safely administer a blood component transfusion.
- Understand how to identify the patient and check the blood component for transfusion.
- Identify specific transfusion requirements.
- Describe the handling and storage requirements for blood components.
- Identify signs and symptoms of an adverse transfusion reaction, and the immediate actions to be taken in response.
- Reflect on your practice and role in safely administering the right blood component to the right patient.

**Relevance to The Code**

Nurses are encouraged to apply the four themes of The Code: Professional Standards of Practice and Behaviour for Nurses and Midwives to their professional practice (Nursing and Midwifery Council (NMC) 2015). The themes are: Prioritise people, Practise effectively, Preserve safety, and Promote professionalism and trust. This article relates to The Code in the following ways:

- It enables nurses to practise effectively by improving their understanding of the processes and checks required to safely administer blood components.
- The Code states that nurses must ensure that patient and public safety is protected. This article equips nurses and other healthcare practitioners to ensure that the right blood components are safely administered to the right patient.
- The Code emphasises that nurses must focus on promoting well-being and preventing ill health. Practising the safe administration of blood components ensures that this form of treatment improves patient well-being and minimises the risk of complications.
Introduction
‘Blood transfusion’ is a general term for administering blood to a patient directly into the circulation. This is usually intravenous (IV) administration, although in emergency situations intraosseous administration is also possible (Lewis and Wright et al 2015). The blood is derived either from a donor (allogeneic) or from the patient themselves (autologous). Allogeneic transfusion may be more precisely termed as ‘blood component transfusion’ because whole blood from a donor is rarely given to patients; instead, the elements of whole blood (red blood cells, platelets, plasma and white blood cells) are processed into specific separate components. These blood components are transfused according to the specific therapeutic requirements of the patient. In this way, the components separated from a whole blood donation may be used to treat more than one patient, maximising the potential value of the blood donation.

Allogeneic blood component transfusion is the administration of foreign biological material to one person from another, and may be considered a type of transplant. This presents several patient safety issues; most significant is the risk of a patient being given an incompatible or unsuitable blood component, which will be discussed later in this article. Additionally, there are particular storage and handling requirements for allogeneic blood components, such as maintaining temperature-controlled storage for red blood cells, which will also be discussed later in this article.

The British Society for Haematology guidelines for the administration of blood components (Robinson et al 2017) provide a set of well-recognised standards for incorporation into local policy throughout the UK, which readers should refer to alongside this article.

TIME OUT I
What do you think constitutes a ‘safe’ blood transfusion? Imagine you are an emergency admission, having presented with acute bleeding and symptomatic anaemia, and have been told you require a blood transfusion. Would you have any concerns and what might they be?

Patient identification
To ensure that the right patient receives the right blood, correct patient identification (ID) is essential (NHS Blood and Transplant 2013, Royal College of Nursing 2013). The British Society for Haematology guidelines (Robinson et al 2017) state that all staff who administer blood component transfusions should be competency assessed and have regular knowledge and skills training relevant to this practice, in line with national and local governance frameworks.

When preparing to administer a blood component transfusion, it is recommended that the patient is identified using an ID band, or an alternative patient ID mechanism that has been locally risk assessed, such as a photo ID card (Robinson et al 2017). A UK-wide National Comparative Audit of Blood Transfusion (2011) found that patients were not wearing ID wristbands in 2.3% (n=216) of the 9,250 transfusions audited.

All of the patient core identifiers listed in Box 1 must be present on the patient’s ID band, with additional core identifiers required in specific localities, for example first line of the patient’s address is required in Wales (Welsh Assembly Government 2007). Whenever possible, these details should be checked using positive patient identification (PPI) – this means that the patient is asked to state their identifiers using open-ended questions, such as ‘What is your full name, please?’ (Royal College of Nursing 2013, Robinson et al 2017). This is as opposed to asking the patient to confirm something in a closed question, such as

**KEY POINT**
Allogeneic blood component transfusion is the administration of foreign biological material to one person from another, and may be considered a type of transplant. This presents several patient safety issues; most significant is the risk of a patient being given an incompatible or unsuitable blood component.
‘Is your name John Wright?’, where the response could be just a ‘yes’ or ‘no’. This closed question is avoided because it may lead to the patient answering ‘yes’ when it is not the case, perhaps mishearing the question for example, and therefore being incorrectly identified.

If the patient is unknown and is unable to identify themselves, for example an emergency admission where the patient is unconscious or confused, they must still have an ID band with a unique patient identifier – often a temporary emergency ID number – and their gender on it, as a minimum (Robinson et al 2017). Once the correct patient ID has been established and is in use, there must be a robust mechanism for the withdrawal of the temporary ID number and the linking of any duplicate patient records (Robinson et al 2017). The universal standard should be that if there is no patient ID band, there should be no blood component transfusion.

