Blood transfusion

NICE guideline: short version

Draft for consultation, May 2015

If you wish to comment on this version of the guideline, please be aware that all the supporting information and evidence is contained in the full version.

Contents

Introduction

Blood transfusions are common in clinical practice. In 2013 NHS Blood and Transplant issued 1.71 million units of red blood cells, 271,000 units of platelets, 230,000 units of fresh frozen plasma and 158,000 units of cryoprecipitate to hospitals in England and North Wales. An estimated 430,000 patients received a red blood cell transfusion in 2002[1]. 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.

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 2013 the risk of transfusion-related death was 8 per million blood components issued, and the risk of transfusion-related major morbidity was 51.8 per million blood components issued[2]. The most common cause of death was transfusion-associated circulatory overload.

There is evidence from national audits of transfusion practice that[3]:

- 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.

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

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

[1] Wells AW, Llewelyn CA, Casbard A, Johnson AJ, Amin M, Ballard S et al. (2009) The EASTR Study: indications for transfusion and estimates of transfusion recipient numbers in hospitals supplied by the National Blood Service. Transfusion Medicine 19(6): 315–28
[2] Bolton-Maggs PHB, Poles D, Watt A and Thomas D (2014) The 2013 SHOT annual report
[3] NHS Blood and Transplant (2013) National comparative audit of blood transfusion

declined from 45.5 to 36 units per 100,000 people between 1999 and 2009[3], and since then has dropped further to around 31.5 units per 100,000 people.

There is evidence from several national audits that inappropriate over-use of all blood components is at around 20%[4]. This is wasteful of a scarce and costly resource and puts patients at unnecessary risk.

This guideline provides guidance on:

- the appropriate use of blood components
- alternatives to transfusion for surgical patients
- ensuring patient safety, including monitoring for transfusion reactions
- providing patients with information about transfusion.

Safeguarding children

Remember that child maltreatment:

- is common
- can present anywhere
- may co-exist with other health problems.

See the NICE guideline on child maltreatment for clinical features that may be associated with maltreatment.

Medicines

The guideline will assume that prescribers will use a medicine's summary of product characteristics to inform decisions made with individual patients.

[4] Bolton-Maggs PHB, Poles D, Watt A and Thomas D (2014) The 2013 SHOT annual report,

Patient-centred care

This guideline offers best practice advice on the care of adults, children and young people who need a blood transfusion.

Patients and healthcare professionals have rights and responsibilities as set out in the NHS Constitution for England – all NICE guidance is written to reflect these. Treatment and care should take into account individual needs and preferences. Patients should have the opportunity to make informed decisions about their care and treatment, in partnership with their healthcare professionals. If the patient is under 16, their family or carers should also be given information and support to help the child or young person to make decisions about their treatment. If it is clear that the child or young person fully understands the treatment and does not want their family or carers to be involved, they can give their own consent. Healthcare professionals should follow the Department of Health's advice on consent. If someone does not have capacity to make decisions, healthcare professionals should follow the code of practice that accompanies the Mental Capacity Act and the supplementary code of practice on deprivation of liberty safeguards.

NICE has produced guidance on the components of good patient experience in adult NHS services. All healthcare professionals should follow the recommendations in Patient experience in adult NHS services.

If a young person is moving between paediatric and adult services, care should be planned and managed according to the best practice guidance described in the Department of Health's Transition: getting it right for young people.

Adult and paediatric healthcare teams should work jointly to provide assessment and services to young people who need a blood transfusion. Diagnosis and management should be reviewed throughout the transition process, and there should be clarity about who is the lead clinician to ensure continuity of care.

Strength of recommendations

Some recommendations can be made with more certainty than others. The Guideline Development Group makes a recommendation based on the trade-off between the benefits and harms of an intervention, taking into account the quality of the underpinning evidence. For some interventions, the Guideline Development Group is confident that, given the information it has looked at, most patients would choose the intervention. The wording used in the recommendations in this guideline denotes the certainty with which the recommendation is made (the strength of the recommendation).

For all recommendations, NICE expects that there is discussion with the patient about the risks and benefits of the interventions, and their values and preferences. This discussion aims to help them to reach a fully informed decision (see also 'Patient-centred care').

