

NATIONAL INSTITUTE FOR HEALTH AND CARE EXCELLENCE

Health and social care directorate

Quality standards and indicators

Briefing paper

Quality standard topic: Blood transfusion

Output: Prioritised quality improvement areas for development.

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1 Introduction

This briefing paper presents a structured overview of potential quality improvement areas for blood transfusion. It provides the committee with a basis for discussing and prioritising quality improvement areas for development into draft quality statements and measures for public consultation.

1.1 Structure

This briefing paper includes a brief description of the topic, a summary of each of the suggested quality improvement areas and supporting information.

If relevant, recommendations selected from the key development source below are included to help the committee in considering potential statements and measures.

1.2 Development source

The key development source(s) referenced in this briefing paper is:

[Blood transfusion](#) (2015) NICE guideline NG24

2 Overview

2.1 Focus of quality standard

This quality standard will cover the assessment and management of blood transfusion in adults, young people and children over 1 year old. It will not cover specific conditions.

2.2 Definition

A blood transfusion is when blood is taken from one person (a 'donor') and given to someone else. Donors give some of their blood in advance, and it is stored until it is needed.

There are different types of blood transfusion, and each one replaces different parts ('components') of the blood. The type used depends on the reason for the blood transfusion.

- Red blood cell - Cells that carry oxygen round the body. Red blood cell transfusions can help with anaemia.
- Platelet- Cells that work with 'clotting factors' in the plasma to make the blood clot (to stop a cut or wound from bleeding). Platelet transfusions can help with clotting problems.

- Plasma- The liquid part of the blood. It is normally frozen to preserve the clotting factors in it, and it is sometimes called 'fresh frozen plasma' or 'FFP'. Plasma transfusions can help with clotting problems.
- Cryoprecipitate- A blood component made from plasma that contains lots of clotting factors. Cryoprecipitate transfusions can help with clotting problems.
- Prothrombin complex concentrate- A blood product made from plasma. It contains specific clotting factors that help people who are taking medicines that make it difficult for their blood to clot.

2.3 *Incidence and prevalence*

Blood transfusions are common in clinical practice. In 2014/15 NHS Blood and Transplant issued 1.7 million units of red blood cells, 275,000 units of platelets, 215,000 units of fresh frozen plasma and 165,000 units of cryoprecipitate to hospitals in England and North Wales. An estimated 430,000 patients received a red blood cell transfusion in 2002; a further study has not been conducted, but given the reduction in blood use since 2002 the number of patients who have had a transfusion is likely to be 10–20% lower than this figure.

There has been an approximate 25% decline in the transfusion of red blood cells in England in the last 15 years. The red blood cell transfusion rate declined from 45.5 to 36 units per 1,000 people between 1999 and 2009, and since then has dropped further to around 31.5 units per 1,000 people. This rate is a little higher than in Northern Ireland, the Netherlands and Canada, but is considerably lower than in the United States. In contrast, the use of platelets and fresh frozen plasma has been increasing. The proportion of red blood cells used between 1999 and 2009 in surgical patients has declined from 41% to 29% of all red cells transfused, and in medical patients has increased from 52% to 64% of all red cells transfused. Use in obstetrics and gynaecology has remained stable at 6%. A national audit of blood transfusion in 2014 showed that the proportion of red cell transfusions used in surgical patients continues to decline and was 27% of all red cells transfused with a corresponding increase in medical patients to 67%.

2.4 *Management*

Despite considerable efforts to ensure the safety of blood transfusions, they are associated with significant risks. The Serious Hazards of Transfusion (SHOT) scheme estimated that in 2014 the risk of transfusion-related death was 5.6 per million blood components issued, and the risk of transfusion-related major morbidity was 63.5 per million blood components issued, although it was not always certain that transfusion was the direct cause of death or major morbidity. Removing cases where patient harm was caused by delayed transfusion rather than transfusion itself reduces the risk of transfusion-related death to 4.5 per million blood components

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issued, and the risk of transfusion-related major morbidity was 61.9 per million blood components issued. The most common cause of death associated with transfusion was transfusion associated circulatory overload.

There is evidence from the SHOT scheme and national audits of transfusion practice that:

- some patients are receiving the wrong blood components
- the choice of blood component is not always based on clinical findings and laboratory test values
- patients are not always monitored for the adverse effects of transfusion, and these effects are not always managed correctly
- some patients are transfused unnecessarily, which is wasteful of a scarce and costly resource and put patients at unnecessary risk.

Accurate patient identification is a crucial step. Giving a patient the wrong blood transfusion is an avoidable serious hazard, and can result from errors made anywhere in the transfusion process.

2.5 National Outcome Frameworks

Table 1 shows the outcomes, overarching indicators and improvement areas from the frameworks that the quality standard could contribute to achieving.

Table 1 [NHS Outcomes Framework 2015–16](#)

Domain	Overarching indicators and improvement areas
1 Preventing people from dying prematurely	<p>Overarching indicators</p> <p>1a Potential Years of Life Lost (PYLL) from causes considered amenable to healthcare</p> <p>i Adults ii Children and young people</p>
3 Helping people to recover from episodes of ill health or following injury	<p>Improving recovery from injuries and trauma</p> <p>3.3 Survival from major trauma</p>
4 Ensuring that people have a positive experience of care	<p>Overarching indicators</p> <p>4b Patient experience of hospital care</p> <p>4d Patient experience characterised as poor or worse</p> <p><i>ii. Hospital care</i></p>
5 Treating and caring for people in a safe environment and protecting them from avoidable harm	<p>Treating and caring for people in a safe environment and protecting them from avoidable harm</p> <p>5a Deaths attributable to problems in healthcare</p> <p>5b Severe harm attributable to problems in healthcare</p>

3 Summary of suggestions

3.1 Responses

In total 11 stakeholders responded to the 2-week engagement exercise 17/02/2016-02/03/2016.

Stakeholders were asked to suggest up to 5 areas for quality improvement. Specialist committee members were also invited to provide suggestions. The responses have been merged and summarised in table 2 for further consideration by the committee.

Full details of all the suggestions provided are given in appendix 3 for information.

Table 2 Summary of suggested quality improvement areas

Suggested area for improvement	Stakeholders
Alternatives to blood transfusion for patients having surgery <ul style="list-style-type: none"> • Use of oral and intravenous iron • Use of tranexamic acid 	NBTC, NHSBT, PREVENTT, SCMx2
Checking haemoglobin levels <ul style="list-style-type: none"> • Testing haemoglobin levels • Thresholds and targets for transfusion • Correct dosage 	NBTC, NHSBT, PREVENTT, SCMx2
Platelets <ul style="list-style-type: none"> • Prophylactic platelet transfusion 	RCPCH
Patient information and consent	NBTC, SCMx2
Patient safety <ul style="list-style-type: none"> • Electronic patient identification systems 	SCMx3
Other <ul style="list-style-type: none"> • Use of electronic decision making systems • Review of clinical/nursing staff training • Pre-hospital transfusion 	PREVENTT, SCMx2
BIA, British Infection Association NBTC, National Blood Transfusion Committee NHSBT, NHS Blood and Transport PREVENTT, PREVENTT clinical trial group RCPCH, Royal College of Paediatrics and Child Health SCMx4, Specialist Committee Member	

3.2 Identification of current practice evidence

Bibliographic databases were searched to identify examples of current practice in UK health and social care settings; 817 papers were identified for blood transfusion. In

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addition, 11 papers were suggested by stakeholders at topic engagement and 6 papers internally at project scoping.

Of these papers, 6 have been included in this report and are included in the current practice sections where relevant. Appendix 2 outlines the search process.

4 Suggested improvement areas

4.1 *Alternatives to blood transfusion for patients having surgery*

4.1.1 Summary of suggestions

Use of oral and intravenous iron

Stakeholders highlighted iron deficiency can result in unnecessary blood transfusions being performed. Stakeholders suggested if iron deficiency is identified and treated with oral or intravenous iron, as recommended by NICE, the number of transfusions being performed will be reduced. Evidence was also highlighted to suggest this is not currently happening.

Use of tranexamic acid

Stakeholders highlighted Tranexamic acid (TXA) can be used to reduce the need for blood transfusion in people undergoing surgery by preventing the breakdown of clots. Evidence was highlighted that shows a reduction in the number of patients needing transfusion and in mortality when TXA is given to patients undergoing surgery. Stakeholders also highlighted evidence to suggest variation in practice in the use of TXA.

4.1.2 Selected recommendations from development source

Table 3 below highlights recommendations that have been provisionally selected from the development source that may support potential statement development. These are presented in full after table 3 to help inform the committee’s discussion.