**TIME OUT 2**

Referring to the information in this article and your local policy, answer the following questions:

» Why is it important to use open-ended questions when identifying a patient before administration of blood components?

» How would you identify patients where PPI may not be possible, for instance those who are unconscious, confused or compromised, or neonates and children?

» What information is on the ID band for emergency and/or unidentified patients?

**Pre-collection checks**

Before requesting collection of a blood component, the healthcare staff who will be setting up the transfusion should check that the patient is wearing an ID band with the correct details on it. Any errors can be identified and rectified at this point, therefore minimising any delay once the component has been delivered to the clinical area. After a blood component has been removed from temperature-controlled storage, transfusion should be commenced as promptly as is safe and appropriate to do so. Red blood cells that are out of temperature-controlled storage for 30 minutes or more may have to be disposed of if they are not administered to the patient within this time (Joint United Kingdom (UK) Blood Transfusion and Tissue Transplantation Services Professional Advisory Committee (JPAC) 2016a).

Additionally, before organising the collection of the component, healthcare staff should check that:

» The patient has a patent IV access.

» The reason for the transfusion is documented in the patient’s clinical notes.

» The transfusion is authorised, including the rate of transfusion.

» A pre-transfusion baseline set of observations has been performed and any concerns with them addressed.

» Valid consent for transfusion has been given, where possible (Robinson et al 2017).

Any concomitant medicines to be given before or with the blood component transfusion should be on the transfusion record or patient’s medicine chart, depending on local policy, for example paracetamol for a known recurrent febrile reaction to transfusion (Norfolk 2013).

It is important to note that the term ‘authorised’ is often used instead of prescribed when referring to blood components because they are not classified as a medicine, with the exception of certain plasma components that are pharmaceutically manufactured, as discussed in The Human Medicines Regulations 2012. Ideally, the reason for transfusion should specify the clinical indications and relevant pre-transfusion test results, and the desired outcome of the transfusion.

**TIME OUT 3**

Reflect on the last time you set up a blood component transfusion. What checks of the blood component did you undertake beforehand and why? Access your local policy and review this aspect. If you have not set up such a transfusion before, discuss what checks should be undertaken with a colleague who has undertaken this procedure previously.

**Blood component checks**

Once the requested blood component has been delivered to the clinical area,
it should be checked that it is the correct component and that it is safe to use. The blood component will have a compatibility tag attached to it, which is produced when the blood component is selected and matched for use with a specific patient (British Committee for Standards in Haematology et al 2013). This will usually be undertaken in the transfusion laboratory. However, there are automated remote issue systems that print a label which the person collecting the component affixes onto a blank compatibility tag of the unit that has been selected and issued for them. The healthcare practitioner should confirm that the correct compatibility tag has been attached to the correct bag by checking that:

» The donation identification number (DIN) on the blood component bag matches that on the compatibility tag. The DIN is a unique identifier assigned to every individual donation, and comprises one letter and 12 numbers followed by one check digit in a box, which may be a number or a letter. One example of how the DIN appears in the UK would be: G151 716 345 212 Y (JPAC 2013).

» The component type – for example red blood cells or platelets – on the blood component bag is the same as that on the compatibility tag.

» The ABO and RhD group on the blood component bag is identical to the ‘donor’ ABO and RhD blood group on the compatibility tag.

The compatibility tag may also display the ‘patient’ ABO and RhD blood group, which may not be identical to that printed on the blood component bag. However, in such cases, there should be a comment printed on the compatibility tag stating that the component is suitable for transfusion (British Committee for Standards in Haematology et al 2013). The ABO group of red blood cells must always be compatible with that of the patient (Box 2 and Table 1).

If there are any concerns that the compatibility tag has been attached to the wrong blood component bag, or that the blood component is not compatible with the patient, the hospital transfusion laboratory should be contacted before commencing the transfusion. Lastly, the healthcare practitioner should check that the patient core identifiers and blood component type on the compatibility tag matches those on the blood component authorisation, often also called the prescription.

**TIME OUT 4**

Read Box 2 and Table 1, and discuss with a colleague which ABO group red blood cells can safely be given to which ABO group patients. Review the choice of red blood cells in Table 2.2 of the Handbook of Transfusion Medicine (Norfolk 2013) – available at www.transfusionguidelines.org/transfusion-handbook/2-basics-of-blood-groups-and-antibodies/2-4-the-abo-system – to confirm your understanding.

