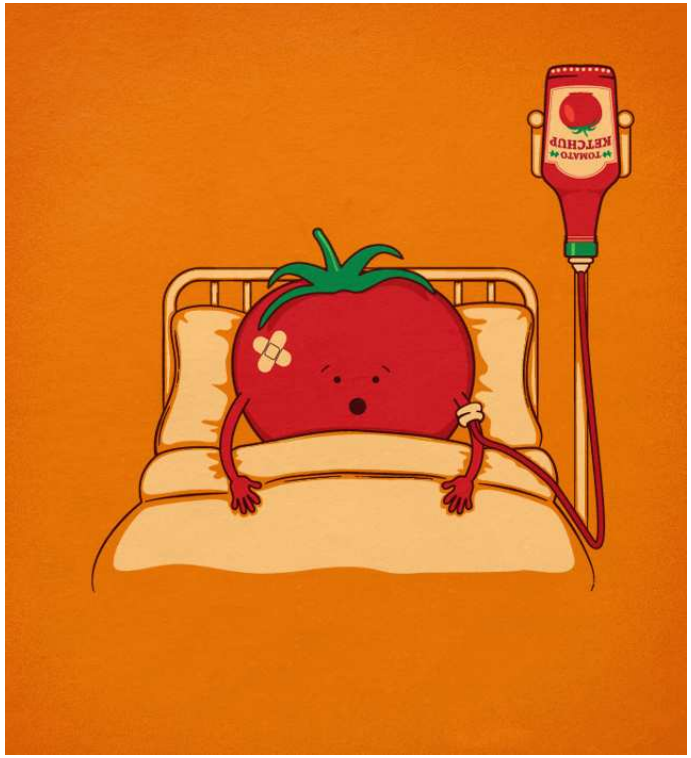
Medical Use of Blood

Chris Newson

Chairman West midlands Regional
Blood Transfusion Committee

Reasons for Blood Transfusion

- to replace blood loss
  - major surgery, childbirth, trauma
- to treat anaemia
- to treat inherited blood disorders
  - thalassaemia , sickle cell anaemia



Health Circular 224

- Attention has focused on blood transfusion practice recently for several reasons:
  - greatly increased demand for blood compared with the increase in donations
  - the likely additional demand for blood associated with the waiting list initiative
  - the rise in the cost of blood with leuco-depletion and nucleic acid testing
  - the recommendations from the Serious Hazards of Transfusion (SHOT) enquiry on how the safety of patients receiving blood could be improved
  - the theoretical risk of new variant Creutzfeldt-Jakob Disease
  - the implications of clinical governance for blood transfusion practice

Health Service Circular

NHS Executive

Series number: **HSC 1998/224**
Issue date: **11 December 1998**
Review date: **11 December 2001**
Category: **Clinical Effectiveness**
Status: **Action**
sets out a specific action on the part of the recipients

Better Blood Transfusion

For action by:
Health Authorities (England): Chief Executives
Health Authorities (England): Directors of Public Health
Health Authorities (England): Finance Directors
NHS Trusts: Chief Executives
NHS Trusts: Medical Directors
NHS Trusts: Nursing Directors
Medical Schools: Deans
Post Graduate Deans

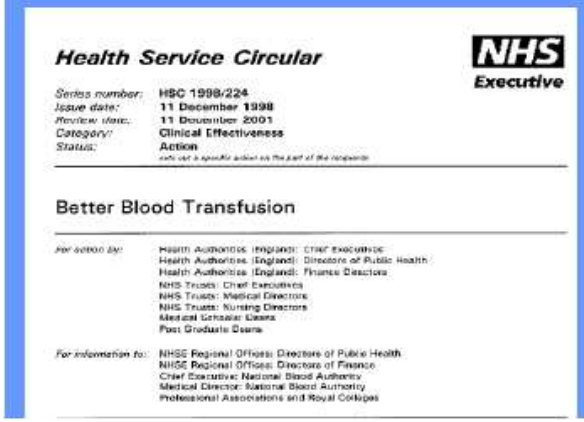
For information to:
NHSE Regional Offices: Directors of Public Health
NHSE Regional Offices: Directors of Finance
Chief Executive: National Blood Authority
Medical Director: National Blood Authority
Professional Associations and Royal Colleges

Further details from: Dr Mike McGovern
Room 412
Wellington House
135–155 Waterloo Road
London
SE1 8UG
0171 972 4520

National *"Better Blood Transfusion"* initiative
1998, 2002 and 2007

Concerns:
- **Patient safety: errors, vCJD**
- **Demand for blood and shortages**
- **Evidence of variation in practice**

Outputs in form of HSCs:
- **HTC/HTTs, NBTC/RTCs**
- **Guidelines, audits**
- **Support from NHSBT**
- **Patient involvement**
- **Use of technology**
- **Clinical research**



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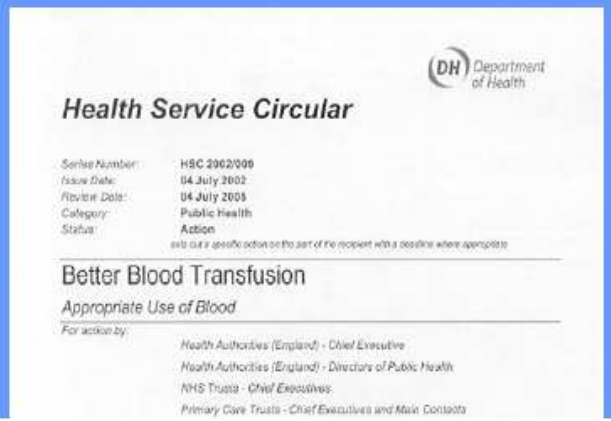

DH Department of Health

Health Service Circular

Series Number:	HSC 2002/000
Issue Date:	04 July 2002
Review Date:	04 July 2005
Category:	Public Health
Status:	Action

Better Blood Transfusion

Appropriate Use of Blood

For action by:
Health Authorities (England) - Chief Executive
Health Authorities (England) - Directors of Public Health
NHS Trusts - Chief Executives
Primary Care Trusts - Chief Executives and Main Contacts

DH Department of Health

Health Service Circular

Series Number: HSC 2007/001
Gateway Reference: 9058
Issue Date: November 2007

Better Blood Transfusion
Safe and Appropriate Use of Blood

For action by:
Strategic Health Authorities (England) – Chief Executive
Strategic Health Authorities (England) – Directors of Public Health
NHS Trusts – Chief Executives
Primary Care Trusts – Chief Executives and Main Contacts
NHS Blood & Transplant – Chief Executive

For information to:
Chief Medical Officers: Wales/Scotland/Northern Ireland
Nursing Statutory Bodies – Chief Executives
Professional Associations and Royal Colleges
Strategic Health Authority Directors of Public Health
Strategic Health Authority Directors of Performance Management
Strategic Health Authority Nurse Directors
Postgraduate Medical Deans
Medical Directors
Foundation Trusts

Prof M Murphy June 2012

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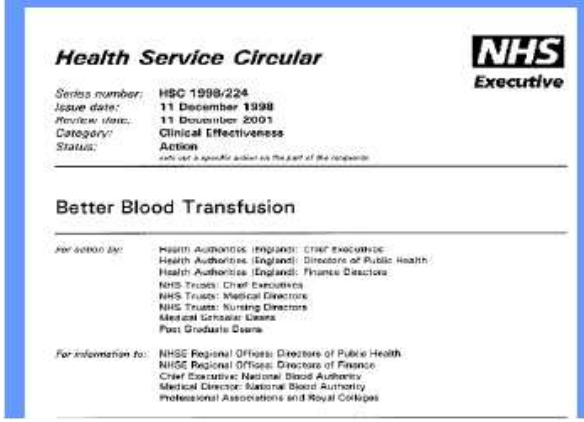

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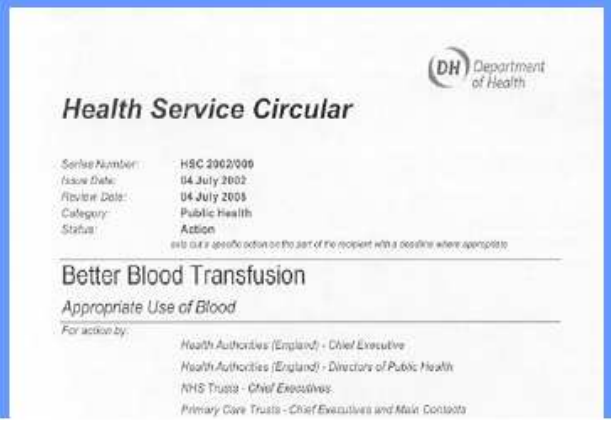