Table 3 Specific areas for quality improvement

Suggested quality improvement area	Suggested source guidance recommendations
Use of oral and intravenous iron	Intravenous and oral iron NICE NG24 Recommendation 1.1.2 (KPI) and 1.1.3
Use of tranexamic acid	Cell salvage and tranexamic acid NICE NG24 Recommendation 1.1.5 (KPI) and 1.1.6

Use of oral and intravenous iron

NICE NG24 – Recommendation 1.1.2 (key priority for implementation)

Offer oral iron before and after surgery to patients with iron-deficiency anaemia.

NICE NG24 – Recommendation 1.1.3

Consider intravenous iron before or after surgery for patients who:

- have iron-deficiency anaemia and cannot tolerate or absorb oral iron, or are unable to adhere to oral iron treatment (see the NICE guideline on medicines adherence)
- are diagnosed with functional iron deficiency
- are diagnosed with iron-deficiency anaemia, and the interval between the diagnosis of anaemia and surgery is predicted to be too short for oral iron to be effective

Use of tranexamic acid

NICE NG24 – Recommendation 1.1.5 (key priority for implementation)

Offer tranexamic acid to adults undergoing surgery who are expected to have at least moderate blood loss (greater than 500 ml).

NICE NG24 – Recommendation 1.1.6

Consider tranexamic acid for children undergoing surgery who are expected to have at least moderate blood loss (greater than 10% blood volume).

4.1.3 Current UK practice

Use of oral and intravenous iron

The National comparative audit of blood transfusion (2015)¹ reported that in people who had timely identification of anaemia, little was done to treat this. Only 15% of these patients had anaemia investigated with a ferritin level. Of these oral iron was given preoperatively in 11%, B12 and folate supplementation in 2% and 4% respectively. The report highlighted a need to increase these figures for the investigation and management of preoperative anaemia in the UK.

Use of tranexamic acid

The National comparative audit of blood transfusion (2015)² highlights although Tranexamic Acid is a commonly available and inexpensive drug to prevent blood loss it was found to be used in only a third of cases looked at in the audit. It was most frequently used in cardiac surgery (73-88%) and orthopaedic surgery (38-64%) but rarely in other surgical specialities (6-15%).

¹ NHS blood and transport, [National comparative audit of blood transfusion](#), 2015

² NHS blood and transport, [National comparative audit of blood transfusion](#), 2015

4.1.4 Resource impact assessment

The [costing statement](#) states that iron is not currently being offered consistently, and there is likely to be an increase in iron prescribing. The weighted average cost of oral iron is estimated to be £1.51 per person. Intravenous iron is more expensive, with the most widely prescribed intravenous iron costing £79.70 per person. However, it is anticipated that most people will receive oral iron. This will be an additional cost to the provider. For commissioners, the cost will depend on how the iron is administered. For intravenous iron people will need a separate appointment, and in some instances this may be a day case.

Clinical opinion is that tranexamic acid may currently only be given to 10–20% of patients having surgery who are at risk of at least moderate bleeding. Therefore the use of tranexamic acid is expected to increase. Tranexamic acid is estimated to cost £1.19 for surgical procedures with a high risk of bleeding and £0.60 for surgical procedures with a moderate risk of bleeding. This will be an additional cost to the provider. For commissioners, the cost will be included in the surgical tariff.

An increase in the use of iron and tranexamic acid is anticipated to result in a decrease in the number of transfusions, and reduce the amount of blood transfused when transfusions are still needed. Therefore it is anticipated that providers may purchase less blood following implementation of the guideline. It is estimated to cost providers £170 for the first unit of blood transfused and £162 for subsequent units. Depending on the reduction in the number of units of blood transfused, there may be a saving in the range of £146-£689 per person.

Studies show that using tranexamic acid may also reduce the length of a patient's hospital stay. This will result in an efficiency saving for providers. If length of stay is still within the tripoint then there will be no saving for the commissioner.

4.2 *Checking haemoglobin levels*

4.2.1 Summary of suggestions

Testing haemoglobin levels

Stakeholders highlighted the importance of checking patients haemoglobin levels prior to commencing transfusion as often this is not done. This not only helps to identify cases of anaemia which can be treated without the need for blood transfusion but also informs the transfusion process.

In addition stakeholders highlighted the importance of checking patients haemoglobin levels prior to undergoing elective surgery as often this is not done. This not only helps to identify cases of anaemia which can be treated without the need for blood transfusion but also informs the transfusion process.

Thresholds and targets for transfusion

Stakeholders highlighted specific haemoglobin thresholds as recommended by NICE should be used to guide transfusion to ensure it is safe and effective. However evidence showing variation in practice in the use of these thresholds was highlighted which may mean unnecessary transfusions are being performed.

Correct dosage

Stakeholders highlighted that patients should only receive one unit of blood at a time and have their haemoglobin levels checked afterwards before further units are given to ensure they are receiving the correct dosage. Evidence was provided to suggest this is not currently always taking place.

4.2.2 Selected recommendations from development source

Table 4 below highlights recommendations that have been provisionally selected from the development source(s) that may support potential statement development. These are presented in full after table 4 to help inform the committee’s discussion.

Table 4 Specific areas for quality improvement

Suggested quality improvement area	Selected source guidance recommendations
Testing haemoglobin levels	No specific guideline recommendation
Thresholds and targets for transfusion	Thresholds and targets NICE NG24 Recommendation 1.21 and 1.2.2 (KPI)

Correct dosage	Doses NICE NG24 Recommendation 1.25 (KPI) and 1.2.6
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Testing haemoglobin levels

No specific guideline recommendation

Thresholds and targets for transfusion

NICE NG24 Recommendation 1.2.1

Use restrictive red blood cell transfusion thresholds for patients who need red blood cell transfusions and who do not:

- have major haemorrhage or
- have acute coronary syndrome or
- need regular blood transfusions for chronic anaemia

NICE NG24 Recommendation 1.2.2 (Key priority for implementation)

When using a restrictive red blood cell transfusion threshold, consider a threshold of 70 g/litre and a haemoglobin concentration target of 70–90 g/litre after transfusion.

Correct dosage

NICE NG24 Recommendation 1.2.5 (Key priority for implementation)

Consider single-unit red blood cell transfusions for adults (or equivalent volumes calculated based on body weight for children or adults with low body weight) who do not have active bleeding.

NICE NG24 Recommendation 1.2.6

After each single-unit red blood cell transfusion (or equivalent volumes calculated based on body weight for children or adults with low body weight), clinically reassess and check haemoglobin levels, and give further transfusions if needed.

4.2.3 Current UK practice

Testing haemoglobin levels

The 2015 Audit of Patient Blood Management report (2015)³ found only 15% of patients had their haemoglobin checked between transfusions of red cells.

The audit also found, of 1652 patients who were known to have had more than one unit of blood transfused post-operatively, 90% did not have their haemoglobin levels checked between units.

The National comparative audit of blood transfusion (2015)⁴ reported preoperative anaemia was common and was present in half of patients included in the audit. However it was often identified relatively late prior to surgery with only half of patients having their haemoglobin level tested at least 14 days preoperatively. This was despite an average of 42 days between listing for elective surgery and operation.

Thresholds and targets for transfusion

The National comparative audit of blood transfusion (2015)⁵ shows 15% or more of red cell transfusions undertaken are unnecessary due to thresholds not being adhered to properly or at all. This applied to several clinical indications e.g. hip replacement, cardiac surgery, and upper gastrointestinal haemorrhage.

Correct dosage

The 2015 Audit of Patient Blood Management report (2015)⁶ found in adults undergoing elective, scheduled surgery a single unit transfusion policy was rarely adopted. Most patients received more than one unit of blood. The audit found the following:

- One dose was given prior to surgery in 20% of cases
- Two doses were given prior to surgery in 61% of cases
- Three doses were given prior to surgery in 13% of cases
- Four doses or more were given prior to surgery in 6% of cases

³ NHS Blood and Transport, National Comparative [Audit of Blood Transfusion, 2015 Audit of Patient Blood Management in Adults undergoing elective, scheduled surgery](#)

⁴ NHS blood and transport, [National comparative audit of blood transfusion](#), 2015

⁵ NHS blood and transport, [National comparative audit of blood transfusion](#), 2015

⁶ NHS Blood and Transport, National Comparative [Audit of Blood Transfusion, 2015 Audit of Patient Blood Management in Adults undergoing elective, scheduled surgery](#)

The audit also found of the 2447 patients who received a post operative transfusion in the absence of active bleeding:

- 32% had one unit of blood transfused.
- 1652 were known to have had more than one unit of which 90% of these patients did not have their haemoglobin levels checked between units.