Interventions that must (or must not) be used

We usually use 'must' or 'must not' only if there is a legal duty to apply the recommendation. Occasionally we use 'must' (or 'must not') if the consequences of not following the recommendation could be extremely serious or potentially life threatening.

Interventions that should (or should not) be used – a 'strong' recommendation

We use 'offer' (and similar words such as 'refer' or 'advise') when we are confident that, for the vast majority of patients, an intervention will do more good than harm, and be cost effective. We use similar forms of words (for example, 'Do not offer…') when we are confident that an intervention will not be of benefit for most patients.

Interventions that could be used

We use 'consider' when we are confident that an intervention will do more good than harm for most patients, and be cost effective, but other options may be similarly cost effective. The choice of intervention, and whether or not to

have the intervention at all, is more likely to depend on the patient's values and preferences than for a strong recommendation, and so the healthcare professional should spend more time considering and discussing the options with the patient.

Key priorities for implementation

The following recommendations have been identified as priorities for implementation. The full list of recommendations is in section 1.

Alternatives to blood transfusion for patients having surgery

Intravenous and oral iron

- Offer oral iron before and after surgery to people with iron-deficiency anaemia. **[1.1.2]**

Cell salvage and tranexamic acid

- Offer tranexamic acid to adults undergoing surgery who are expected to have at least moderate blood loss (greater than 500 ml). **[1.1.6]**
- Consider intra-operative cell salvage with tranexamic acid for patients who are expected to lose a very high volume of blood (for example in complex cardiac and vascular surgery, major obstetric procedures, and pelvic reconstruction and scoliosis surgery). **[1.1.9]**

Red Blood Cells

Thresholds and Targets

- 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. **[1.2.2]**

Doses

- Consider single-unit red blood cell transfusions for adults (or equivalent volumes, calculated based on body weight, for children or adults who weigh under 50 kg) who do not have active bleeding.
- **[1.2.5]**

Platelets

Thresholds and Targets

Patients who are not bleeding or having invasive procedures or surgery

- Offer prophylactic platelet transfusions to patients with a platelet count below $10x10^9$ per litre who are not bleeding or having invasive procedures or surgery, unless they have:
  - chronic bone marrow failure
  - autoimmune thrombocytopenia
  - heparin-induced thrombocytopenia
  - thrombotic thrombocytopenic purpura. **[1.3.3]**

Doses

- Do not routinely give more than a single dose of platelets in a transfusion. **[1.3.9]**

Fresh Frozen Plasma

- Do not offer fresh frozen plasma transfusions to correct abnormal coagulation in patients who:
  - are not bleeding and
  - are not having invasive procedures or surgery with a risk of clinically significant bleeding. **[1.4.2]**

Prothrombin complex concentrate

- 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.**[1.6.1]**

Patient information

- 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
- the implications of having a transfusion, such as no longer being able to donate blood
- that they are encouraged to ask questions. **[1.8.1]**

1 Recommendations

The following guidance is based on the best available evidence. The full guideline [hyperlink to be added for final publication] gives details of the methods and the evidence used to develop the guidance.

Some people have religious beliefs that do not allow the transfusion of blood. Specific issues relating to these people have been addressed when reviewing the evidence and writing the recommendations.

Terms used in this guideline

Adults, children and young people are defined as:

- Children: over 1 year to under 16 years.
- Young people: 16 years to under 18 years. No evidence was found on transfusions specifically for young people. Recommendations for adults in this guideline will generally apply to young people as well, but healthcare professionals should use their clinical judgement on when this is not appropriate for individual patients.
- Adults: 18 years or older.

Major haemorrhage can be defined as any of the following:

- The loss of more than 1 blood volume within 24 hours (around 70 mL/kg, or more than 5 litres in a 70 kg adult).
- A loss of 50% of total blood volume in under 3 hours.
- Bleeding in excess of 150 mL/minute in adults.
- As a practical clinical definition, bleeding which leads to:
  - a systolic blood pressure of less than 90 mm/Hg or
  - a heart rate of more than 110 beats per minute in adults.