Donated blood may be processed into five different types of blood component for clinical use:

» Red blood cells, often referred to as red cells.

» Platelets.

» Fresh frozen plasma.

» Cryoprecipitate.

» Granulocytes (white blood cells).

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**BOX 2. ABO and RhD blood groups**

A person's ABO blood group is determined by the presence or absence of an A and/or B antigen on the surface of their red blood cells. A person will have antibodies (anti-A and/or anti-B) in their plasma depending on the presence or absence of A and/or B antigens on the surface of their red blood cells (Table 1)

Donor red blood cells can only be given to a person who does not have antibodies to the A and/or B antigen present on the surface of the donor red blood cells. For example, group A red blood cells can be given to a group A patient, but not to a group B patient. If group A red blood cells were given to a group B patient, the anti-A antibodies in the group B patient’s plasma could identify the A antigen on the donor red blood cells as foreign and attack those cells.

This attack can trigger a severe and potentially life-threatening reaction

Red blood cell transfusion ABO compatibility is as follows:

» Group O red blood cells can only be given to group O, group A, group B and group AB recipients

» Group A red blood cells can only be given to group A or group AB recipients

» Group B red blood cells can only be given to group B or group AB recipients

» Group AB red blood cells can only be given to group AB recipients

It should be noted that ABO compatibility for platelets and plasma is different from that of red blood cells; however, red blood cell ABO compatibility is the most important

The RhD blood group is determined by the presence (RhD positive) or absence (RhD negative) of the RhD antigen on the red blood cells

RhD compatibility is as follows:

» RhD negative components can be given to RhD positive or RhD negative recipients

» RhD positive components can be given to RhD positive recipients

In certain situations, RhD positive components may be given to RhD negative recipients under specific instruction from the healthcare practitioner managing the patient

(Adapted from Norfolk 2013)
Every blood component will have an expiry date and time on the component bag – usually midnight unless specifically stated otherwise – which is relative to the date it was donated and the shelf-life of the component type. A blood component should not be given after the expiry time and date, unless specific instructions sanctioning a deviation or concession have been given by the healthcare practitioner in charge of the patient’s care. If the blood component expires on the day of transfusion, it should be started with sufficient time for it to be completed safely and as per the blood component authorisation. The expiry time and date on the compatibility tag, where present, must match that printed on the label on the blood component bag (Robinson et al 2017).

Once processed, red blood cells must be kept in temperature-controlled storage at 2-6°C; breaching this may promote bacterial proliferation and reduce the longevity of the red blood cells (JPAC 2016b). This storage must be in a blood refrigerator or container unit that has been specifically validated for this purpose, and which will be managed stringently by the hospital transfusion laboratory in accordance with The Blood Safety and Quality Regulations 2005. Red blood cells must never be stored in a medicines refrigerator or a domestic refrigerator.

The way in which blood donations are processed means that the final volume in the blood component bag is variable. For example, the specification for the volume of a bag of red blood cells is 280mL ±60mL (JPAC 2013); however, all of the volumes in this range fall under the generic denomination of a ‘unit’. The volume of a blood component is printed on the label on the bag. This figure will need to be used when giving a blood transfusion via an infusion pump, and will need to be carefully considered when managing patients at risk of fluid overload, such as those with heart failure.

A visual inspection of the unit should identify any leaks or other damage to the bag, and any unusual colour, turbidity or clotting or clumping of the blood component (Robinson et al 2017). If there is any concern about the integrity of the blood component, or the correctness of the compatibility tag, the component must not be used and the hospital transfusion laboratory should be contacted immediately.

**Specific requirements**

Some specific groups of patients are considered to be at increased risk of particular adverse reactions or adverse effects from transfusion of ‘standard’ allogeneic blood components. These patients have what is termed ‘specific requirements’, also known as ‘special requirements’, which relate to the additional or specific properties that a blood component being administered to them should have (Table 2).