4.2.4 Resource impact assessment

These recommendations were not specifically included in the costing statement for NG24. However under other considerations it was noted that recommendations to encourage restrictive use are likely to lead to savings for the NHS. However there may be a cost in educating healthcare professionals and encouraging them to follow these recommendations.

There is evidence from national audits of transfusion practice that currently some patients have unnecessary blood transfusions, with inappropriate overuse of all blood components at around 20%. And despite considerable efforts to ensure the safety of blood transfusions, they are associated with significant risks.

4.3 *Platelets*

4.3.1 Summary of suggestions

Prophylactic platelet transfusion

Stakeholders highlighted prophylactic platelet transfusion can reduce the need for the transfusion of blood products. It was highlighted that reducing blood product transfusions to only those which are absolutely necessary is safer for the population and will reduce costs for the NHS.

4.3.2 Selected recommendations from development source

Table 5 below highlights recommendations that have been provisionally selected from the development source(s) that may support potential statement development. These are presented in full after table 5 to help inform the committee’s discussion.

Table 5 Specific areas for quality improvement

Suggested quality improvement area	Selected source guidance recommendations
Prophylactic platelet transfusion	Patients who are not bleeding or having invasive procedures or surgery NICE NG24 Recommendation 1.3.3 (KPI)

Prophylactic platelet transfusion

NICE NG24 Recommendation 1.3.3 (Key priority for implementation)

Offer prophylactic platelet transfusions to patients with a platelet count below 10×10 per litre who are not bleeding or having invasive procedures or surgery, and who do not have any of the following conditions:

- chronic bone marrow failure
- autoimmune thrombocytopenia
- heparin-induced thrombocytopenia
- thrombotic thrombocytopenic purpura

4.3.3 Current UK practice

A 2010 audit of the use of platelets in Haematology (2011)⁷ looked at 3296 transfusion episodes and found:

- 60% of patients were aged 60 years or over and 7% of patients were under 18 years of age
- The most common haematological diagnoses were acute myeloid leukaemia (29%) lymphoma (18%) and myelodysplasia (11%)
- There was 92% (3046/3296) compliance with the requirement for a recent pre-transfusion platelet count
- The reason for the transfusion was only clearly documented in the notes in 72% of cases. However, auditors were able to identify the reason for transfusion as prophylactic in 69%, pre-procedure in 15%, therapeutic in 13% and unclear in 3%

⁷ NHS Blood and Transport , [2010 Re-audit of the Use of Platelets in Haematology](#), 2011

4.4 Patient information and consent

4.4.1 Summary of suggestions

Patient information and consent

Stakeholders highlighted the importance of people being provided with information about blood transfusion prior to receiving it. It was highlighted that currently some people are not aware of the risks associated with blood transfusion and the options available to them. A stakeholder also felt that currently patients are not being asked if they consent to receiving a blood transfusion which should be being done for all patients. The connection between patient information and consent was highlighted with a stakeholder commenting it is essential for patients to be properly informed about transfusion to allow them to give meaningful consent.

4.4.2 Selected recommendations from development source

Table 6 below highlights recommendations that have been provisionally selected from the development source(s) that may support potential statement development. These are presented in full after table 6 to help inform the committee's discussion.

Table 6 Specific areas for quality improvement

Suggested quality improvement area	Selected source guidance recommendations
Patient information and consent	Patient information NICE NG24 Recommendation 1.8.1 (KPI)

Patient information and consent

NICE NG24 Recommendation 1.8.1 (Key priority for implementation)

Provide verbal and written information to patients who may have or who have had a transfusion, and their family members or carers (as appropriate), explaining:

- the reason for the transfusion
- the risks and benefits
- the transfusion process
- any transfusion needs specific to them
- any alternatives that are available, and how they might reduce their need for a transfusion

- that they are no longer eligible to donate blood
- that they are encouraged to ask questions.

4.4.3 Current UK practice

NHS Blood and Transport audit of patient information (2014)⁸ looked at data on 2784 patient cases as part of a case note documentation audit. Of these people the study found:

- 81% had documentation of the clinical indication for transfusion in the notes.
- Evidence for documentation of patient consent for transfusion was found in only 43%; this was largely verbal consent.
- In nearly 80% of cases, consent was obtained by doctors and of these 72% were FY1 and FY2 trainees.
- While 85% of staff stated that they had explained the reason for transfusion to the patient, only 65% stated that they had documented this; it was only evident in 37% of notes reviewed that the reason for transfusion had been explained to the patient.
- The proportion of patients stating that they received information on risks was only 38% and even lower at 8% for alternatives. These low levels are reflected in the case note audit with documentation that information was given on risks in 23% and on alternatives in 17%.
- 21% of patients stated that they did not feel at all involved in the decision making process around receiving a blood transfusion

⁸ NHS Blood and Transport, National Comparative Audit of Blood Transfusion, [2014 Audit of Patient Information](#)

4.5 *Patient safety*

4.5.1 Summary of suggestions

Electronic patient identification systems

Stakeholders highlighted the use of electronic patient identification systems can improve patient safety by ensuring people receive the right blood transfusion by removing the risk of human error (e.g. when cross matching) when determining which products a patient should receive.

4.5.2 Selected recommendations from development source

Table 7 below highlights recommendations that have been provisionally selected from the development source(s) that may support potential statement development. These are presented in full after table 7 to help inform the committee’s discussion.

Table 7 Specific areas for quality improvement

Suggested quality improvement area	Selected source guidance recommendations
Electronic patient identification systems	Electronic patient identification systems NICE NG24 Recommendation 1.7.3

Electronic patient identification systems

NICE NG24 Recommendation 1.7.3

Consider using a system that electronically identifies patients to improve the safety and efficiency of the blood transfusion process.

4.5.3 Current UK practice

The Serious Hazards of Transfusion (SHOT) Annual Report (2005)⁹ reported that reliance on compatibility forms and checking these against patients' notes has been a significant contributory factor to ABO incompatible transfusions. The reports states analysis of reports received in 2005 indicated that in six of seven cases in which blood administration error resulted in an ABO incompatible transfusion, the blood was checked away from the patient's side using a compatibility form or equivalent.

4.5.4 Resource impact assessment

This recommendation was included in the [costing statement](#) for the guideline.

⁹ Serious Hazards of Transfusion. Annual Report 2005

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Costs and savings will vary depending on the existing IT infrastructure, how the system is implemented, and each hospital's transfusion rates and processes.

An example was given in the costing statement based on a quality and productivity case study submitted by [Oxford University Hospitals](#). The electronic transfusion management system at Oxford University Hospitals costs £350,000 per year in a managed service contract with the supplier for the hardware (including bedside handheld computers), software, and support with troubleshooting, training and ensuring the system is used correctly. In addition, the Trust employs a senior manager to ensure the correct day-to-day running of the system. The Trust identified gross savings of £920,000, of which £420,000 are cash-releasing. Expenditure on blood has decreased by 10% because access to blood is much quicker, meaning less blood is ordered and then wasted. Productivity savings are through reduced nursing/laboratory time.

After taking account of the service contract and system manager the net realisable savings are £28,000, or £4,561 per 100,000 population. There are also productivity savings of £500,000.

There are also potential savings from avoiding very costly treatment associated with ABO incompatible blood transfusions.

4.6 *Additional areas*

Summary of suggestions

The improvement areas below were suggested as part of the stakeholder engagement exercise. However they were felt to be either unsuitable for development as quality statements, outside the remit of this particular quality standard referral or require further discussion by the committee to establish potential for statement development.

There will be an opportunity for the QSAC to discuss these areas at the end of the session on 14/04/2016.

Use of electronic decision making systems

Stakeholders suggested electronic decision devices are becoming available to support clinicians in their decision to transfuse to reduce the risk of inappropriate blood transfusion.

Review of clinical/nursing staff training

A stakeholder highlighted the importance of well trained and knowledgeable staff to ensure safe and effective blood transfusion.

Pre-hospital transfusion

A stakeholder felt trauma remains a major cause of mortality and morbidity with the role of transfusion in Damage Control Resuscitation appearing to be important. It was also highlighted where possible blood components should be selected for patients on the basis of their blood group to minimise the inappropriate use of universal components.

Appendix 1: Key priorities for implementation (NG24)

Recommendations that are key priorities for implementation in the source guideline and that have been referred to in the main body of this report are highlighted in grey.

1.1 Alternatives to blood transfusion for patients having surgery

Erythropoietin

1.1.1 Do not offer erythropoietin to reduce the need for blood transfusion in patients having surgery, unless:

- the patient has anaemia and meets the criteria for blood transfusion, but declines it because of religious beliefs or other reasons or
- the appropriate blood type is not available because of the patient's red cell antibodies.