The modified World Health Organization (WHO) bleeding scale was used to assess bleeding in trials of platelet transfusions. Examples of bleeding at each grade are listed below:

World Health Organization Bleeding Grade	Examples
1	• Oropharyngeal bleeding, with the total duration of all episodes no more than 30 minutes in the last 24 hours • Epistaxis, with the total duration of all episodes no more than 30 minutes in the last 24 hours • Petechiae of oral mucosa or skin • Purpura up to 2.5 cm (1 inch) in diameter • Spontaneous haematoma in soft tissue or muscle • Positive stool occult blood test • Microscopic haematuria or haemoglobinuria • Abnormal vaginal bleeding (spotting)
2	• Epistaxis, with the total duration of all episodes over 30 minutes in 24 hours • Purpura over 2.5 cm (1 inch) in diameter • Joint bleeding • Melanotic stool • Haematemesis • Gross/visible haematuria • Abnormal vaginal bleeding (more than spotting) • Haemoptysis • Visible blood in body cavity fluid • Retinal bleeding without visual impairment • Bleeding at invasive sites
3	• Bleeding needing red blood cell transfusion over routine transfusion needs • Bleeding associated with moderate haemodynamic instability
4	• Bleeding associated with severe haemodynamic instability • Fatal bleeding • Central nervous system bleeding on imaging study with or without dysfunction

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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.

Intravenous and oral iron

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

1.1.3 Consider intravenous iron before and after surgery for patients with iron-deficiency anaemia who:

- cannot tolerate or absorb oral iron
- are diagnosed with functional iron deficiency
- are diagnosed with iron-deficiency anaemia and the interval to surgery is considered short
- are unable to adhere to oral iron treatment (see the NICE guideline on medicines adherence).

1.1.4 For guidance on managing anaemia in patients with chronic kidney disease, see the NICE guideline on anaemia management in chronic kidney disease.

1.1.5 For guidance on managing acute upper gastrointestinal bleeding, see the NICE guideline on acute upper gastrointestinal bleeding.

Cell salvage and tranexamic acid

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

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

1.1.8 Do not routinely offer cell salvage alone.

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

1.2 Red Blood Cells

Thresholds and targets

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 acute coronary syndrome.

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.

1.2.3 Consider a red blood cell transfusion threshold of 80 g/litre and a haemoglobin concentration target of 80–100 g/litre after transfusion for patients with acute coronary syndrome.

1.2.4 Consider setting individual thresholds and haemoglobin concentration targets for each patient who needs regular blood transfusions for chronic anaemia.

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 who weigh under 50 kg) who do not have active bleeding.

1.2.6 After each single-unit red blood cell transfusion (or equivalent volumes, calculated based on body weight, for children or adults who weigh under 50 kg), clinically reassess and check haemoglobin levels, and give further transfusions if needed.

1.3 Platelets

Thresholds and targets

Patients with thrombocytopenia who are bleeding

1.3.1 Offer platelet transfusions to patients with thrombocytopenia who have clinically significant bleeding (World Health Organization [WHO] grade 2) and a platelet count below $30x10^9$ per litre.

1.3.2 Use higher platelet thresholds (up to a maximum of $100x10^9$ per litre) for patients with thrombocytopenia and either of the following:

- severe bleeding (WHO grades 3 and 4)
- bleeding in critical sites, such as the central nervous system (including eyes).

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 $10x10^9$ per litre who are not bleeding or having invasive procedures or surgery, unless they have:

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

Patients who are having invasive procedures or surgery

1.3.4 Consider prophylactic platelet transfusions to raise the platelet count above $50x10^9$ per litre in patients who are having invasive procedures or surgery

1.3.5 Consider a higher threshold (for example $50–75x10^9$ per litre) for patients with a high risk of bleeding who are having invasive procedures or surgery, after taking into account:

- the specific procedure the patient is having
- the cause of the thrombocytopenia
- whether the patient's platelet count is falling
- any coexisting causes of abnormal haemostasis.

1.3.6 Consider prophylactic platelet transfusions to raise the platelet count above $100x10^9$ per litre in patients having surgery in critical sites, such as the central nervous system (including the posterior segment of the eyes).

When prophylactic platelet transfusions are not indicated

1.3.7 Do not routinely offer prophylactic platelet transfusions to patients with any of the following:

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

1.3.8 Do not offer prophylactic platelet transfusions to patients having procedures with a low risk of bleeding, such as adults having central venous cannulation or any patients having bone marrow aspiration and trephine biopsy.