Department of Health

Health Service Circular

Series Number: HSC 2002/009
Issue Date: 04 July 2002
Review Date: 04 July 2005
Category: Public Health
Status: Action

Better Blood Transfusion

Appropriate Use of Blood

For action by: Health Authorities (England) - Chief Executive; Health Authorities (England) - Directors of Public Health; NHS Trusts - Chief Executives; Primary Care Trusts - Chief Executives and Main Contacts

Department of Health

Health Service Circular

Series Number: HSC 2007/001
Gateway Reference: 9058
Issue Date: November 2007

Better Blood Transfusion
Safe and Appropriate Use of Blood

For action by: Strategic Health Authorities (England) – Chief Executive; Strategic Health Authorities (England) – Directors of Public Health; NHS Trusts – Chief Executives; Primary Care Trusts – Chief Executives and Main Contacts; NHS Blood & Transplant – Chief Executive

For information to: Chief Medical Officers: Wales/Scotland/Northern Ireland; Nursing Statutory Bodies – Chief Executives; Professional Associations and Royal Colleges; Strategic Health Authority Directors of Public Health; Strategic Health Authority Directors of Performance Management; Strategic Health Authority Nurse Directors; Postgraduate Medical Deans; Modernisation Team; Foundation Trusts

Prof M Murphy June 2012 Prof A Newland Nov 2014

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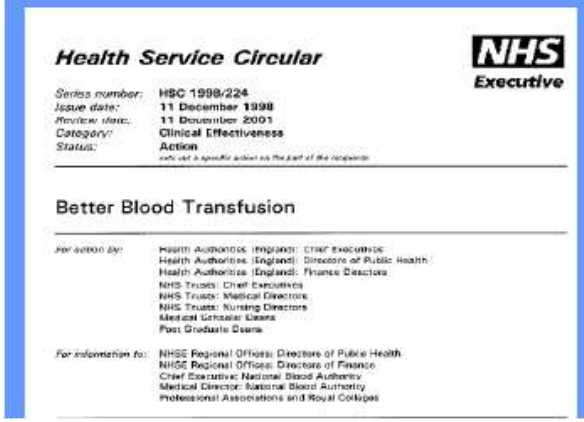

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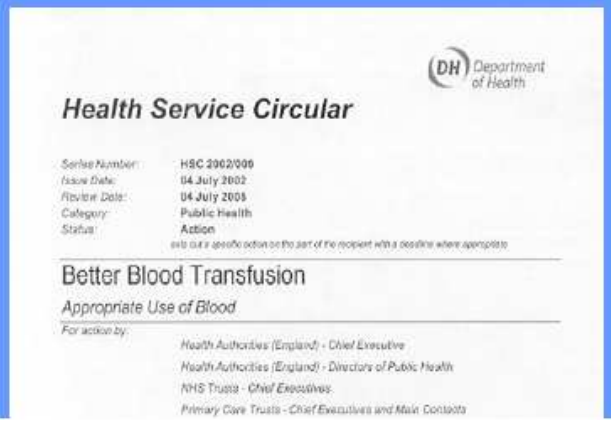

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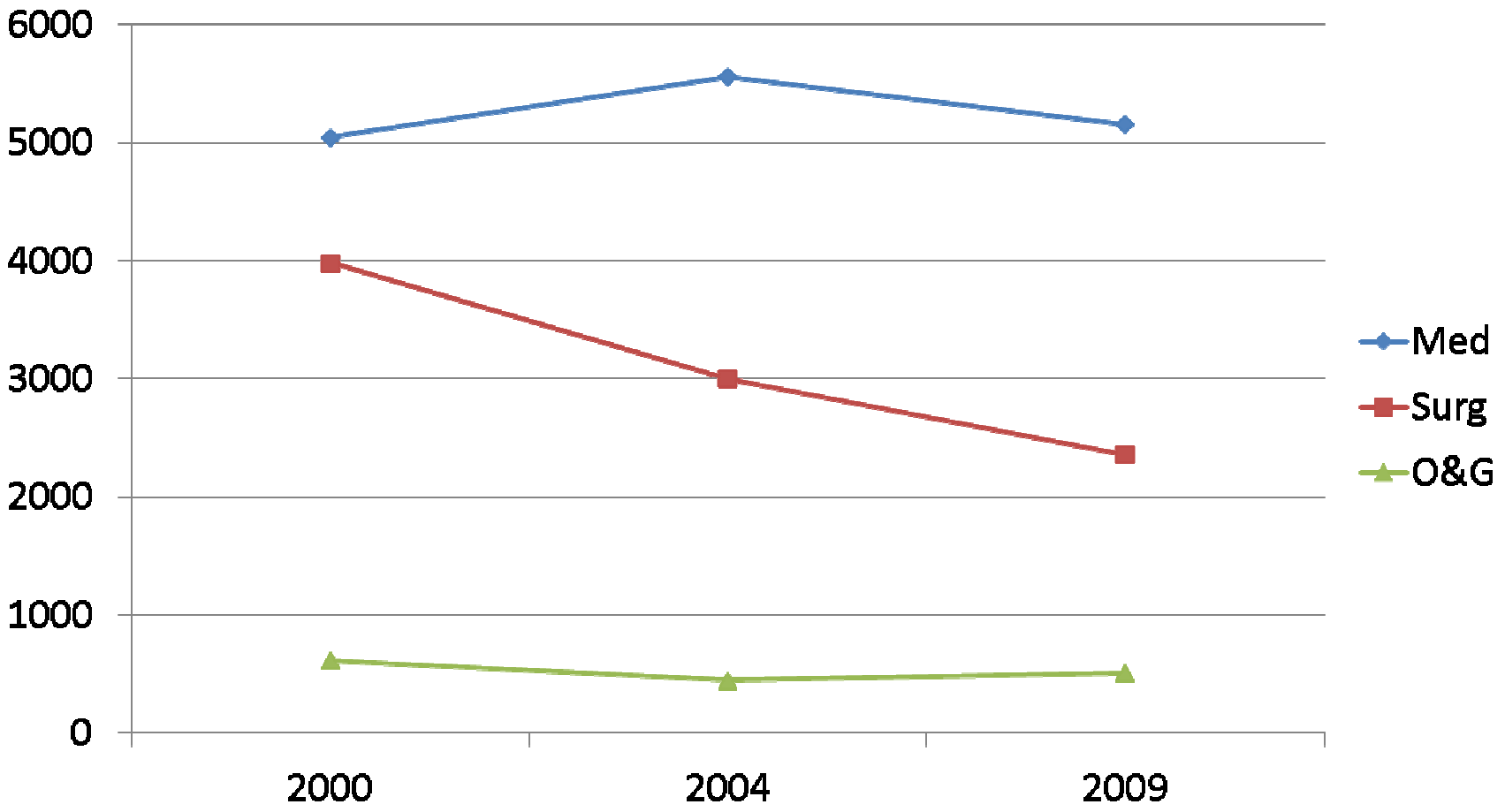
Prof M Murphy June 2012 Prof A Newland Nov 2014 Dr C Newson May 2016