Intravenous and oral iron

1.1.2 Offer oral iron before and after surgery to patients with iron-deficiency anaemia.

Cell salvage and tranexamic acid

1.1.5 Offer tranexamic acid to adults undergoing surgery who are expected to have at least moderate blood loss (greater than 500 ml).

1.1.8 Consider intra-operative cell salvage with tranexamic acid for patients who are expected to lose a very high volume of blood (for example in cardiac and complex vascular surgery, major obstetric procedures, and pelvic reconstruction and scoliosis surgery).

1.2 Red blood cells

Thresholds and targets

1.2.2 When using a restrictive red blood cell transfusion threshold, consider a threshold of 70 g/litre and a haemoglobin concentration target of 70–90 g/litre after transfusion.

Doses

1.2.5 Consider single-unit red blood cell transfusions for adults (or equivalent volumes calculated based on body weight for children or adults with low body weight) who do not have active bleeding.

1.3 Platelets

Thresholds and targets

Patients who are not bleeding or having invasive procedures or surgery

1.3.3 Offer prophylactic platelet transfusions to patients with a platelet count below 10×10^9 per litre who are not bleeding or having invasive procedures or surgery, and who do not have any of the following conditions:

- chronic bone marrow failure
- autoimmune thrombocytopenia
- heparin-induced thrombocytopenia
- thrombotic thrombocytopenic purpura.

Doses

1.3.9 Do not routinely transfuse more than a single dose of platelets.

1.4 Fresh frozen plasma

Thresholds and targets

1.4.2 Do not offer fresh frozen plasma transfusions to correct abnormal coagulation in patients who:

- are not bleeding (unless they are having invasive procedures or surgery with a risk of clinically significant bleeding)
- need reversal of a vitamin K antagonist.

1.6 Prothrombin complex concentrate

1.6.1 Offer immediate prothrombin complex concentrate transfusions for the emergency reversal of warfarin anticoagulation in patients with either:

- severe bleeding or
- head injury with suspected intracerebral haemorrhage.

1.8 Patient information

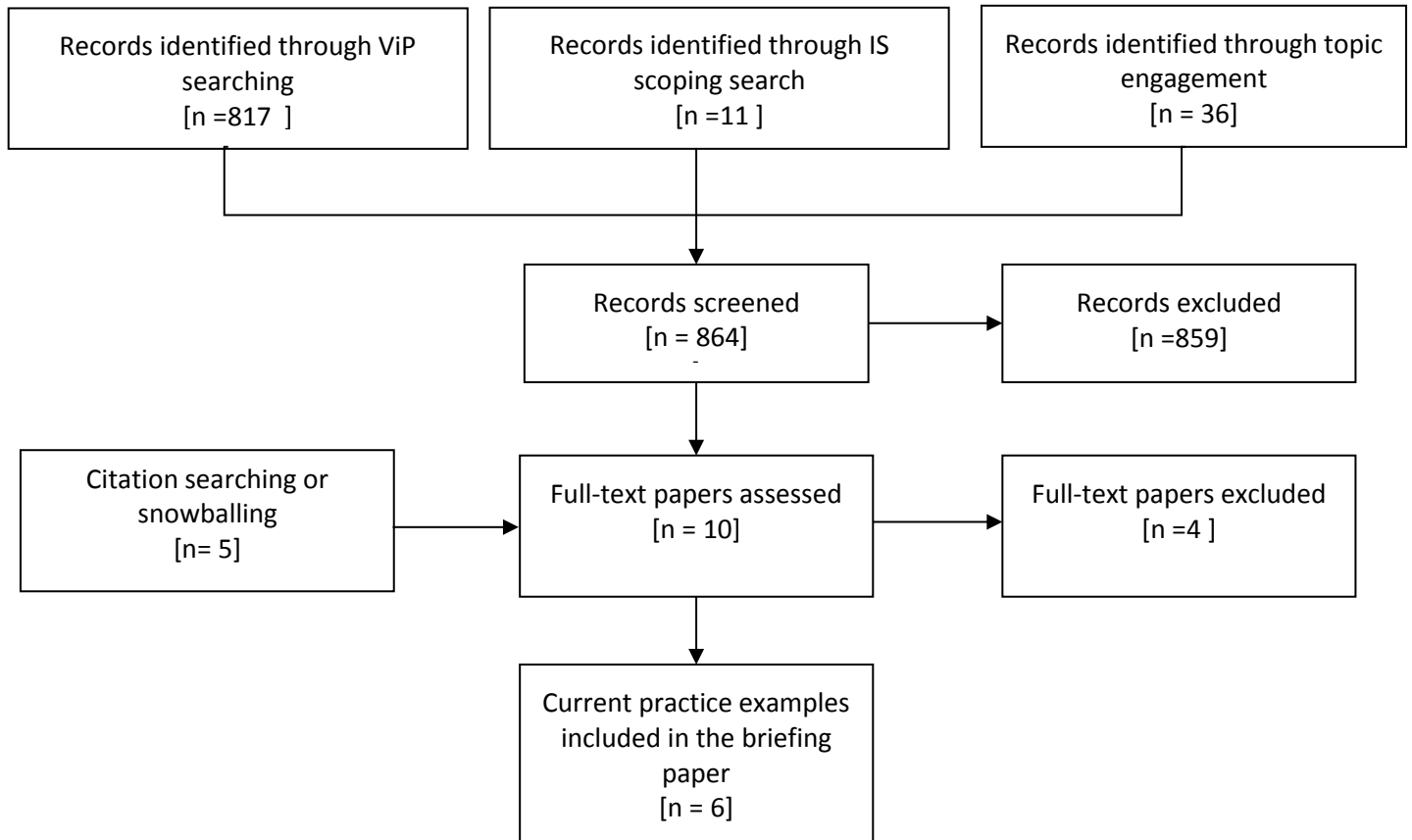
1.8.1 Provide verbal and written information to patients who may have or who have had a transfusion, and their family members or carers (as appropriate), explaining:

- the reason for the transfusion

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- the risks and benefits
- the transfusion process
- any transfusion needs specific to them
- any alternatives that are available, and how they might reduce their need for a transfusion
- that they are no longer eligible to donate blood
- that they are encouraged to ask questions.

Appendix 2: Review flowchart



Appendix 3: Suggestions from stakeholder engagement exercise – registered stakeholders

ID	Stakeholder	Key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
1	[PREVENTT clinical trial group]	Correct Preoperative anaemia before elective surgery	Where appropriate (elective orthopaedics) surgery should be cancelled and oral iron given	Easy to measure and audit	NICE 2015
2	NHS Blood and Transplant	5. Treat iron deficiency anaemia with oral or intravenous iron rather than blood transfusion	<p>Iron deficiency anaemia is very common, and is associated with poor clinical outcomes in preoperative and obstetric patients. Oral iron is effective treatment but compliance may be poor due to side-effects such as nausea and diarrhoea. Intravenous iron is appropriate treatment for patients who cannot tolerate or absorb oral iron, or where the interval to surgery is too short for oral iron to be effective.</p> <p>It is one the key priorities for implementation in the NICE guideline for blood transfusion (2015).</p>	<p>A more consistent approach to replenish iron stores in patients with iron deficiency anaemia e.g. in preoperative and obstetric patients would reduce unnecessary transfusion, the associated risks of transfusion and save money.</p> <p>A survey of 'Patient Blood Management' practices found that only 46% of hospitals had a policy for the identification and correction of the underlying cause of anaemia before considering transfusion.</p> <p>An audit of over 9,000 medical patients who received a red cell</p>	<p><u>NICE guidelines for blood transfusion (2015):</u> <u>https://www.nice.org.uk/guidance/ng24</u></p> <p><u>National Patient Blood management Survey (2013)</u></p> <p><u>http://hospital.blood.co.uk/media/27840/generic-pbm-survey-2013-report.pdf</u></p> <p><u>National Comparative Audit of Blood Transfusion (NCABT) report on the use of red cell transfusion in medical patients</u></p> <p><u>http://hospital.blood.co.uk/media/26861/nca-2011-medical-use-audit-part-2-report.pdf</u></p>