It is important to check that the blood component being administered meets any specific requirements indicated on the blood component authorisation. For instance, the following will be written in the component name on the blood component bag label:

<table>
<thead>
<tr>
<th>ABO blood group</th>
<th>A antigen on the surface of the red blood cells</th>
<th>B antigen on the surface of the red blood cells</th>
<th>Anti-A antibody in plasma</th>
<th>Anti-B antibody in plasma</th>
</tr>
</thead>
<tbody>
<tr>
<td>O</td>
<td>Absent</td>
<td>Absent</td>
<td>Present</td>
<td>Present</td>
</tr>
<tr>
<td>A</td>
<td>Present</td>
<td>Absent</td>
<td>Absent</td>
<td>Present</td>
</tr>
<tr>
<td>B</td>
<td>Absent</td>
<td>Present</td>
<td>Absent</td>
<td>Absent</td>
</tr>
<tr>
<td>AB</td>
<td>Present</td>
<td>Present</td>
<td>Absent</td>
<td>Absent</td>
</tr>
</tbody>
</table>

(Adapted from Norfolk 2013)
Irradiated red blood cells.
Irradiated platelets.
Washed red blood cells.
Platelets in additive solution.
The following will be noted under ‘additional testing’ on the blood component bag label:
Cytomegalovirus negative.
Hepatitis E virus negative.
Human leucocyte antigen selected.
Human platelet antigen selected.
In addition, irradiated blood components should have a sticker attached to show that irradiation has been successfully achieved. It should be noted that the Advisory Committee on the Safety of Blood, Tissues and Organs (SaBTO) (2016) recommended that all blood donations should be screened for hepatitis E virus, and this has been introduced by the four UK blood services; all red blood cells, platelets and granulocytes should therefore now be hepatitis E virus negative; however, it is possible that there is untested fresh frozen plasma or cryoprecipitate in storage that may yet be issued for transfusion.
All blood components are leucodepleted during processing, with a few specific exceptions (JPAC 2013). Leucodepletion is the removal of white blood cells by filtration, and removes almost all of them from the blood components. However, there may still be a small number of residual lymphocytes (a form of white blood cell) within red blood cell or platelet components. There is the possibility that they could engraft onto the bone marrow of immunosuppressed or other ‘at risk’ recipients. This can lead to transfusion-associated graft-versus-host disease (TA-GvHD) which, while rare, is usually fatal (Treleaven et al 2011). Irradiation inactivates any residual lymphocytes, preventing them from being able to engraft (NHS Blood and Transplant 2016). Granulocytes are white blood cells, so do not undergo leucodepletion, which is why they must always be irradiated.
In 2016, there were 89 episodes reported across the UK in which patients who should have received irradiated blood components received a non-irradiated component (Serious Hazards of Transfusion Steering Group 2017). However, none of these patients developed TA-GvHD.

**TABLE 2. Possible specific requirements for blood components**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Explanation</th>
<th>Components implicated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irradiated</td>
<td>Components are exposed to a dose of gamma or X-irradiation, during or after processing</td>
<td>Red blood cells, platelets, granulocytes</td>
</tr>
<tr>
<td>Cytomegalovirus negative (CMV-)</td>
<td>Components are tested and confirmed CMV- (from CMV- donors)</td>
<td>Red blood cells, platelets, granulocytes</td>
</tr>
<tr>
<td>Hepatitis E virus negative (HEV-)</td>
<td>Components are tested and confirmed HEV- (from HEV- donors)</td>
<td>All components</td>
</tr>
<tr>
<td>Human leucocyte antigen (HLA) or human platelet antigen (HPA) selected platelets</td>
<td>Platelets are matched for specific HLA or HPA antigen (from a panel of typed donors)</td>
<td>Platelets</td>
</tr>
<tr>
<td>Washed red blood cells</td>
<td>Red blood cells are ‘washed’ during processing to remove any residual plasma</td>
<td>Red blood cells</td>
</tr>
<tr>
<td>Platelets in additive solution</td>
<td>Platelets have the majority of plasma removed and replaced with additive solution during processing</td>
<td>Platelets</td>
</tr>
</tbody>
</table>

(Adapted from Treleaven et al 2011, Advisory Committee on the Safety of Blood, Tissues and Organs 2012, 2016, Norfolk 2013)
Vigilance for specific requirements is the responsibility of not only the person authorising the blood component transfusion, but also every member of staff involved in the transfusion process. If the patient reports that they have a specific requirement that has not been accounted for, or it is suspected for any other reason, this must be investigated further. This should be raised with the person who wrote the blood component authorisation and with the transfusion laboratory. If there is any concern that specific requirements are not being met, the transfusion should not be given until this has been resolved.