Use of Blood



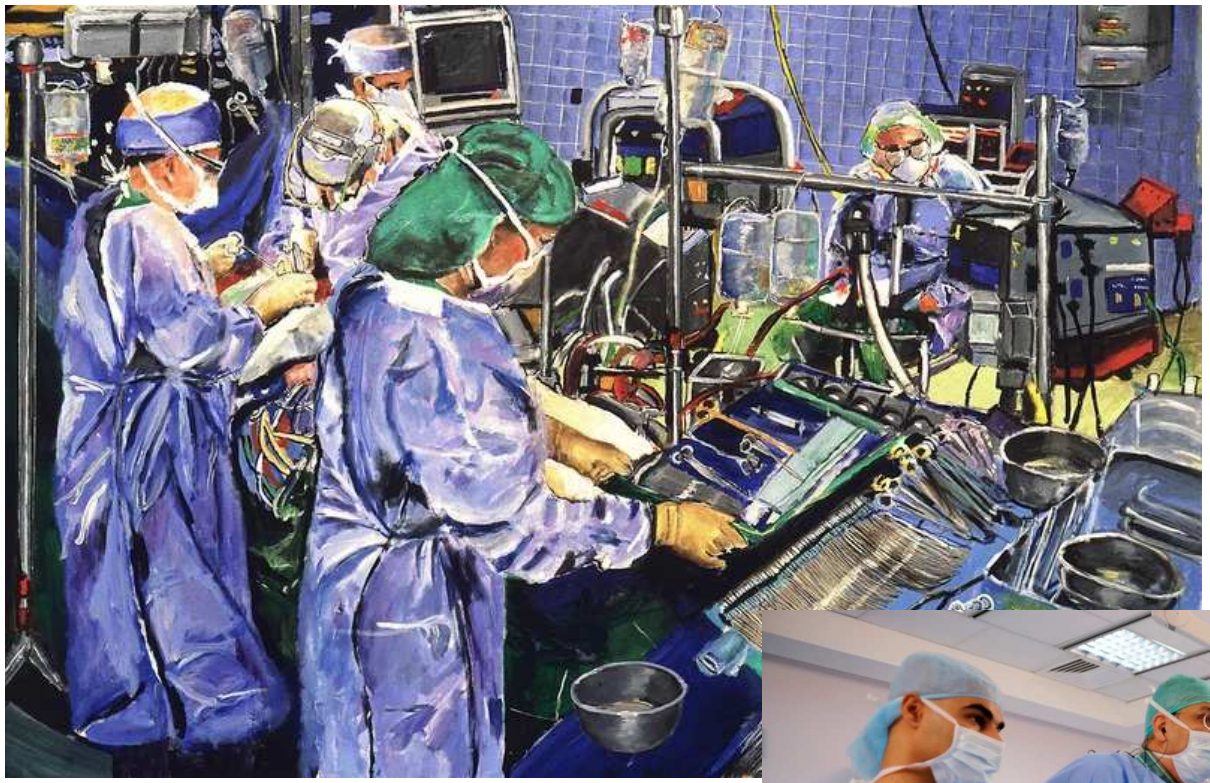
The New England
Journal of Medicine

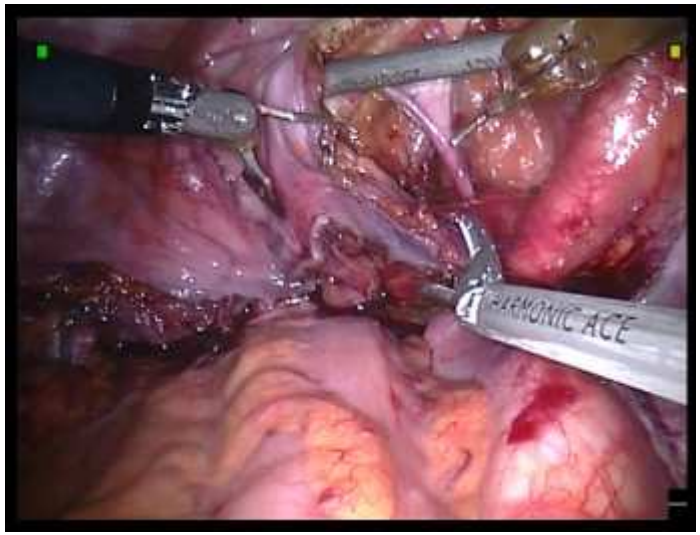
VOLUME 340 FEBRUARY 11, 1999 NUMBER 6

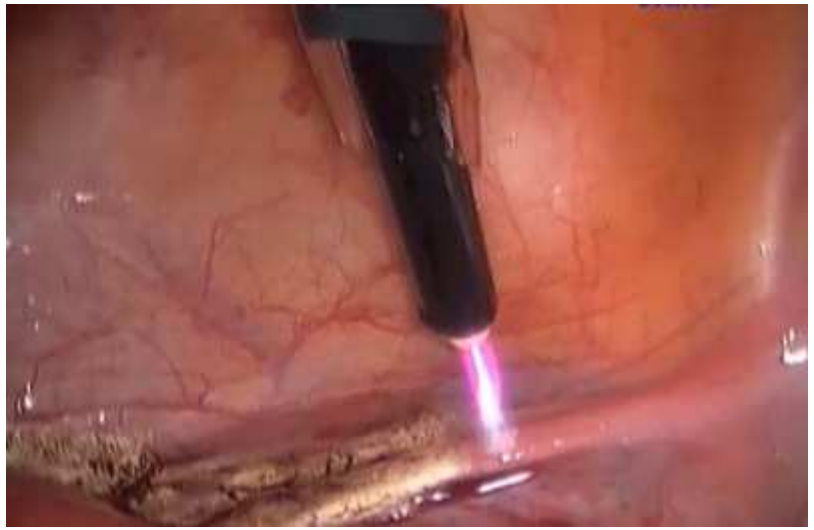
A MULTICENTER, RANDOMIZED, CONTROLLED CLINICAL TRIAL OF TRANSFUSION REQUIREMENTS IN CRITICAL CARE

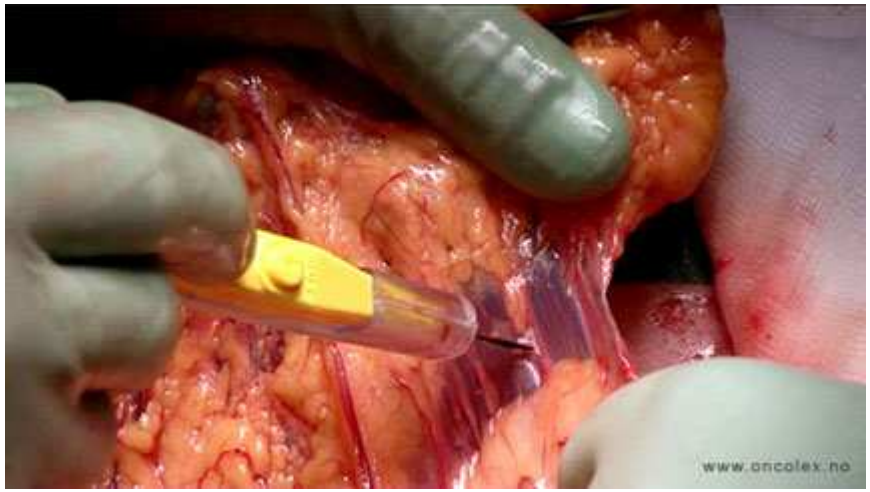
PAUL C. HÉBERT, M.D., GEORGE WELLS, PH.D., MORRIS A. BLAJCHMAN, M.D., JOHN MARSHALL, M.D., CLAUDIO MARTIN, M.D., GIUSEPPE PAGLIARELLO, M.D., MARTIN TWEEDDALE, M.D., PH.D., IRWIN SCHWEITZER, M.SC., ELIZABETH YETISIR, M.SC., AND THE TRANSFUSION REQUIREMENTS IN CRITICAL CARE INVESTIGATORS FOR THE CANADIAN CRITICAL CARE TRIALS GROUP*

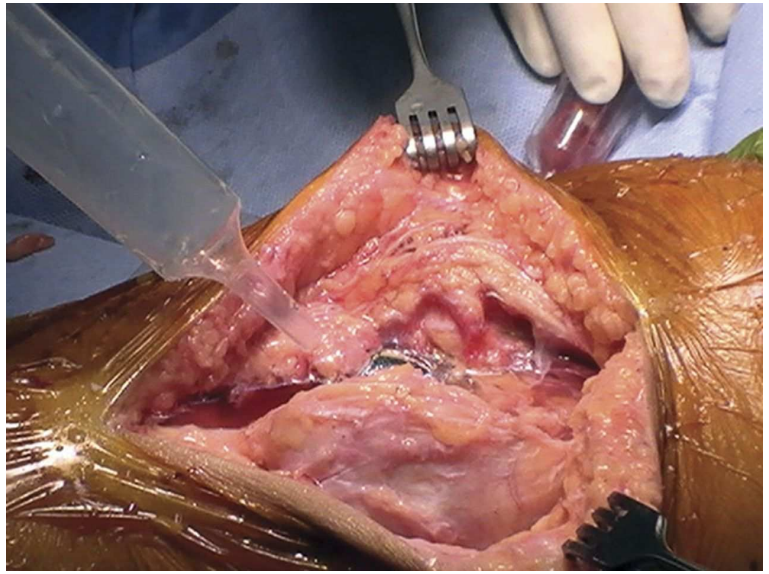
On the basis of our results, we recommend that critically ill patients receive red-cell transfusions when their hemoglobin concentrations fall below 7.0 g per deciliter and that hemoglobin concentrations should be maintained between 7.0 and 9.0 g per deciliter. The diversity of the patients enrolled in this trial and the consistency of the results suggest that our conclusions may be generalized to most critically ill patients, with the possible exception of patients with active coronary ischemic syndromes.