ID	Stakeholder	Key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
				<p>transfusion, 53% were considered to have an inappropriate transfusion (inappropriate reason for transfusion, or inappropriately high Hb threshold or Hb target for transfusion. Detailed analysis of about half of these cases found a cause for reversible anaemia in about 50% and that about 70% of these had iron deficiency anaemia. Only 27% of the patients with iron deficiency anaemia were treated with iron (either oral or intravenous) and 15% of those treated with oral iron were intolerant of it.</p>	
3	SCM3	Key area for quality improvement 2	Appropriate management of iron deficiency anaemia pre operatively and in medical and obstetric patients	Potentially optimise the Haemoglobin and therefore minimise blood transfusion requirements	Links in with NICE Blood Transfusion guideline – considering alternatives to transfusion
4	SCM4	5. Treat iron deficiency anaemia with oral or intravenous iron rather than blood transfusion	Iron deficiency anaemia is very common, and is associated with poor clinical outcomes in preoperative and obstetric patients. Oral iron is effective treatment but compliance may	A more consistent approach to replenish iron stores in patients with iron deficiency anaemia e.g. in preoperative and	<p><u>NICE guidelines for blood transfusion (2015):</u> <u>https://www.nice.org.uk/guidance/ng24</u></p> <p><u>National Patient Blood</u></p>

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			<p>be poor due to side-effects such as nausea and diarrhoea. Intravenous iron is appropriate treatment for patients who cannot tolerate or absorb oral iron, or where the interval to surgery is too short for oral iron to be effective.</p> <p>It is one the key priorities for implementation in the NICE guideline for blood transfusion (2015).</p>	<p>obstetric patients would reduce unnecessary transfusion, the associated risks of transfusion and save money.</p> <p>A survey of 'Patient Blood Management' practices found that only 46% of hospitals had a pilicy for the identification and correction of the underlying cause of anaemia before considering transfusion.</p> <p>An audit of over 9,000 medical patients who received a red cell transfusion, 53% were considered to have an inappropriate transfusion (inappropriate reason for transfusion, or inappropriately high Hb threshold or Hb target for transfusion. Detailed analysis of about half of these cases found a cause for reversible anaemia in about 50%</p>	<p><u>management Survey (2013)</u></p> <p>http://hospital.blood.co.uk/media/27840/generic-pbm-survey-2013-report.pdf</p> <p><u>National Comparative Audit of Blood Transfusion</u></p> <p>http://hospital.blood.co.uk/media/26861/nca-2011_medical_use_audit_part_2_report.pdf</p>

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				<p>and that about 70% of these had iron deficiency anaemia. Only 27% of the patients with iron deficiency anaemia were treated with iron (either oral or intravenous) and 15% of those treated with oral iron were intolerant of it.</p>	
5	NBTC and RTCs / HTC	<p>4. Treat iron deficiency anaemia with oral or intravenous iron rather than blood transfusion. GPs to check FBC at point of referral for major surgery to allow for early identification of pre operative anaemia</p>	<p>Iron deficiency anaemia is very common, and is associated with poor clinical outcomes in preoperative and obstetric patients. Oral iron is effective treatment but compliance may be poor due to side-effects such as nausea and diarrhoea. Intravenous iron is appropriate treatment for patients who cannot tolerate or absorb oral iron, or where the interval to surgery is too short for oral iron to be effective.</p> <p>It is one the key priorities for implementation in the NICE guideline for blood transfusion (2015).</p>	<p>A more consistent approach to replenish iron stores in patients with iron deficiency anaemia e.g. in preoperative and obstetric patients would reduce unnecessary transfusion, the associated risks of transfusion and save money.</p> <p>A survey of 'Patient Blood Management' practices found that only 46% of hospitals had a policy for the identification and correction of the underlying cause of anaemia before</p>	<p><u>NICE guidelines for blood transfusion (2015):</u> <u>https://www.nice.org.uk/guidance/ng24</u></p> <p><u>National Patient Blood management Survey (2013)</u></p> <p><u>http://hospital.blood.co.uk/media/27840/generic-pbm-survey-2013-report.pdf</u></p> <p><u>National Comparative Audit of Blood Transfusion (NCABT) report on the use of red cell transfusion in medical patients</u></p> <p><u>http://hospital.blood.co.uk/media/26861/nca-2011_medical_use_audit_part_2_report.pdf</u></p>

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				<p>considering transfusion.</p> <p>An audit of over 9,000 medical patients who received a red cell transfusion, 53% were considered to have an inappropriate transfusion (inappropriate reason for transfusion, or inappropriately high Hb threshold or Hb target for transfusion. Detailed analysis of about half of these cases found a cause for reversible anaemia in about 50% and that about 70% of these had iron deficiency anaemia. Only 27% of the patients with iron deficiency anaemia were treated with iron (either oral or intravenous) and 15% of those treated with oral iron were intolerant of it.</p>	
6	SCM4	<p>4. Use tranexamic acid for adults undergoing surgery who are expected to have at least 500mL blood loss.</p>	<p>Tranexamic acid (TXA) is an antifibrinolytic drug i.e. it prevents breakdown of clots.</p> <p>A large international multicentre</p>	<p>A survey of 'Patient Blood Management' practices found that 29% of NHS hospitals were not using TXA for</p>	<p><u>Ker K et al. Effect of tranexamic acid on surgical bleeding: systematic review and cumulative meta-analysis.</u></p>

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			<p>randomised placebo controlled trial showed a reduction in mortality and blood transfusion in trauma patients treated with TXA.</p> <p>Systematic reviews of the use of TXA in surgery show a reduction in the number of patients needing transfusion and in mortality with no increase in complications such as infection or thrombosis.</p> <p>It is one the key priorities for implementation in the NICE guideline for blood transfusion (2015).</p>	<p>surgical patients. It is likely that it is only being used for certain types of surgery in most hospitals using TXA in surgery and not inclusive of all surgical patients likely to have blood loss > 500mL.</p>	<p>http://www.bmj.com/content/344/bmj.e3054</p> <p>NICE guidelines for blood transfusion (2015): https://www.nice.org.uk/guidance/ng24</p> <p>National Patient Blood management Survey (2013) http://hospital.blood.co.uk/media/27840/generic-pbm-survey-2013-report.pdf</p>
7	NBTC and RTCs / HTC's	3. Use tranexamic acid for adults undergoing surgery who are expected to have at least 500mL blood loss unless known thrombotic tendency	<p>Tranexamic acid (TXA) is an antifibrinolytic drug i.e. it prevents breakdown of clots.</p> <p>A large international multicentre randomised placebo controlled trial showed a reduction in mortality and blood transfusion in trauma patients treated with TXA.</p> <p>Systematic reviews of the use of TXA in surgery show a reduction in the number of patients</p>	<p>A survey of 'Patient Blood Management' practices found that 29% of NHS hospitals were not using TXA for surgical patients. It is likely that it is only being used for certain types of surgery in most hospitals using TXA in surgery and not inclusive of all surgical patients likely to have blood loss > 500mL.</p>	<p>Ker K et al. Effect of tranexamic acid on surgical bleeding: systematic review and cumulative meta-analysis. http://www.bmj.com/content/344/bmj.e3054</p> <p>NICE guidelines for blood transfusion (2015): https://www.nice.org.uk/guidance/ng24</p> <p>National Patient Blood</p>

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			<p>needing transfusion and in mortality with no increase in complications such as infection or thrombosis.</p> <p>It is one the key priorities for implementation in the NICE guideline for blood transfusion (2015).</p>		<p>management Survey (2013)</p> <p>http://hospital.blood.co.uk/media/27840/generic-pbm-survey-2013-report.pdf</p>
8	[PREVENTT clinical trial group]	Test Hb level before blood transfusion	Often this is not done	Easy to measure and audit	NICE 2015
9	[PREVENTT clinical trial group]	Test Hb before listing patients for Elective Surgery	Preoperative anaemia affects 30% of people undergoing operation and the biggest predictor of surgical need form BT	Easy to measure and audit	NICE 2015
10	NHS Blood and Transplant	2. Use a threshold of a haemoglobin concentration (Hb) of 70g/L and a target of Hb of 90g/L for red cell transfusions except for major haemorrhage, patients with acute coronary syndrome and patients on chronic transfusion regimens.	Blood transfusion is often perceived by clinicians, patients and the public as being a 'good thing'. Of course, it is the appropriate treatment for major bleeding and symptomatic anaemia where there is no alternative effective treatment. However, there is a need for a greater understanding by clinicians, patients and the public of the risks and benefits of transfusion, when transfusions are clinically indicated and when they are	<p>In common with other developed countries, the use of red cell units is decreasing in the UK where 1.97 million units of red cells were issued by the UK blood services in 2014.</p> <p>National audits of transfusion practice for several clinical indications e.g. hip replacement, cardiac surgery, and upper</p>	<p>NICE guidelines for blood transfusion (2015): https://www.nice.org.uk/guidance/ng24</p> <p>National Comparative Audit of Blood Transfusion (NCABT) reports</p> <p>http://hospital.blood.co.uk/audits/national-comparative-audit/national-comparative-audit-reports/</p> <p>Summary of data on</p>