Pre-administration checks at the patient’s bedside
When the blood component is ready to be set up for administration, the ID band should again be checked with the patient wherever possible; there may be situations where this is not possible, for example if the patient is unconscious. All patient core identifiers on the blood component compatibility tag should match those on the patient’s ID band; if any of the details do not match, the transfusion must not be started until the error has been rectified, which may involve having to return the blood component to temperature-controlled storage. These checks must be undertaken at the patient’s bedside immediately before setting up the transfusion; completing these checks away from the patient increases the risk of the wrong component being given to the wrong patient (Serious Hazards of Transfusion Steering Group 2017). A compatibility form may also be sent with the blood component from the transfusion laboratory (British Committee for Standards in Haematology et al 2013). This form should not be used as part of this final checking process at the patient’s bedside (Robinson et al 2017). Electronic systems, which support correct patient and component ID at the patient’s bedside, are in use by some organisations; however, such systems are an additional safety mechanism and do not replace the requirement for manual ID checking, nor the requirement to have trained and competency assessed staff undertaking the administration (British Society for Haematology 2014). Local and national policy will indicate whether patient ID checks need to be completed by only one staff member or by two; when two staff members are checking they must do this independently of each other (Robinson et al 2017).

Use of a checklist for the final administration check at the patient’s bedside is advised, which should include checking patient ID, the blood component, specific requirements and blood authorisation (Department of Health 2017, Serious Hazards of Transfusion Steering Group 2017). The healthcare practitioner should refer to local and national policy on how this checklist is being implemented.

TIME OUT 5
Consider the following clinical scenario. You take over the care of William, a 70-year-old man who is receiving a blood transfusion. When you discuss the transfusion with William, he states that he was unsure why he was receiving the blood. He says that he did not really want to have it, but was too nervous to say this when he was told he needed a transfusion. Discuss with an experienced colleague what action you would take in this scenario, and what the consequences of this action might be. Is there any local policy or further advice you could access?

Consent
Before commencing the blood component transfusion, it should be confirmed that, whenever possible, the patient has consented to transfusion, ideally before sending for the blood component. SaBTO (2011a) recommended that documented evidence of valid consent for transfusion should be obtained and documented in the patient’s clinical records. The consent process should include a discussion on the intended benefits of, risks of, and possible alternatives to, transfusion between the patient and the person making the decision to transfuse (SaBTO 2011a). However, a UK-wide National Comparative Audit of Blood Transfusion (2014) found that 43% (n=1,192) of 2,784 patients who had an elective red blood cell transfusion had evidence of consent in their clinical notes. The consent...
process can be supported by the use of patient information leaflets focusing on transfusion, which are available from UK blood services and from some local healthcare providers.

There may be situations where it is not possible to gain valid consent for a transfusion, such as in an emergency situation or if the person is unconscious. If it was not possible to gain consent from the patient before transfusion, they should be provided with retrospective information about the transfusion as soon as is appropriate (SaBTO 2011b). The British Society for Haematology guidelines (Robinson et al 2017) state that a decision by the supreme court in the case of Montgomery v Lanarkshire Health Board [2015] ‘resulted in a significant change in legislation on patient consent, such that healthcare practitioners have a duty to provide patients with accurate, up-to-date information about proposed treatments’.

**Blood component administration**
The administration of a blood component varies from the infusion of any other IV fluid in several ways. As stated previously, red blood cells taken out of temperature-controlled storage should be returned to temperature-controlled storage within 30 minutes if they are not going to be given to the patient; if they remain out for longer than 30 minutes they must be returned to the hospital transfusion laboratory, or quarantined remotely using electronic blood tracking (JPAC 2016a). Red blood cells returned to the laboratory that have been out of temperature-controlled storage for more than 30 minutes but less than 60 minutes will be quarantined by the laboratory and may subsequently be made available for use again (JPAC 2016a). Red blood cells returned to the laboratory that have been out of temperature-controlled storage for more than 60 minutes cannot be re-issued for transfusion. Healthcare practitioners should refer to local policy regarding this issue.

Blood components must be administered through a CE-marked blood component administration set, which has an integral 170-200 micron mesh filter (Robinson et al 2017). The CE mark is placed on the product by the manufacturer to show that it meets legislation related to any directive specific to the product, and to its safety and performance. Infusion pumps can be used with blood components, as long as they are validated for this purpose. Local policy, which should consider manufacturer’s guidance, should be referred to here to ensure that pumps used are validated for use with blood components. Failure to do so could risk damage to the cellular components (red blood cells, platelets and granulocytes).

Blood components should be set up to be transfused at the rate indicated on the blood component authorisation. Administration rates may be generally based on recommended transfusion times (Table 3), but these are only guidelines, and the patient’s clinical status, test results and transfusion history must also be considered (Robinson et al 2017). Changes in the patient’s condition during administration may prompt a review of this rate of transfusion.