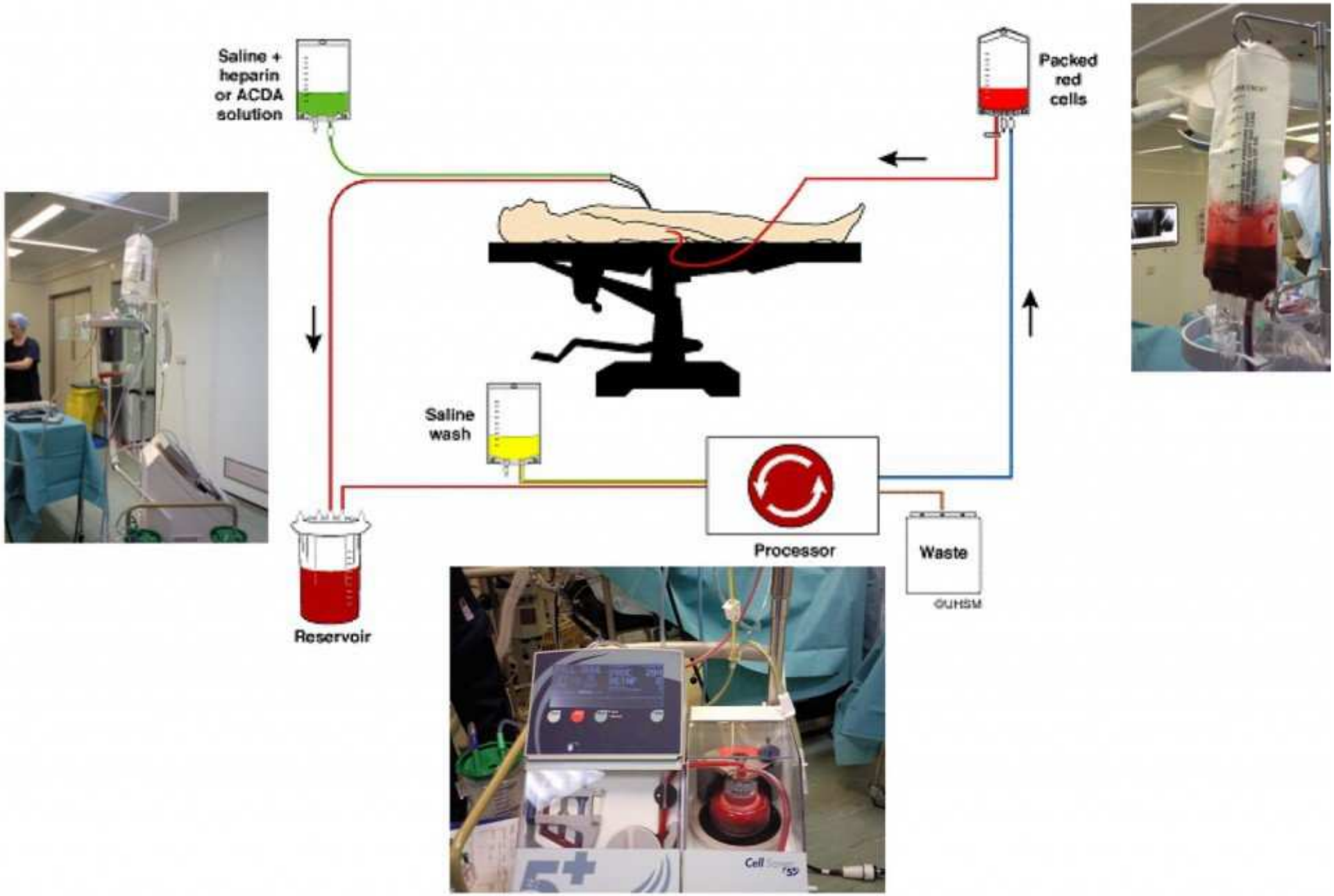



HARMONIC ACE




www.oncolex.no



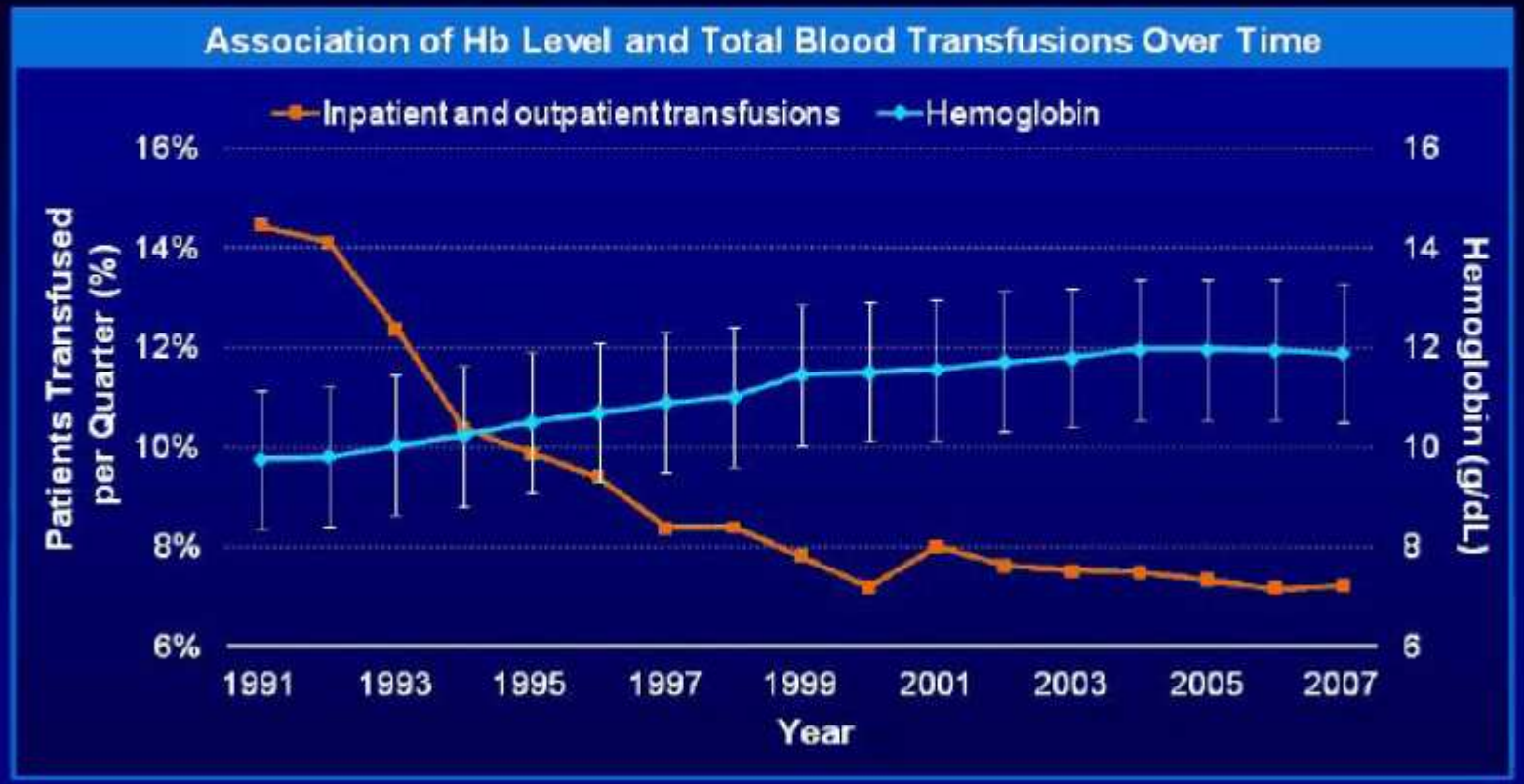

Saline + heparin or ACDA solution
Packed red cells
Saline wash
Processor
Waste
Reservoir

Causes of change in red cell use

- TRICC trial: Changes in transfusion triggers
- Introduction of transfusion practitioners
- 'Better Blood Transfusion' initiative
- Increasing cost of blood
- (Reduction in cardiac surgery)
- (Improvement in surgical techniques)
- (Cell salvage)