Doses

1.3.9 Do not routinely give more than a single dose of platelets in a transfusion.

1.3.10 Only consider giving more than a single dose of platelets in a transfusion for patients with severe thrombocytopenia and bleeding in a critical site, such as the central nervous system (including eyes).

1.3.11 Clinically reassess the patient's condition and check their platelet count after each platelet transfusion, and give further doses if still needed.

1.4 Fresh frozen plasma

Thresholds and targets

1.4.1 Only consider fresh frozen plasma transfusion for patients with clinically significant bleeding but without major haemorrhage if they have abnormal coagulation test results (for example, prothrombin time ratio or activated partial thromboplastin time ratio above 1.5).

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

- are not bleeding **and**
- are not having invasive procedures or surgery with a risk of clinically significant bleeding.

1.4.3 Consider prophylactic fresh frozen plasma transfusions for patients with abnormal coagulation who are having invasive procedures or surgery with a risk of clinically significant bleeding.

Doses

1.4.4 Use a dose of at least 15 ml/kg when giving fresh frozen plasma transfusions.

1.4.5 Clinically reassess the patient's condition and repeat the coagulation tests after fresh frozen plasma transfusion, and give further doses if needed.

1.5 Cryoprecipitate

Thresholds and targets

1.5.1 Consider cryoprecipitate transfusions for patients without major haemorrhage who have:

- clinically significant bleeding **and**
- a fibrinogen level below 1.5 g/litre.

1.5.2 Do not offer cryoprecipitate transfusions to correct the fibrinogen level in patients who:

- are not bleeding **and**
- are not having invasive procedures or surgery with a risk of clinically significant bleeding.

1.5.3 Consider prophylactic cryoprecipitate transfusions for patients with a fibrinogen level below 1.0 g/litre who are having invasive procedures or surgery with a risk of clinically significant bleeding.

Doses

1.5.4 Use an adult dose of 2 pools when giving cryoprecipitate transfusions (for children, use 5–10 ml/kg up to a maximum of 2 pools).

1.5.5 Clinically reassess the patient's condition, repeat the fibrinogen level measurement and give further doses if needed.

1.6 Prothrombin complex concentrate

Doses

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.

1.6.2 For guidance on reversing anticoagulation treatment in people who have a stroke and a primary intracerebral haemorrhage, see recommendation 1.4.2.8 in the NICE guideline on the initial diagnosis and management of stroke.

1.6.3 Consider immediate prothrombin complex concentrate transfusions to reverse warfarin anticoagulation in patients having emergency

surgery, depending on the level of anticoagulation and the bleeding risk.

1.6.4 Monitor the international normalised ratio (INR) to confirm that warfarin anticoagulation has been adequately reversed, and consider further prothrombin complex concentrate.

1.7 Patient Safety

Monitoring for acute blood transfusion reactions

1.7.1 Monitor the patient's condition and vital signs before, during and after blood transfusions, to detect acute transfusion reactions that may need immediate investigation and treatment.

1.7.2 Observe patients who are having or have had a blood transfusion in an environment with adequate staffing and facilities for monitoring and managing acute reactions.

Electronic patient identification systems

1.7.3 Hospitals should consider using electronic patient identification systems to improve the safety and efficiency of the blood transfusion process.

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
- 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

- the implications of having a transfusion, such as no longer being able to donate blood
- that they are encouraged to ask questions.

1.8.2 Document discussions in the patient's notes.

1.8.3 Provide the patient and their GP with copies of the discharge summary or other written communication that explains:

- the details of any transfusions they had
- the reasons for the transfusion
- any adverse events.

2 Research recommendations

The Guideline Development Group has made the following recommendations for research, in areas where there was not enough evidence to make recommendations for clinical practice. These research recommendations are intended to improve NICE guidance and patient care in the future.

2.1 Red blood cell transfusion thresholds for patients with chronic cardiovascular disease

What is the clinical and cost effectiveness of restrictive compared with liberal red blood cell thresholds and targets for patients with chronic cardiovascular disease?