Transfusion of red blood cells should be completed within four hours of their removal from temperature-controlled storage wherever possible, which includes the time taken to deliver the red blood cells to the clinical area (Robinson et al 2017). If a blood component administration set is used to give more than one unit, it must not be in use for more than 12 hours, or in line with manufacturer’s instructions, and a

| TABLE 3. Recommended blood component transfusion times |
|---------------------------------|------------------|
| **Blood component**             | **Transfusion time per unit** |
| Red blood cells                  | 90-120 minutes   |
| Platelets                        | 30-60 minutes    |
| Fresh frozen plasma              | 10-20mL per kg per hour |
| Cryoprecipitate                  | 10-20mL per kg per hour |
| Granulocytes                     | Not stated - refer to local policy |

*Typical administration for adult patients in non-urgent transfusion (Adapted from Robinson et al 2017)*
new administration set should be used for a platelet transfusion or fluid infusion following administration of red blood cells (Robinson et al 2017). Co-administration of drugs through a blood component administration set or single lumen venous access device should be avoided. Drugs must never be added directly into a blood component bag (Robinson et al 2017). Co-administration of fluids should also be avoided, in particular fluids containing calcium because this antagonises the citrate anticoagulant, allowing clot formation if mixed with red blood cells (Norfolk 2013). Priming or flushing blood component administration sets with 0.9% sodium chloride is not necessary (Robinson et al 2017).

Every blood component transfusion is associated with a risk of the patient having an adverse reaction. Therefore, the patient should be monitored throughout the process to identify this as early as possible. The minimum clinical observations to be performed for patients receiving a blood component transfusion are shown in Box 3. The first set of observations is taken before the start of the transfusion to provide a baseline recording. The second set is taken 15 minutes into the transfusion because serious acute reactions can present this early and after only a small volume of transfusion (Tinegate et al 2012, Norfolk 2013). The third set of observations should be taken on completion of the transfusion. Further observations should be performed if there is any cause for concern during the transfusion. All transfusion observations should be documented in the patient’s clinical records, and should be distinguishable from routine patient observations (Robinson et al 2017).

The patient should be advised of the possibility of a transfusion reaction, the symptoms to look out for and that they are to inform healthcare staff immediately if they experience any of these symptoms. It is vital for the patient to have access to a call bell throughout the transfusion, and for close visual monitoring of the patient to be undertaken, especially of those who may not be able to alert healthcare staff to symptoms of a transfusion reaction, for example those who are unconscious.

**Adverse blood component transfusion reactions**

Acute blood component transfusion reactions may occur up to 24 hours after completion of a blood component transfusion (Tinegate et al 2012). An acute transfusion reaction will often be apparent on visual examination. However, any unexpected change to the patient’s observations or deterioration in their condition should prompt suspicion of an acute transfusion reaction. Signs and symptoms of acute transfusion reactions are listed in Box 4. Recognising reactions in the critically ill patient may be challenging since these may be masked by underlying morbidity.

There are various types of acute blood component transfusion reaction, including:

» Febrile reaction (fever) – often mild and, following medical review, may be managed with antipyretics and close monitoring, to enable completion of the transfusion. This is the most common transfusion reaction (Serious Hazards of Transfusion Steering Group 2017).
Allergic reaction – ranges from mild to severe or anaphylactic, and treatment usually involves administering antihistamines, but may also necessitate adrenaline (epinephrine) or corticosteroids in severe anaphylaxis. This is one of the more common transfusion reactions.

Haemolytic reaction – caused by red blood cell antibody-antigen immune response as a result of incompatibility, which may occur as a result of antibodies not being detected in the patient’s pre-transfusion sample, or because the wrong blood was transfused; acute haemolytic reactions resulting from ABO incompatibility, while rare, can be fatal (Serious Hazards of Transfusion Steering Group 2017).

Transfusion-related acute lung injury – a pulmonary reaction caused by antibodies in the donor blood component (Norfolk 2013). This is rare, but usually requires management in the intensive care unit.

Bacterial transfusion transmitted infection – caused by contamination of the blood component. There was only one confirmed case of this in the UK from 2010-2016 (Serious Hazards of Transfusion Steering Group 2017).

Transfusion-associated circulatory overload (TACO) – a potentially avoidable pulmonary complication, which is emerging as a significant adverse transfusion event, most commonly associated with transfusion of red blood cells (Serious Hazards of Transfusion Steering Group 2016). While it can develop at any age, TACO is ‘especially prevalent among the elderly because of the frequency of co-morbidities that predispose the patient to volume intolerance’ (Serious Hazards of Transfusion Steering Group 2017). Particular care should be taken when transfusing red blood cells to patients at increased risk of TACO, namely those with low body weight, heart failure, pulmonary oedema, respiratory disease, clinically significant positive fluid balance, peripheral oedema, renal failure and hypoalbuminaemia (Norfolk 2013, Serious Hazards of Transfusion Steering Group 2016). In patients who are not actively bleeding, transfusion of a single unit of red blood cells (or a volume calculated to give the equivalent effect) should be considered, followed by clinical reassessment and a recheck of haemoglobin levels to determine the need for further transfusion (National Institute for Health and Care Excellence 2015).