Jonathan Wallis, Haematologist , Newcastle upon Tyne

Time Trend of Transfusions Rates and ESA Use in Hemodialysis Patients



US Renal Data System 2009 Annual Report

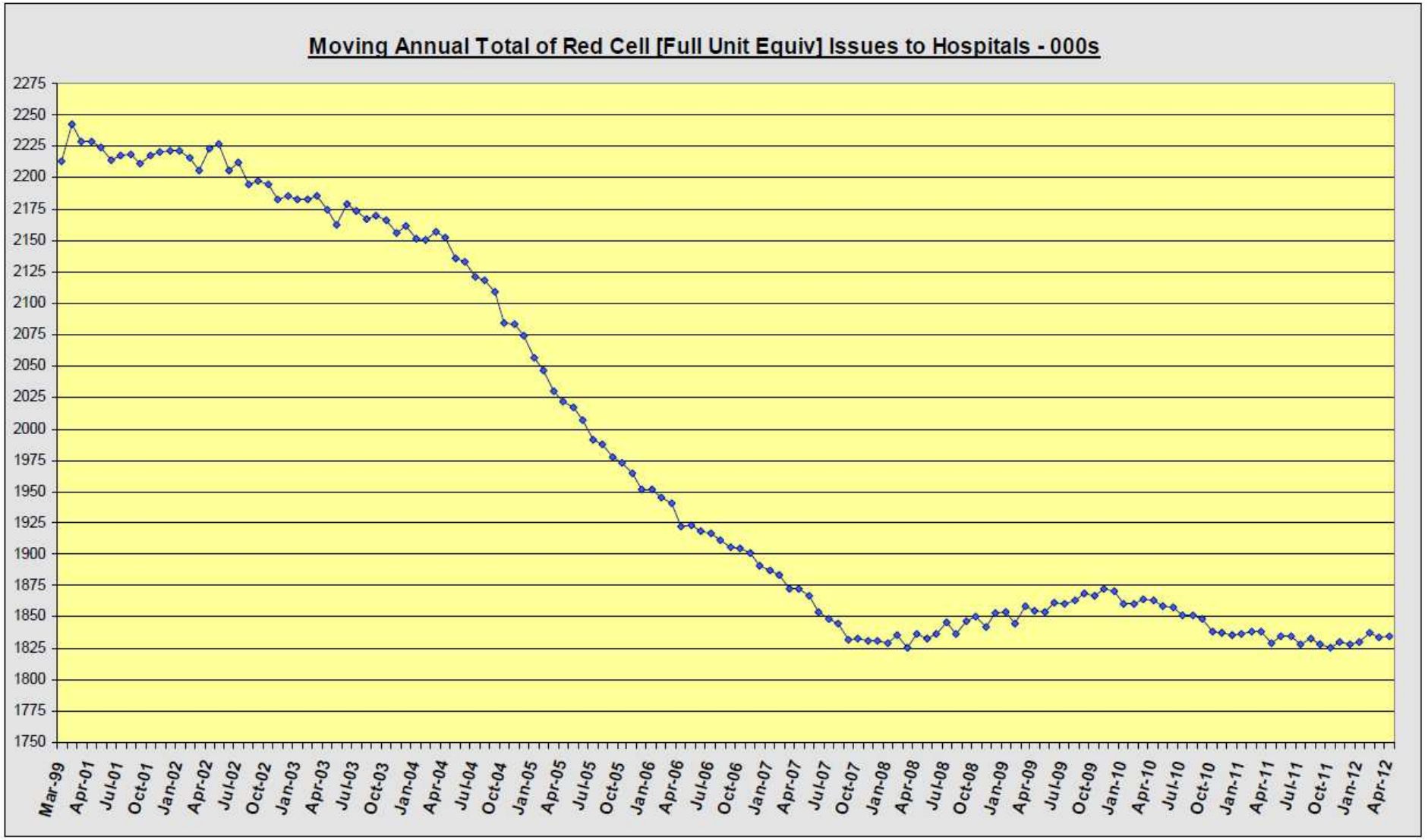


Figure 1: Red cell issues to hospitals 1999-2012 (NHSBT data)

"Build on the success of previous better blood transfusion initiatives to further promote appropriate use of all blood components."

NHS
Blood and Transplant

Patient Blood Management

Optimising the care of patients who may need transfusion

What is Patient Blood Management (PBM)?

PBM is an evidence-based, multi-disciplinary approach to optimising the care of patients who may need a blood transfusion.

PBM puts the patient at the heart of decision making.

PBM represents an international initiative in best practice for transfusion medicine.

Why is PBM needed?

Improve patient outcomes.

Reduce healthcare costs.

Avoid inappropriate use of blood – blood is then available for those who really need it.

National clinical audits consistently show inappropriate use of all blood components of between 15-30%

Who needs to be involved?

- Everyone involved in patient care
- Patients
- Clinicians from both primary and secondary care
- Laboratory staff

PTO

NHS
Blood and Transplant

Establishing a PBM Programme

Include:

1. Patient and staff education
2. Active management of anaemia
3. Minimise the volume of blood samples taken
4. Use restrictive threshold values
5. In non-bleeding patients transfuse one dose of blood component, then reassess
6. Active management of abnormal haemostasis
7. Use alternatives to transfusion where appropriate
8. Surgical Patients
   a. Detect and treat pre-operative anaemia
   b. Minimise blood loss and bleeding
   c. Be aware of drug interactions that can increase risk of anaemia

Remember to investigate and treat anaemia promptly!

For further information and to **get involved** with PBM in your hospital, contact your local Transfusion Practitioner or call 01865 381 032 for local PBM network details.

Further information and details on PBM initiatives and strategies can be found at
www.transfusionguidelines.org.uk
http://hospital.blood.co.uk/

Follow us @PBM_NHS

PATIENT BLOOD MANAGEMENT

BLC708P 1415039

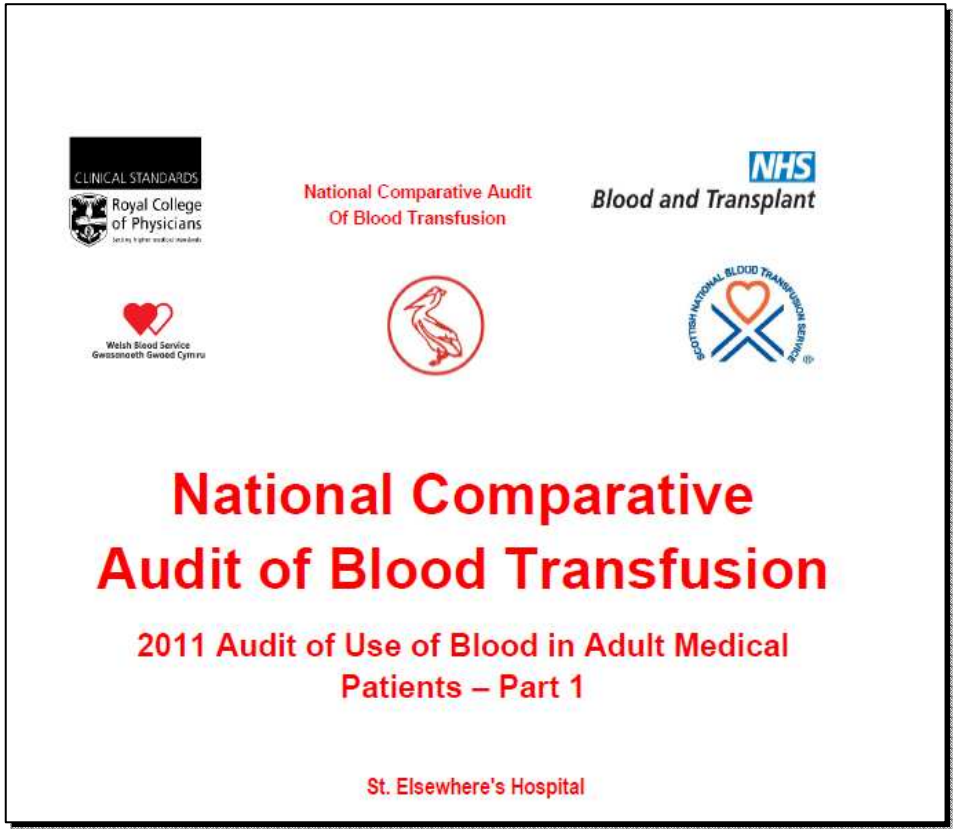


Table 1: Falling use of red cells in surgical patients in NE England[2]

Year of audit	Percentage of red cells transfused to medical patients	Percentage of red cells transfused to surgical patients
2000	52%	41%
2004	62%	33%
2008	64%	29%