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			<p>best avoided.</p> <p>It is one the key priorities for implementation in the NICE guideline for blood transfusion (2015).</p>	<p>gastrointestinal haemorrhage England show that 15% or more of red cell transfusions are inappropriate</p>	<p><u>inappropriate transfusion from the NCABT reports in Goodnough LT & Murphy MF. Do liberal transfusions cause more harm than good? BMJ 2014; 349: g6897.</u></p> <p><u>http://www.bmj.com/content/349/bmj.g6897</u></p>
11	SCM1	<p>Key area for quality improvement 2 –</p> <p>Restrictive transfusion thresholds for patients who do not have major haemorrhage, acute coronary syndrome or are transfusion dependant</p>	<p>It intends to limit donor exposure (and therefore reduce the inherent risks of transfusion) and, by reducing the overall number of units transfused, maximise blood stocks and reduces costs.</p>	<p>Developments in recent years have pointed to a restrictive approach for transfusion. A restrictive approach ensures that the benefits to transfusion outweigh the risks. However, it has been recognised that blood transfusion is one of the most overused treatments in the UK and US.</p> <p>Blood transfusion does not come without risk, so should be avoided wherever possible. Data from the Serious Hazards of Transfusion demonstrates that 77.6% of reported incidents related to human error,</p>	<p>A recent review of literature concluded that whilst a restrictive approach resulted in reduction in the number of red cells transfused and number of patients transfused, mortality, morbidity and myocardial infarction was unaffected.</p> <p>http://www.bmj.com/content/bmj/350/bmj.h1354.full.pdf</p> <p>A further study found that a liberal approach may have a negative effect in terms of rebleeding and 45 day mortality.</p> <p>http://www.bmj.com/content/bmj/349/bmj.g6897.full.pdf</p> <p>However, a National</p>

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				<p>despite rigorous training and competency assessments programmes for all staff. The overall risk of death related to blood transfusion is 1 in 125,000 and of major morbidity is 1 in 19.157.</p>	<p>Comparative Audit of Blood Transfusion in medical patients in 2011 found that 29% of patients were transfused at an Hb concentration above the predefined 'trigger'; and patients were often transfused up to a higher than necessary Hb concentration (especially patients of low body weight).</p> <p>http://www.transfusionguidelines.org/transfusion-handbook/8-effective-transfusion-in-medical-patients</p>
12	SCM4	<p>2. Use a threshold of a haemoglobin concentration (Hb) of 70g/L and a target of a Hb of 90g/L for red cell transfusions except for major haemorrhage, patients with acute coronary syndrome and patients on chronic transfusion regimens.</p>	<p>Blood transfusion is often perceived by clinicians, patients and the public as being a 'good thing'. Of course, it is the appropriate treatment for major bleeding and symptomatic anaemia where there is no alternative effective treatment. However, there is a need for a greater understanding by clinicians, patients and the public of the risks and benefits of transfusion, when transfusions are clinically</p>	<p>In common with other developed countries, the use of red cell units is decreasing in the UK where 1.97 million units red cells were issued by the UK blood services in 2014.</p> <p>National audits of transfusion practice for several clinical indications e.g. hip replacement, cardiac</p>	<p><u>NICE guidelines for blood transfusion (2015):</u> <u>https://www.nice.org.uk/guidance/ng24</u></p> <p><u>National Comparative Audit of Blood Transfusion (NCABT) reports</u></p> <p><u>http://hospital.blood.co.uk/audits/national-comparative-audit/national-comparative-audit-reports/</u></p>

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			<p>indicated and when they are best avoided.</p> <p>It is one the key priorities for implementation in the NICE guideline for blood transfusion (2015).</p>	<p>surgery, and upper gastrointestinal haemorrhage England show that 15% or more of red cell transfusions are inappropriate.</p>	<p><u>Summary of data on inappropriate transfusion from the NCABT reports in Goodnough LT & Murphy MF. Do liberal transfusions cause more harm than good? BMJ 2014; 349: q6897.</u></p> <p><u>http://www.bmj.com/content/349/bmj.q6897</u></p>
13	SCM4	3. Use single unit red cell transfusions for adults (or equivalent body weights for children) who do not have active bleeding.	<p>Avoidance of over-transfusion such as an inappropriate high dose of red cells is just as important as avoidance of an inappropriate high Hb threshold for red cell transfusion.</p> <p>A national audit of red cell transfusion in medical patients identified that 33% were over-transfused as defined by a post-transfusion Hb of >20g/L above the threshold for transfusion.</p> <p>It is one the key priorities for implementation in the NICE guideline for blood transfusion (2015).</p>	<p>The benefits of avoidance of an inappropriate high dose of red cell transfusion i.e. transfusing single units at a time in an adult include a reduction in the number of units transfused, a reduction in transfusion complications and making best use of a the limited supply of donor blood as well as reducing hospital costs.</p>	<p><u>NICE guidelines for blood transfusion (2015):</u> <u>https://www.nice.org.uk/guidance/ng24</u></p> <p><u>National Comparative Audit of Blood Transfusion (NCABT) report on the use of red cell transfusion in medical patients</u></p> <p><u>http://hospital.blood.co.uk/media/26861/nca-2011_medical_use_audit_part_2_report.pdf</u></p>
14	NBTC and RTCs / HTCcs	2. Use a threshold of a haemoglobin concentration (Hb) of 70g/L and a target of a Hb of 90g/L for red cell transfusions	<p>Blood transfusion is often perceived by clinicians, patients and the public as being a 'good thing'. Of course, it is the</p>	<p>In common with other developed countries, the use of red cell units is decreasing in the UK</p>	<p><u>NICE guidelines for blood transfusion (2015):</u> <u>https://www.nice.org.uk/guidance/ng24</u></p>

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		<p>except for major haemorrhage, patients with acute coronary syndrome and patients on chronic transfusion regimens.</p>	<p>appropriate treatment for major bleeding and symptomatic anaemia where there is no alternative effective treatment. However, there is a need for a greater understanding by clinicians, patients and the public of the risks and benefits of transfusion, when transfusions are clinically indicated and when they are best avoided.</p> <p>It is one the key priorities for implementation in the NICE guideline for blood transfusion (2015).</p>	<p>where 1.97 million units red cells were issued by the UK blood services in 2014.</p> <p>National audits of transfusion practice for several clinical indications e.g. hip replacement, cardiac surgery, and upper gastrointestinal haemorrhage England show that 15% or more of red cell transfusions are inappropriate.</p>	<p><u>National Comparative Audit of Blood Transfusion (NCABT) reports</u></p> <p><u>http://hospital.blood.co.uk/audits/national-comparative-audit/national-comparative-audit-reports/</u></p> <p><u>Summary of data on inappropriate transfusion from the NCABT reports in Goodnough LT & Murphy MF. Do liberal transfusions cause more harm than good? BMJ 2014; 349: g6897.</u></p> <p><u>http://www.bmj.com/content/349/bmj.g6897</u></p>
15	[PREVENTT clinical trial group]	Transfuse one unit of blood at a time and check Hb before further units given	This is not current practice and would dramatically improve BT	Easy to measure and audit	NICE 2015
16	NHS Blood and Transplant	<p>3. Use single unit red cell transfusions for adults (or equivalent body weights for children) who do not have active bleeding.</p>	<p>Avoidance of over-transfusion such as an inappropriate high dose of red cells is just as important as avoidance of an inappropriate high Hb threshold for red cell transfusion.</p> <p>A national audit of red cell transfusion in medical patients identified that 33% were over-</p>	The benefits of avoidance of an inappropriate high dose of red cell transfusion i.e. transfusing single units at a time in an adult include a reduction in the number of units transfused, a reduction in transfusion complications	<p><u>NICE guidelines for blood transfusion (2015):</u> <u>https://www.nice.org.uk/guidance/ng24</u></p> <p><u>National Comparative Audit of Blood Transfusion (NCABT) report on the use of red cell transfusion in medical patients</u></p>