Delayed blood component transfusion reactions are those occurring 24 hours or more after the end of a transfusion, and may include delayed haemolytic reaction, TA-GvHD and viral transfusion transmitted infection. It is important to document all adverse transfusion reactions and adverse events in the patient’s clinical notes, and report them to a member of the hospital transfusion team. In the UK, these may then be reported to the Medicines and Healthcare products Regulatory Agency (the regulatory body for the Blood Safety and Quality Regulations 2005), the Serious Hazards of Transfusion haemovigilance scheme, and/or the supplying blood service, depending on the type of reaction.

If a patient develops any of the signs or symptoms of a blood component transfusion reaction, the immediate response outlined in Box 5 should be followed. The immediate response is always the same, irrespective of the possible type of transfusion reaction.

**Box 4. Possible signs and symptoms of an acute blood component transfusion reaction**

- Chills
- Collapse
- Fever
- Flushing
- General malaise
- Hypertension or hypotension
- Nausea
- Pain – bone, muscle, chest, abdominal
- Respiratory distress
- Rigours
- Tachycardia
- Urticaria (hives)

(Adapted from Tinegate et al 2012)
**Documentation and information**

The blood component transfusion should be documented in the patient’s clinical notes, including the name of the person administering it, start date and time, finish date, and time and volume transfused (Robinson et al 2017). Details of whether the transfusion achieved the desired outcome should also be documented, as should any adverse transfusion reaction or adverse event (Robinson et al 2017).

Confirmation that a patient has received a blood component transfusion must be sent to the hospital transfusion laboratory, in accordance with The Blood Safety and Quality Regulations 2005, even if the patient has only received part of the blood component. The DIN of every component given to a patient must be documented in their clinical notes. Creating this audit trail from donation episode to patient transfusion enables follow-up care should either the donor or the patient later develop a complication that may be transfusion-transmissible or transfusion-related.

It is important to confirm with the patient that they have had a transfusion, and also if a provisionally planned transfusion did not go ahead, for example during surgery. This is because anyone who has had a blood or blood component transfusion can no longer be a blood donor themselves (JPAC 2013). Confirmation that a patient has received a blood component transfusion must be sent to the hospital transfusion laboratory, in accordance with The Blood Safety and Quality Regulations 2005, even if the patient has only received part of the blood component. The DIN of every component given to a patient must be documented in their clinical notes. Creating this audit trail from donation episode to patient transfusion enables follow-up care should either the donor or the patient later develop a complication that may be transfusion-transmissible or transfusion-related.

It is important to confirm with the patient that they have had a transfusion, and also if a provisionally planned transfusion did not go ahead, for example during surgery. This is because anyone who has had a blood or blood component transfusion can no longer be a blood donor themselves (JPAC 2013). This is a risk reduction measure to prevent the potential transmission of variant Creutzfeldt-Jakob disease by blood transfusion (JPAC 2013). It is also important to reiterate to the patient the risk of a delayed reaction.

Details of any blood component transfusions should be included as part of the patient’s discharge summary, including why it was administered, any adverse transfusion reactions or adverse events that occurred, and any ongoing management needs relating to the transfusion, so that the patient’s GP is fully informed. Patients who are discharged home on the same day as receiving a transfusion, for example day case patients, or patients receiving a transfusion out of hospital, should be informed of the signs and symptoms of an acute or delayed transfusion reaction, and know who to contact if they exhibit any of these. This information should be given to the patient in written form.

**Conclusion**

A systematic approach, with identification, communication and documentation as fundamental principles, is crucial to safely administer blood component transfusions. All healthcare staff involved in administering a transfusion should be aware of how to correctly undertake this process and ensure patient safety. It is important for healthcare practitioners to have an understanding of the various ways that a blood component may or may not be correct for the individual patient. It is an essential element of patient safety for healthcare staff to know how and why to correctly check patient ID and the blood component for transfusion, how to monitor the patient during a transfusion, and how to identify adverse transfusion reactions and the immediate response to be taken when these occur.

**TIME OUT 6**

Nurses are encouraged to apply the four themes of The Code (NMC 2015) to their professional practice. Consider how undertaking the safe transfusion of blood components relates to The Code.