Why this is important

The literature suggests that there may be some evidence of harm with the use of restrictive red blood cell thresholds in populations with coronary ischaemia at baseline. In this guideline a level of 80–100 g/litre was used for patients with acute coronary syndrome, but further studies are needed to determine the optimal transfusion threshold for patients with chronic cardiovascular disease.

2.2 Electronic Decision Support

What is the clinical and cost effectiveness of an electronic decision support system compared with current practice in reducing inappropriate blood transfusions, overall rates of blood transfusion and mortality?

Why this is important

The clinical evidence evaluating electronic decision support systems is of low quality. There is also no evidence on their cost effectiveness within the NHS, and this is particularly important because of the potentially high setup and running costs of these systems. An evaluation of the clinical and cost effectiveness of electronic decision support systems for blood transfusion is needed. Important outcomes are rates of inappropriate transfusion, overall rates of transfusion, and patient safety outcomes including mortality and transfusion errors. Secondary outcomes should include length of hospital stay and quality of life; and pre-transfusion haemoglobin levels, platelet count and coagulation results.

2.3 Post-operative cell salvage for patients having cardiac surgery with a significant risk of post-operative blood loss

For patients having cardiac surgery with a significant risk of post-operative blood loss, is post-operative cell salvage and reinfusion clinically and cost effective in reducing red blood cell use and improving clinical outcomes, compared with existing practice?

Why this is important

There was some evidence for benefit from post-operative cell salvage, but the quality was low. Reducing blood loss during cardiac surgery may reduce the risk of complications. However, post-operative cell salvage carries additional cost. Studies are needed to determine whether post-operative cell salvage is more clinically and cost effective than existing practice for patients having cardiac surgery with a significant risk of post-operative blood loss. Important

outcomes should include the use of red blood cells and other blood products, clinical outcomes and quality of life.

3 Other information

3.1 Scope and how this guideline was developed

NICE guidelines are developed in accordance with a scope that defines what the guideline will and will not cover.

How this guideline was developed

NICE commissioned the National Clinical Guideline Centre to develop this guideline. The Centre established a Guideline Development Group (see section 4), which reviewed the evidence and developed the recommendations.

The methods and processes for developing NICE clinical guidelines are described in The guidelines manual.

3.2 Related NICE guidance

Details are correct at the time of consultation on the guideline (May 2015). Further information is available on the NICE website.

Published

General

- Patient experience in adult NHS services (2012) NICE guideline CG138
- Medicines adherence (2009) NICE guideline CG76

Condition-specific

- Intrapartum care (2014) NICE guideline CG190
- Erythropoiesis-stimulating agents (epoetin and darbepoetin) for the treatment of cancer-treatment induced anaemia (including review of TA142) (2014) NICE technology appraisal guidance 323

- Intravenous fluid therapy in adults (2013) NICE guideline CG174
- Ulcerative colitis (2013) NICE guideline CG166
- Acute upper gastrointestinal bleeding (2012) NICE guideline CG141
- Caesarean section (2011) NICE guideline CG132
- Anaemia management in people with chronic kidney disease (2011) NICE guideline CG114
- Neonatal jaundice (2010) NICE guideline CG98
- Intraoperative blood cell salvage during radical prostatectomy or radical cystectomy (2008) NICE interventional procedure guidance 258
- Intraoperative blood cell salvage in obstetrics (2005) NICE interventional procedure guidance 144
- Preoperative tests (2003) NICE guideline CG3

Under development

NICE is developing the following guidance:

- Anaemia management in chronic kidney disease (update). NICE guideline. Publication expected May 2015.
- Intravenous fluids therapy in children. NICE guideline. Publication expected October 2015.
- Major trauma. NICE guideline. Publication expected February 2016.
- Major trauma services. NICE guideline. Publication expected February 2016.
- Intrapartum care for high risk women. NICE guideline. Publication expected January 2017.

4 The Guideline Development Group, National Collaborating Centre and NICE project team, and declarations of interests

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4.4 Declarations of interests

The following members of the Guideline Development Group made declarations of interests. All other members of the Group stated that they had no interests to declare. The conflicts of interest policy (2007) was followed until September 2014, when an updated policy was published.