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			<p>transfused as defined by a post-transfusion Hb of >20g/L above the threshold for transfusion.</p> <p>It is one the key priorities for implementation in the NICE guideline for blood transfusion (2015).</p>	<p>and making best use of a the limited supply of donor blood as well as reducing hospital costs.</p>	<p>http://hospital.blood.co.uk/media/26861/nca-2011_medical_use_audit_part_2_report.pdf</p>
17	SCM1	<p>Key area for quality improvement 1 –</p> <p>Patients who are not actively bleeding should receive a single unit and be clinically reviewed prior to administration of further units</p>	<p>This is a key recommendation for implementation in the NICE guidelines. It intends to limit donor exposure (and therefore reduce the inherent risks of transfusion) and, by reducing the overall number of units transfused, maximise blood stocks and reduces costs</p>	<p>Traditionally patients would always receive 2 units, and there is a possibility that this historical practice continues to take place, even though it no longer reflects best practice. A long held belief that each unit transfused will increase the patients haemoglobin by 10g/L has been shown to be inaccurate, and the increment may be considerably greater</p> <p>Reports to the Serious Hazards of Transfusion (SHOT) scheme over the last few years have shown that the largest cause for mortality is transfusion associated</p>	<p>Patient Blood Management recommendations are endorsed by NHS England and recommends ‘<i>Transfuse one dose of blood component at a time e.g. one unit of red cells or platelets in non-bleeding patients and reassess the patient clinically and with a further blood count to determine if further transfusion is needed.</i>’</p> <p>Source - http://hospital.blood.co.uk/patient-services/patient-blood-management/single-unit-blood-transfusions/</p> <p><i>The National Comparative Audit of blood transfusion in 2014 studied Patient Blood Management in surgical patients. One of the findings</i></p>

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				<p>circulatory overload, the prevalence of which will be reduced if patients only receive a single unit and are then reviewed.</p>	<p><i>was that of the patients transfused post operatively 61% received 2 units, whilst only 31% received a single unit. These findings are similar to a recent audit in my Trust which audited all patients transfused over a 2 week period (excluding paediatrics and neonates, haematology/ oncology patients and those experiencing major haemorrhage) found only 41% of patients received a single unit transfusion. Of those receiving more than a single unit only 56% of the patients were reviewed between units. (audit presentation available on request)</i></p>
18	SCM2	Use of electronic patient identification systems	<p>Human error is the main cause of adverse, transfusion-related events. The most serious of such errors is “wrong blood in tube”. Electronic patient ID systems prompt medical staff to carry out the right steps in the right order, ensuring that transfusions are given to the right patients through scanning</p>	<p>Over recent years, there has been much good practice guidance and many hospitals have introduced protocols that should ensure that human errors do not occur. In practice, however, such errors continue to take place.</p>	<p>NICE Guideline on Blood Transfusion, published November 2015 nice.org.uk/guidance/ng24</p>

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			of compatible wristbands and blood component containers.	Hospitals need to be encouraged to consider introducing such systems, having weighed up the potential costs against the likely efficiency gains and, of course, patient safety.	
19	SCM4	1. Provide verbal and written information to patients who may have or who have had a transfusion	<p>Patients have a limited understanding of many aspects of transfusion e.g. the risks and benefits of transfusion, but they do want to be part of informed decision-making.</p> <p>It is one the key priorities for implementation in the NICE guideline for blood transfusion (2015).</p>	<p>A national audit in 2014 of 22493 patients found that only 38% received information on the risks of transfusion and 8% information about alternatives to transfusion. Despite this, 75% of patients considered they had received sufficient information and had been able to ask questions. However, 21% said they did not feel at all involved in the decision-making for blood transfusion.</p> <p>Good quality patient information on blood transfusion is available online and in paper format to give to patients.</p>	<p><u>National audit of patient consent (2014):</u> http://hospital.blood.co.uk/media/27580/2014-audit-of-patient-information-consent.pdf</p> <p><u>Recommendations for patient consent from The Advisory Committee for the Safety of Blood, Tissues and Organs (SaBTO) (2011):</u> https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/216586/dh_130715.pdf</p> <p><u>NICE guidelines for blood transfusion (2015):</u> https://www.nice.org.uk/guidance/ng24</p> <p><u>National patient information leaflet:</u></p>

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				<p>It is unknown whether the provision of patient information will actually result in better decision-making about the use of blood transfusion.</p>	<p>http://hospital.blood.co.uk/media/27165/inf64_will-i-need-a-blood-transfusion.pdf</p>
20	SCM4	<p>6. Use electronic systems for patient identification for blood sampling for pre-transfusion compatibility testing and the pre-transfusion bedside check.</p>	<p>The transfusion of the ‘wrong blood’ remains the commonest adverse event related to transfusion. There were 278 reports to the UK haemovigilance system (Serious Hazards of Transfusion – SHOT)in 2014, and there were 10 of the most serious type of wrong transfusion event – ABO incompatible red cell transfusion. These events indicate that staff are not following correct patient identification procedures at the time of blood sampling for pre-transfusion compatibility testing, at the time of blood collection from blood fridges and when administering transfusions. These errors are putting patients’ lives at risk.</p> <p>It is one of the recommendations in the NICE</p>	<p>NICE’s review of this topic (see pages 154-155 of the full guideline) found evidence to suggest that using electronic patient identification systems may reduce the number of incidents of wrong blood in tube, blood samples rejected and incorrect blood component transfused. Reducing these outcomes would improve patient safety as it should translate into a reduction in the number of acute transfusion reactions, morbidity and mortality. A reduction in the number of rejected samples should also reduce delays in the provision of blood</p>	<p><u>Serious Hazards of Transfusion. Annual Report (2014):</u> http://www.shotuk.org/wp-content/uploads/report-2014.pdf</p> <p><u>NICE guidelines for blood transfusion (2015):</u> https://www.nice.org.uk/guidance/ng24</p> <p><u>Electronic blood transfusion: improving safety and efficiency of transfusion systems. Case study for the QIPP programme by Oxford University Hospitals.</u> https://www.rcplondon.ac.uk/file/2501/download?token=EB7yeYBA</p> <p><u>RCP London Future Hospital programme: ‘Electronic, paperless transfusion</u></p>

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			<p>guideline for blood transfusion (2015).</p>	<p>components and patients needing to have further blood samples taken.</p> <p>The NICE Guideline Development Group for the Blood Transfusion guideline agreed that electronic patient identification systems improved the documentation of the transfusion process leading to improvement in traceability of blood and transparency of each step in the transfusion process. Clear audit trails also help to identify the number of staff requiring training and the specific development needs of staff involved in the transfusion process at different levels. Moreover, mandatory competency training could be linked to the transfusion process.</p>	<p><u>process: improving patient safety and saving money'</u></p> <p><u>https://www.rcplondon.ac.uk/projects/outputs/your-story-electronic-paperless-transfusion-process-improving-patient-safety-and</u></p>
21	Royal College of Paediatrics and	Key area for quality improvement 1	Restricting blood product transfusions to only those which	Informal survey of platelet transfusion	

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	Child Health	Offer prophylactic platelet transfusions to patients with a platelet count below 10×10^9 per litre who are not bleeding or having invasive procedures or surgery.	are absolutely necessary is both safer for the population and cheaper than a more liberal approach.	criteria among paediatric haem/onc centres (whose guidelines appear to be used by most other specialities in paediatrics) shows variation in what 'trigger' number is used to give platelet transfusions.	
22	SCM2	Provision of information to patients who may have or who have had a transfusion and (as appropriate) their family members and carers	Patients have the right to know why a procedure is being carried out, how it will be carried out and what its implications are. Without these requirements being met, any "consent" they give to a transfusion will not be meaningful.	Evidence shows that the information written for patients (for example, by the National Blood Transfusion Committee) is not actually reaching many of them, and that pre-transfusion discussions between health professionals and patients can sometimes provide minimal information only, with little opportunity for dialogue or questions. Over recent years, there has been much good practice guidance, but little sign of improvement in actual practice.	NICE Guideline on Blood Transfusion, published November 2015 nice.org.uk/guidance/ng24
23	SCM4	7. Electronic decision support to reduce inappropriate blood transfusions	Electronic decision devices are emerging as tools to support the clinical users in their	The clinical evidence gathered by the NICE Guideline Development	NICE guidelines for blood transfusion (2015): https://www.nice.org.uk/guida