**TIME OUT 7**

Now that you have completed the article, you might like to write a reflective account as part of your revalidation.

**KEY POINT**

It is important to confirm with the patient that they have had a transfusion, and also if a provisionally planned transfusion did not go ahead, for example during surgery. This is because anyone who has had a blood or blood component transfusion can no longer be a blood donor themselves (JPAC 2013).
References


Call for reflective accounts

Submit a reflective account and be in with a chance to win a £50 book token!

We’re looking for reflective accounts based on CPD articles published in Nursing Standard in the past year. Submissions should be 700 words in length and follow the NMC’s requirements on reflective accounts:

- What was the nature of the CPD activity and/or practice-related feedback and/or event or experience in your practice?
- What did you learn from the CPD activity and/or feedback and/or event or experience in your practice?
- How did you change or improve your practice as a result?
- How is this relevant to The Code?

To find out more visit: rcni.com/reflective-account
Blood components
TEST YOUR KNOWLEDGE BY COMPLETING SELF-ASSESSMENT QUESTIONNAIRE 930

1. What is an allogeneic blood component transfusion?
   a) The administration of foreign biological material to one person from another
   b) The process of separating whole blood into its component parts
   c) The administration of biological material derived from the patient themselves
   d) The transplantation of stem cells or bone marrow only

2. Which of the following is not a core patient identifier on the patient’s identification (ID) band?
   a) First name
   b) Date of birth
   c) Next of kin
   d) Unique patient ID number

3. Which statement is true?
   a) The healthcare practitioner should check the patient’s identity before a transfusion by asking a closed question, such as ‘Is your name John Wright?’
   b) If the patient core identifiers on the blood component compatibility tag do not match those on the patient’s ID band, then the transfusion must not be started
   c) Completing patient ID checks away from the patient decreases the risk of the wrong blood component being given to the wrong patient
   d) Manual ID checking is not required in organisations where electronic systems for checking are in use

4. Before organising the collection of a blood component, healthcare professionals should check that:
   a) The patient has patent intravenous access
   b) The reason for the transfusion is documented in the patient’s clinical notes
   c) A pre-transfusion baseline set of observations has been performed
   d) All of the above

5. Group B red blood cells:
   a) Can be given to group O, group A, group B and group AB recipients
   b) Can only be given to group A or group AB recipients
   c) Can only be given to group B or group AB recipients
   d) Can only be given to group AB recipients

6. Which of the following is not one of the five different types of blood component that donated blood can be processed into for clinical use?
   a) Platelets
   b) Haemoglobin
   c) Fresh frozen plasma
   d) Granulocytes

7. Which of the following is a possible specific requirement for red blood cells only?
   a) Exposed to a dose of gamma or X-irradiation, during or after processing
   b) Tested and confirmed to be cytomegalovirus negative
   c) ‘Washed’ during processing to remove any residual plasma
   d) Tested and confirmed to be hepatitis E virus negative

8. In an emergency situation, where it is not possible to gain consent for a transfusion:
   a) The patient should be provided with retrospective information about the transfusion as soon as is appropriate
   b) The transfusion should not be undertaken
   c) It is not necessary to provide the patient with any retrospective information about the transfusion
   d) A best interests meeting should be held to determine the patient’s wishes

9. Transfusion of red blood cells should be completed within how many hours of their removal from temperature-controlled storage?
   a) Two
   b) Four
   c) Six
   d) Eight

10. One possible sign or symptom of an acute transfusion reaction is:
    a) Fever
    b) Nausea
    c) Urticaria (hives)
    d) All of the above

How to complete this assessment
This self-assessment questionnaire will help you to test your knowledge. It comprises ten multiple choice questions that are broadly linked to the article starting on page 50. There is one correct answer to each question.

- You can test your subject knowledge by attempting the questions before reading the article, and then go back over them to see if you would answer any differently.
- You might like to read the article before trying the questions. The correct answers will be published in Nursing Standard on 28 February.

Subscribers making use of their RCNi Portfolio can complete this and other questionnaires online and save the result automatically.

Alternatively, you can cut this page out and add it to your professional portfolio. Don’t forget to record the amount of time taken to complete it.

You may want to write a reflective account based on what you have learned. Visit rcni.com/reflective-account

This self-assessment questionnaire was compiled by Alex Bainbridge

The answers to this questionnaire will be published on 28 February

Answers to SAQ 928 on Principles of anticoagulation, which appeared in the 31 January issue, are:
1. c 2. c 3. a 4. a 5. d 6. b 7. c 8. a 9. b 10. b