Appropriate red cell use in medical patients with anaemia

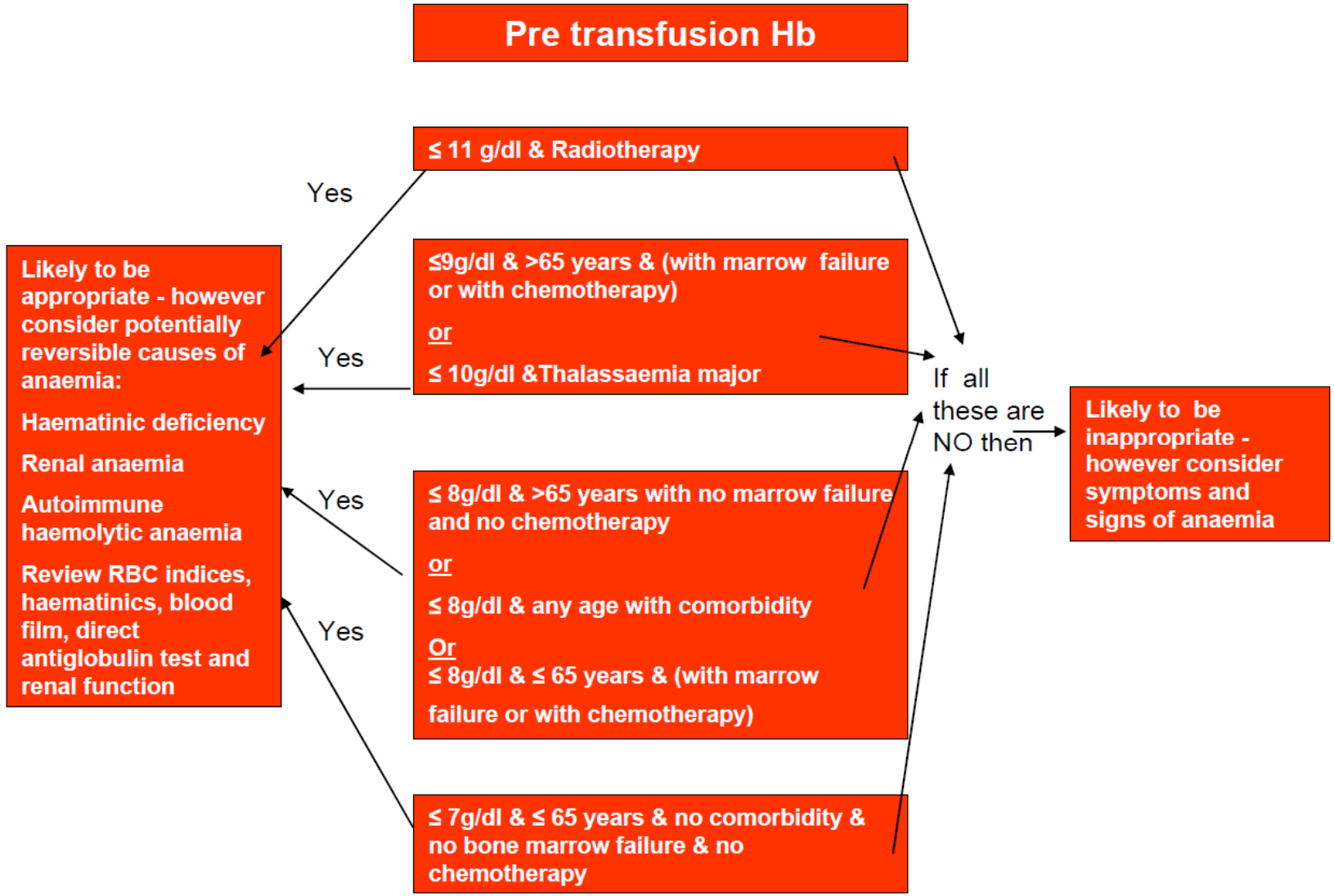


Table 3 - Reason for red cell use

	National (9126)	
	%	N
Anaemia	78	7128
Blood loss	19	1773
Prophylactic prior to procedure	2	189*
Not known	0.4	36

*Surgery (95), endoscopy without biopsy (36), endoscopy with biopsy (17), liver biopsy (3), ECRP without sphincterotomy (2), ECRP with sphincterotomy (1), others (32), not known 3.

Figure 11

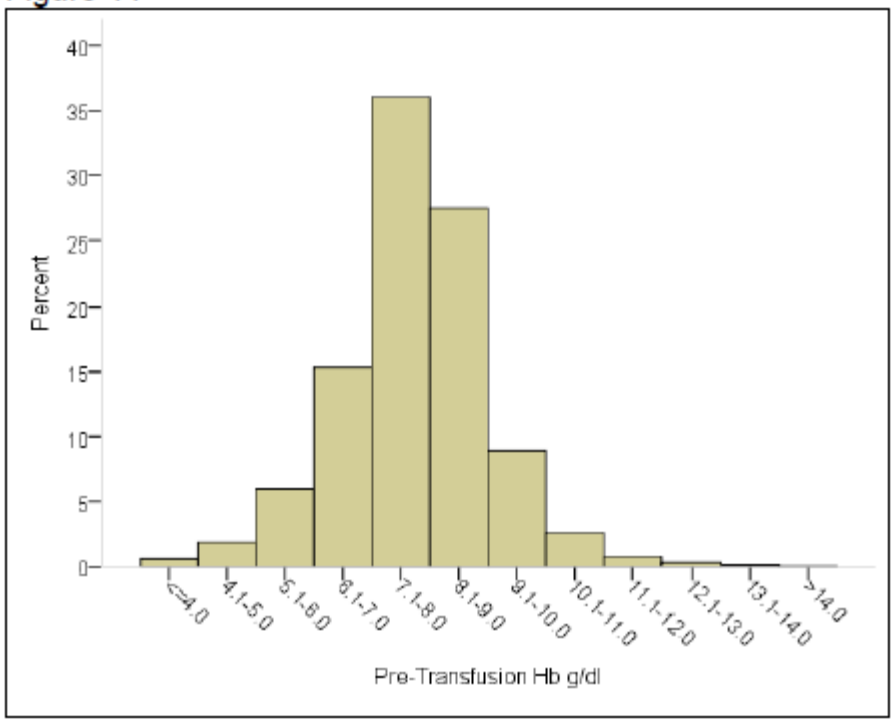


Table 14 - Pre-transfusion haemoglobin (Hb)

	National (9126)	
	%	N
With pre-Hb	99.2	9051
≤4.0	0.6	53
4.1-5.0	2	170
5.1-6.0	6	541
6.1-7.0	15	1389
7.1-8.0	36	3261
8.1-9.0	28	2488
9.1-10.0	9	806
10.1-11.0	3	232
11.1-12.0	0.8	68
12.0-13.0	0.3	26
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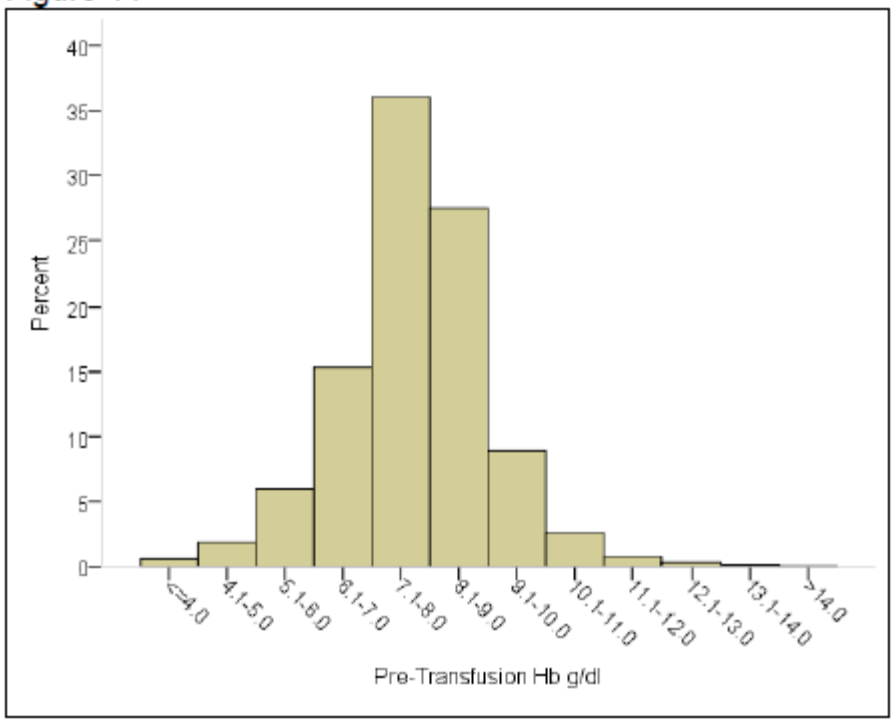