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			<p>decision to transfuse, the aim being to reduce inappropriate blood transfusions. These systems enable:-</p> <ol style="list-style-type: none"> 1. enable accurate recording of the clinical reason for transfusion to be readily available for audit and feedback; 2. provide the most recent blood count to the ordering doctor and an alert if the order is outside local guidelines with the option to cancel the order; 3. collection of data on blood use and transfusions non-compliant with local guidelines for feedback to clinical teams and individual clinicians. <p>It is one of the research recommendations in the NICE guideline for blood transfusion (2015). At a time when many NHS Trusts are implementing electronic patient record systems there is the potential to include electronic decision support for blood transfusion at little cost and a major impact on</p>	<p>Group for the Blood Transfusion suggested that using electronic decision support systems for blood ordering may reduce the number of patients transfused, the number of units transfused, the proportion of inappropriate transfusions and the length of stay in hospital.</p> <p>National audits of transfusion practice for several clinical indications e.g. hip replacement, cardiac surgery, and upper gastrointestinal haemorrhage England show that 15% or more of red cell transfusions are inappropriate.</p>	<p>nce/ng24</p> <p>National Comparative Audit of Blood Transfusion (NCABT) reports</p> <p>http://hospital.blood.co.uk/audits/national-comparative-audit/national-comparative-audit-reports/</p> <p>Summary of data on inappropriate transfusion from the NCABT reports in Goodnough LT & Murphy MF. Do liberal transfusions cause more harm than good? BMJ 2014; 349: g6897.</p> <p>http://www.bmj.com/content/349/bmj.g6897</p> <p>Hibbs SP, Nielsen ND, Brunskill S, Dorée C, Yazer MH, Kaufman RM, Murphy MF (2015) The Impact of Electronic Decision Support on Transfusion Practice: A Systematic Review. Transfusion Medicine Reviews. 29, p14-23.</p>

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			inappropriate blood use.		<p><u>Electronic blood transfusion: improving safety and efficiency of transfusion systems. Case study for the QIPP programme by Oxford University Hospitals.</u> https://www.rcplondon.ac.uk/file/2501/download?token=EB7yeYBA</p> <p><u>RCP London Future Hospital programme: 'Electronic, paperless transfusion process: improving patient safety and saving money'.</u> https://www.rcplondon.ac.uk/projects/outputs/your-story-electronic-paperless-transfusion-process-improving-patient-safety-and</p>
24	NBTC and RTCs / HTC's	<p>Provide verbal and written information to patients who may receive or who have had a transfusion</p> <p>Gain verbal consent from the patient where possible and document the discussion of risks and benefits in the case notes</p>	<p>Patients have a limited understanding of many aspects of transfusion e.g. the risks and benefits of transfusion, but they do want to be part of informed decision-making.</p> <p>It is one the key priorities for implementation in the NICE guideline for blood transfusion (2015).</p>	<p>A national audit in 2014 of 22493 patients found that only 38% received information on the risks of transfusion and 8% information about alternatives to transfusion. Despite this, 75% of patients considered they had received sufficient</p>	<p><u>National audit of patient consent (2014):</u> http://hospital.blood.co.uk/media/27580/2014-audit-of-patient-information-consent.pdf</p> <p><u>Recommendations for patient consent from The Advisory Committee for the Safety of Blood, Tissues and Organs</u></p>

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				<p>information and had been able to ask questions. However, 21% said they did not feel at all involved in the decision-making for blood transfusion.</p> <p>Good quality patient information on blood transfusion is available online and in paper format to give to patients.</p> <p>It is unknown whether the provision of patient information will actually result in better decision-making about the use of blood transfusion.</p>	<p><u>(SaBTO) (2011):</u> https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/216586/dh_130715.pdf</p> <p><u>NICE guidelines for blood transfusion (2015):</u> https://www.nice.org.uk/guidance/ng24</p> <p><u>National patient information leaflet:</u> http://hospital.blood.co.uk/media/27165/inf64_will-i-need-a-blood-transfusion.pdf</p>
25	SCM3	Key area for quality improvement 1	Improved IM&T systems that incorporate clinical decision making – use of standardised transfusion triggers	<p>There is good evidence that referral to policies and guidelines/education support best practice.</p> <p>Improvement into the requesting process for blood and blood components by use of Electronic Decision support linked to IM&T systems further supports</p>	<p>Links in with NICE Blood Transfusion guideline – red blood cell recommendations.</p> <p>https://www.nice.org.uk/guidance/ng24/chapter/Key-priorities-for-implementation</p> <p>British Committee for Standards of Haematology http://www.bcsghguidelines.co</p>

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				<p>the above.</p> <p>It will allow benchmarking and audit of practice both locally and nationally.</p> <p>May also identify training needs.</p>	<p>m/documents/IT_guidelinesAug14_final.pdf</p> <p>http://www.bcshguidelines.com/4_HAEMATOLOGY_GUIDELINES.html?dpage=0&dtype=Transfusion&ipage=0</p>
26	[PREVENTT clinical trial group]	Consent for blood transfusion	Not done !	Easy to measure and audit	NICE 2015
27	SCM3	Key area for quality improvement 3	Review of clinical/nursing staff training – standardised across the Medical schools and within Trusts e.g. prescription writing/anaemia managements/when to transfuse/documentation	Documentation is variable this was highlighted in the National Comparative Audit for Consent – showed poor documentation in patient case notes	<p>Links in with NICE Blood Transfusion guideline on giving appropriate verbal and written information to the patient and or carer</p> <p>National Patient Safety Agency 2006</p>
28	NBTC and RTCs / HTC	Consider use of pre-hospital transfusion only within the context of a clinical trial .	Resuscitation of trauma patients with blood products is becoming increasingly widespread in both civilian and military practice. However, this relies on a supply of valuable universal donor blood components	Trauma remains a major cause of mortality and morbidity. The role of transfusion in Damage Control Resuscitation appears to be important. However, where possible blood components should be selected for patients on the basis of their blood group to minimise the	Various pre-hospital blood product (PHBP) combinations have been adopted by pre-hospital emergency medical (PHEM) providers. A forthcoming systematic review ¹ demonstrated that the clinical evidence supporting this practice is entirely composed of observational studies, with a preponderance of case series

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				inappropriate use of universal components.	and inadequately controlled comparative studies. Nonetheless, there was little evidence of a long-term survival benefit. Smith IM, James RH, Dretzke J, et al. Pre-hospital blood product resuscitation for trauma: a systematic review. Shock 2016 (in press).
29	British Infection Association	Key area for quality improvement 1	The BIA are content with this QS. Thank you		
30	British Infection Association	Key area for quality improvement 2	The BIA are content with this QS. Thank you		
31	British Infection Association	Key area for quality improvement 3	The BIA are content with this QS. Thank you		
32	British Infection Association	Key area for quality improvement 4	The BIA are content with this QS. Thank you		
33	British Infection Association	Key area for quality improvement 5	The BIA are content with this QS. Thank you		
34	British Infection Association	Additional developmental areas of emergent practice	The BIA are content with this QS. Thank you		
35	NHS England	Thank you for the opportunity to comment on the above Quality Standard. I wish to confirm that NHS England has no substantive comments to make regarding this consultation.			
36	Royal College of Nursing	Thank you very much for the notification. We have circulated this to our relevant networks but			

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		unfortunately at this stage there are no comments to submit on behalf of the Royal College of Nursing.			
37	NHS Blood and Transplant	4. Use tranexamic acid for adults undergoing surgery who are expected to have at least 500mL blood loss.	<p>Tranexamic acid (TXA) is an antifibrinolytic drug i.e. it prevents breakdown of clots.</p> <p>A large international multicentre randomised placebo controlled trial showed a reduction in mortality and blood transfusion in trauma patients treated with TXA.</p> <p>Systematic reviews of the use of TXA in surgery show a reduction in the number of patients needing transfusion and in mortality with no increase in complications such as infection or thrombosis.</p> <p>It is one the key priorities for implementation in the NICE guideline for blood transfusion (2015).</p>	<p>A survey of 'Patient Blood Management' practices found that 29% of NHS hospitals were not using TXA for surgical patients. It is likely that it is only being used for certain types of surgery in most hospitals using TXA in surgery and not inclusive of all surgical patients likely to have blood loss > 500mL.</p>	<p>Ker K et al. Effect of tranexamic acid on surgical bleeding: systematic review and cumulative meta-analysis. <u>http://www.bmj.com/content/344/bmj.e3054</u></p> <p>NICE guidelines for blood transfusion (2015): <u>https://www.nice.org.uk/guidance/ng24</u></p> <p>National Patient Blood management Survey (2013) <u>http://hospital.blood.co.uk/media/27840/generic-pbm-survey-2013-report.pdf</u></p>
38	SCM3	Key area for quality improvement 4	<p>Electronic patient Identification systems</p> <p>Allows full end to end patient identification from the time of blood sampling to the final</p>	<p>Patient safety and takes out the human factor – improve patient safety and efficiency.</p> <p>Currently in many Trusts</p>	<p>National Patient Safety Agency 2006</p> <p>http://www.nrls.npsa.nhs.uk/resources/?entryid45=59805</p>

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			administration of blood/blood components	2 qualified checkers complete the final administration checks – with use of electronic patient identification systems this could be reduced to one.	Right patient, right blood: advice for safer blood transfusions