Member	Interest declared	Type of interest	Decision taken
Shubha Allard	Chair of the BCSH transfusion task force and has co-authored various guidelines including Acute Transfusion Reactions and Use of Red Cells in Critical Care. Has also steered the development of many other guidelines.	Personal non-pecuniary.	Declared and participated
	Project lead for a national comparative audit looking at patient information and consent who are soon to publish a report.	Personal non-pecuniary	Declared and participated
Graham Donald	GDG member declared that he is part of a team that has drafted patient referral leaflets, but no funds have been received for this work.	Personal non-pecuniary	Declared and participated.
Mary Marsden	GDG member declared that her hospital currently uses Octaplex, a drug which is used in some of the studies in the reviews at this GDG, and companies sometimes sponsor study days in her trust, but she has no personal pecuniary interest and has no declared preference for one PCC drug. GDG member also declared that there is research into dabigatran in her trust currently but that she is not directly involved in this research.	Non-personal pecuniary	Declared and participated.
Mike Murphy	GDG member declared that he is an employee of the National Health Service Blood and Transplant, the only blood supplier for blood components in England. He has also written various articles on many aspects of Blood Transfusion and he has done extensive work in the area of electronic transfusion systems.	Personal non-pecuniary	Declared and participated
	GDG member declared that he is secretary of the National Blood Transfusion committee, clinical director for NHS blood and transplant and also leads the blood transfusion team in Oxford, a team which has	Personal non-pecuniary	Declared and participated

	developed electronic blood management systems to support transfusion in the NHS.		
	GDG member declared published papers in electronic decision support and electronic patient identification systems.	Personal non-pecuniary	It was agreed that during the presentation of evidence in this area, the chair would step down and Susan Robinson would act as interim chair for this section of the agenda. The Chair will not assist with drafting recommendations for this area.
	Named author on some of the studies used in the patient information review.	Non personal pecuniary	Declared and participated
	Published an article in BMJ online about restrictive and liberal transfusion strategies.	Non-personal pecuniary	Withdrew from chairing, participating in discussions and drafting of recommendations in this area.
Helen New	GDG member declared her employment with the NHS Blood and Transplant service.	Non-specific personal pecuniary interest	Declared and participated
	GDG member declared that she is the lead on a writing group for the new British Committee for Standards in haematology (BCSH) guidelines on neonatal and paediatric transfusion in preparation.	Personal non-pecuniary	Declared and participated
	GDG member declared that she is a member of the Serious Hazards of Transfusion working expert group and steering group and a member of the scientific committee of Network for advances of Transfusion Alternatives),	Personal non-pecuniary	Declared and participated
Dafydd Thomas	GDG member declared one instance of an honorarium paid for keynote lecture given at the	Personal pecuniary	Declared and participated

	1st Danish meeting on blood transfusion to launch national guideline development document.	interest	
	Chair of Network for advancement of transfusion alternatives, a scientific society which holds annual symposia and delivers on line learning in transfusion related interests. We rely on commercial support to run conferences. GDG member also declared his role as chair of SHOT steering group supported by UK forum (NHSBT/WBS/SNBTS/NIBTS)	Non-personal pecuniary and personal non-pecuniary interest	Declared and participated
	GDG member declared that he is involved in previous blood transfusion guidelines for BCSH and AAGBT. Currently involved in 2 guidelines for BSCH, 1) Cell Salvage and Preoperative Anaemia and recently completed the BCSH on transfusion in clinical care.	Personal non-pecuniary interest	Declared and participated
	GDG member declared that he is seconded 1 day per week to work for the Welsh Blood service.	Non-specific personal pecuniary interest	Declared and participated.
	GDG member declared that he chairs the network for alternatives to transfusion.	Personal non-pecuniary	Not applicable
	Attended a study day on 01/11/2014 run by CSL Behring about setting up an educational resource related to the coagulation of trauma patients, for which payment of expenses was received.	Personal pecuniary	Declared and participated as allowable reasonable expenses.
Timothy Walsh	GDG member declared that he is the UK Chief investigator for the National Institute for Health Research, Health Technology Assessment funded ABLE study (Age of Blood Evaluation Study).	Non-personal pecuniary and personal non-pecuniary interests	Declared and participated
	Published research in Red Blood Cell transfusion.	Personal non-pecuniary	Withdrew from discussions at Meeting 14 regarding the finalising of

			recommendations in this area.

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