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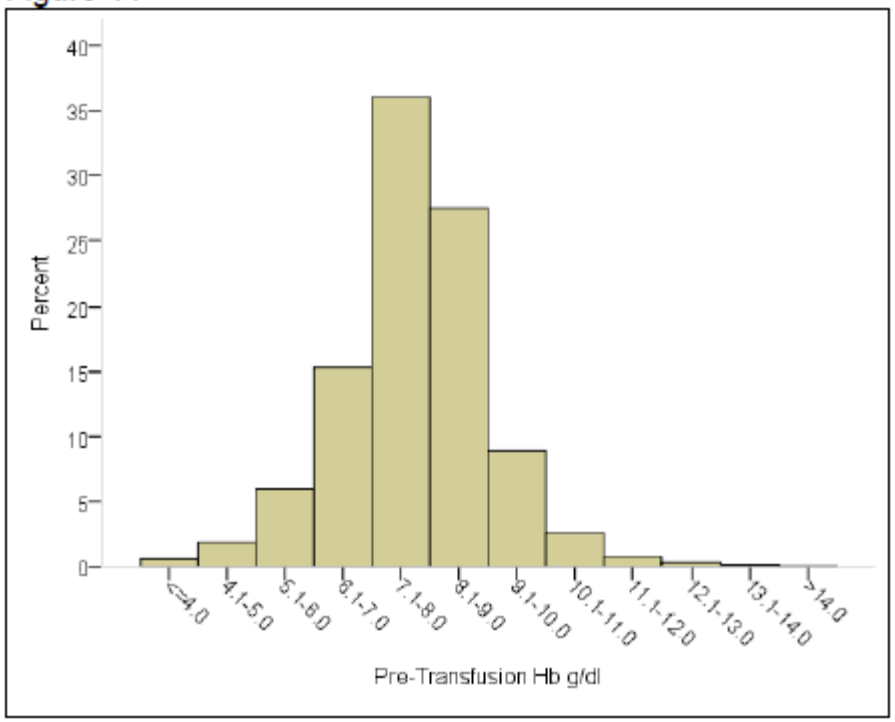

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≤ 7g/dl & ≤ 65 years & no comorbidity & no bone marrow failure & no chemotherapy

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≤ 11 g/dl & Radiotherapy

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≤9g/dl & >65 years & (with marrow failure or with chemotherapy)

or

≤ 10g/dl &Thalassaemia major

≤ 8g/dl & >65 years with no marrow failure and no chemotherapy

or

≤ 8g/dl & any age with comorbidity

Or

≤ 8g/dl & ≤ 65 years & (with marrow failure or with chemotherapy)

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≤ 8g/dl & ≤ 65 years & (with marrow failure or with chemotherapy)

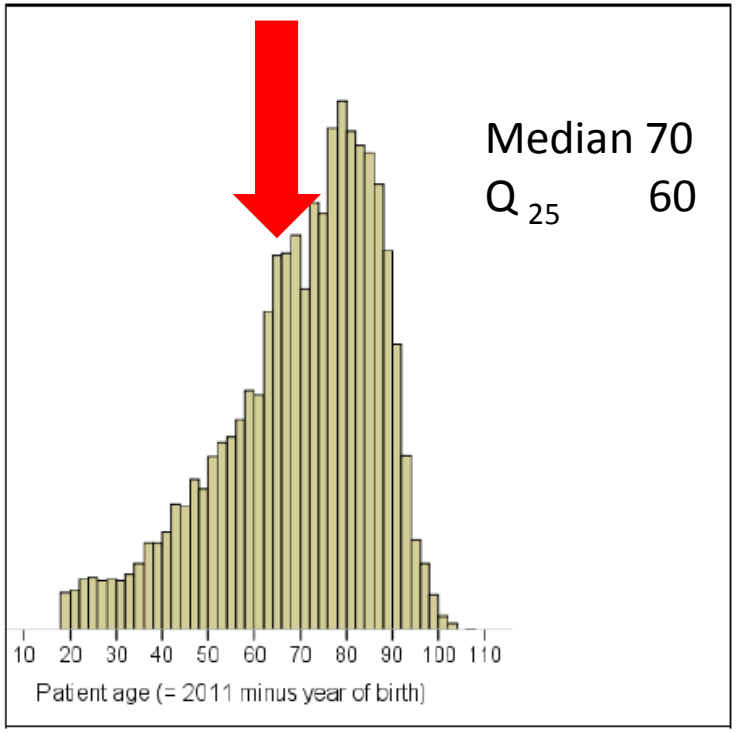
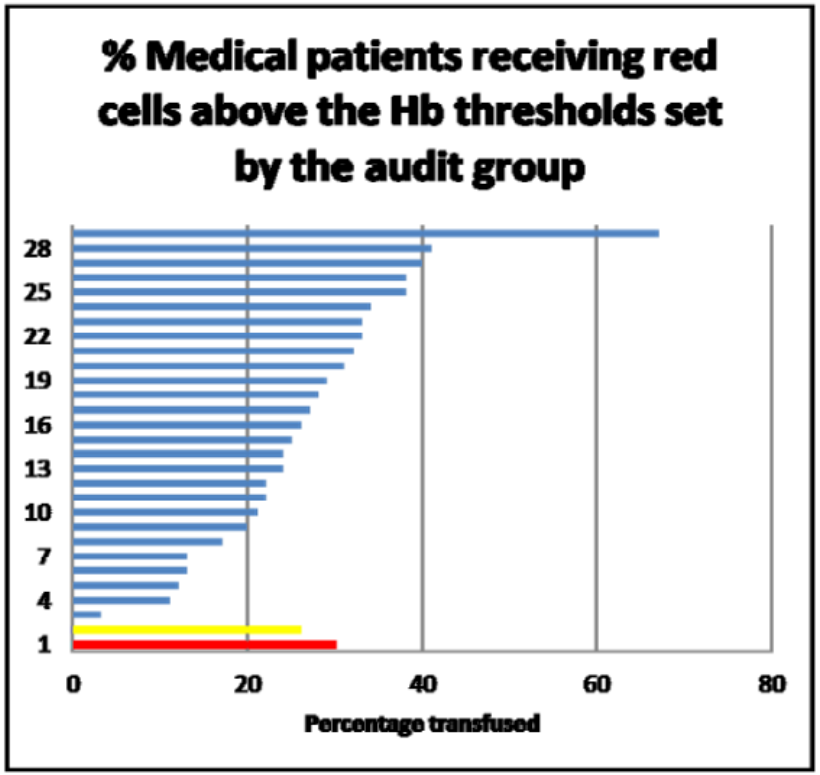
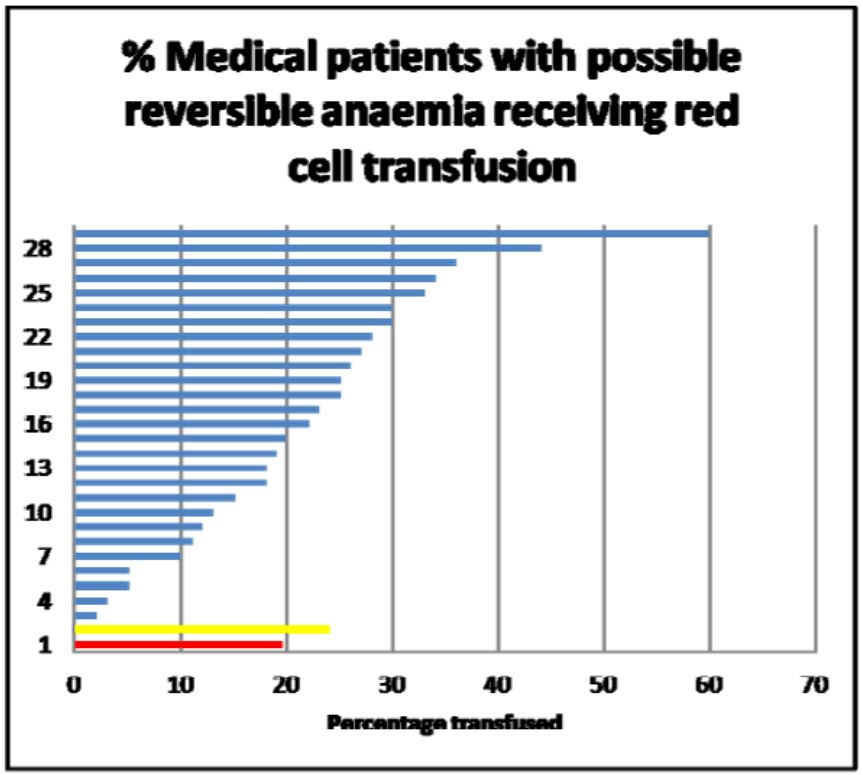


Table 14 - Pre-transfusion haemoglobin (Hb)

	National (9126)	
	%	N
With pre-Hb	99.2	9051
≤4.0	0.6	53
4.1-5.0	2	170
5.1-6.0	6	541
6.1-7.0	15	1389
7.1-8.0	36	3261
8.1-9.0	28	2488
9.1-10.0	9	806
10.1-11.0	3	232
11.1-12.0	0.8	68
12.0-13.0	0.3	26
13.1-14.0	0.1	12
>14.0	0.1	5





National Comparative Audit of Use of Blood in Medical Patients 2011

- North West Regional Results

NHS
Blood and Transplant

SINGLE Unit Blood Transfusions reduce the risk of an adverse reaction

Don't give two without review

Before you transfuse your patient:

- What is your patient's current haemoglobin level?
- What is your patient's target haemoglobin level and would this be achieved by transfusing one unit?

Each unit transfused is an independent clinical decision

Clinically re-assess your patient after each unit is transfused.

✓ Is your patient still symptomatic?

✓ Is further transfusion appropriate?

Only order one unit at a time for non-bleeding patients.

Document the reason for the transfusion.[1]

Further copies are available from NHSBT.CustomerService@nhsbt.nhs.uk

1. *British Committee for Standards in Haematology: Addendum to the Guideline on the Administration of Blood Components. 2012*

Guidance for the use of Blood Components

This guidance is based on the NBTC Indication Codes for Transfusion (April 2013).

Red Cell Concentrates

Dose - For a single transfusion episode in adult patients with a potentially reversible cause of anaemia e.g. after surgery, consider transfusing one unit only with a further Hb estimation before further units are given. Neonates and small children require doses calculated in ml of blood and require separate consideration.

- **R1 Acute blood loss** in an emergency. Hb unreliable, resuscitation by experienced clinician, transfuse if blood loss >30%. When normovolaemic use Hb thresholds below.

Surgery/medical/critical care

- **R2** Use Hb of <70g/l as a guide for red cell transfusion.
- **R3** Cardiovascular disease – consider transfusion at Hb <80g/L or for symptoms e.g. chest pain; hypotension or tachycardia unresponsive to fluid resuscitation; or cardiac failure.
- **R4** Severe sepsis, traumatic brain injury and/or acute cerebral ischaemia – use Hb <90g/L to guide transfusion.
- **R5 Radiotherapy** Limited evidence for maintaining Hb >100g/L.
- **R6 Chronic anaemia** Maintain Hb to prevent symptoms of anaemia. Hb >80g/L appropriate for many patients.
- **R7 Exchange transfusion.**

Fresh Frozen Plasma (FFP) - (15mL/kg)

- **F1 Coagulation factor deficiency** where factor concentrate unavailable.
- **F2 Reversal of warfarin** only if critical bleeding and Prothrombin complex concentrate (the treatment of choice) is not available.
- **F3 Disseminated intravascular coagulation (DIC)** if bleeding and abnormal coagulation.
- **F4 Thrombotic thrombocytopenic purpura.**
- **F5 Major haemorrhage** if emergency uncontrolled bleeding, early infusion of FFP recommended. Subsequent use to maintain PT/APTT ratio <1.5 and fibrinogen >1.5g/L (see also **C4**).
- **F6 Liver disease** (non-bleeding): no evidence of benefit for FFP, regardless of PT ratio.

Platelet concentrate (1 unit = 1 adult therapeutic dose or ATD)

Bone marrow failure (BMF)

- **P1 Prophylactic use if reversible BMF** and count <10 x 10^9/L. Not indicated in chronic stable BMF.
- **P2 Prophylactic use if BMF with additional risk factors** for bleeding e.g. sepsis if count <20 x 10^9/L.
- **P3 Invasive procedure** keep count >50 x 10^9/L, >80 x 10^9/L if epidural, >100 x 10^9/L if Central Nervous System (CNS) or eye surgery. Transfusion prior to bone marrow biopsy is not usually required.

Critical care

- **P4 Massive transfusion** aim for count of >75 x 10^9/L, >100 x 10^9/L if multiple, CNS or eye trauma.
- **P5 Acquired platelet dysfunction** e.g. use of potent anti-platelet agents such as clopidogrel, with non surgically correctable bleeding.
- **P6 Acute DIC and bleeding** with severe thrombocytopaenia.
- **P7 Inherited platelet dysfunction** with bleeding or pre-surgery.

Immune thrombocytopenia

- **P8 Immune thrombocytopenia** as emergency pre-surgery or with haemorrhage. Aim for count >80 x 10^9/L pre-major surgery and >70 x 10^9/L for obstetric regional axial anaesthesia.
- **P9 Post-transfusion purpura** if major haemorrhage.
- **P10 Neonatal alloimmune thrombocytopenia** maintain count >30 x 10^9/L.

Cryoprecipitate. Use with FFP unless isolated fibrinogen deficiency (2 pooled units for an adult)

- **C1 DIC and bleeding** when fibrinogen <1g/L.
- **C2 Liver disease** with bleeding or pre-surgery when fibrinogen <1g/L.
- **C3 Bleeding with thrombolytic therapy** causing hypofibrinogenaemia.
- **C4 Massive transfusion** maintain fibrinogen >1.5g/L.
- **C5 Renal or liver failure** with abnormal bleeding when DDAVP not appropriate.
- **C6 Inherited hypofibrinogenaemia** when concentrate not available.

Further information on blood transfusion will be available on hospital intranet sites or from the blood transfusion laboratory.

Reference:
National Blood Transfusion Committee Indication Codes – An Audit Tool (April 2013)
http://hospital.blood.co.uk/patient-services/patient-blood-management/general-resources/

BLC711.1 1516455
Version 2 – October 2015

SICKLE CELL AWARENESS

information for hospitals, doctors and nurses

Always let Transfusion Labs know

that the patient has SCD as they have additional special requirements for blood (eg: blood that is negative for certain antigens, HbS negative etc).

Always use the correct patient ID

including their full name, date of birth AND hospital number / NHS number, so that we ensure that the right patient gets the right blood

The development of antibodies may jeopardise their future transfusion programme.

SCD patients are particularly prone to

developing red cell antibodies,

with the risk of delayed haemolytic transfusion reactions (renal failure & jaundice), with in some cases, difficulty in sourcing compatible blood.

Matching of blood for full Rh (C, c, D, E, e) and K,

reduces the risk of forming these antibodies. Labs can only match if they are informed that the patient has SCD.

If possible,

find out which hospital normally undertakes their care

for SCD and let the Transfusion Lab know (eg: state on Transfusion request form).

Indications for transfusion in SCD patients are increasing

so giving the right matched blood is important, particularly if the patient is not known to the current hospital.

SICKLE CELL AWARENESS

some improvements in blood provision

Proactive genotyping enables

better selection of blood in emergencies,

when patients have auto-antibodies or a positive DAT which could mask underlying alloantibodies. By matching blood for antigens which patients lack, the risk of haemolysis would be reduced.

Identification of patients with Rh variants

+/- corresponding allo-antibodies, and whether clinically significant haemolysis has occurred, could enable better matched blood provision for patients, or if unavailable, then advice on IVIg cover for transfusion may reduce haemolysis.

Genotyping can be done even when patients have been

recently transfused

(whereas phenotyping cannot).

ADVANTAGES FOR PATIENTS AND THE BLOOD SERVICE

NHS Blood and Transplant (NHSBT) launched a project this year, to

red cell genotype all patients with Sickle Cell Disease, by June 2016.

Red cell genotyping at the International Blood Group Reference Laboratory (IBGRL), Bristol covers Rh variants as well as genes for the usual antigens covered by extended phenotyping (Full Rh, Kell, Fy, Jk, MNSs).

Patients with Rh variants (usually SCD patients) can be clinically assessed proactively to establish whether they have corresponding allo-antibodies +/- haemolysis following transfusion with unmatched blood, and a plan for

the most appropriate blood for transfusion

in future can be made with reference to the relevant expertise & literature, before the need arises.

Proactive genotyping of all SCD patients will enable NHSBT to better

predict the demand

for blood, particularly for "rare" blood due to patients having multiple antibodies or antibodies to high frequency antigens (eg: anti-U).
NHSBT could better plan to meet patient needs through defined plans for extended genotyping or phenotyping of more donors for "rare" blood and recruitment of relevant donors to address unmet demand.

SaBTO

Advisory Committee on the Safety of Blood, Tissues and Organs

PATIENT CONSENT FOR BLOOD TRANSFUSION

OCTOBER 2011

NHS
Blood and Transplant

Will I need a blood transfusion?

Patient information

NHS
Blood and Transplant

Information for patients who have received an unexpected blood transfusion

Note: This leaflet should be read alongside the NHS Blood and Transplant patient information leaflet **'Will I need a blood transfusion?'**

While you were in hospital, it was necessary for you to receive a blood transfusion. There are many reasons why patients may need a transfusion, some of which are discussed in the 'Will I need a blood transfusion?' leaflet. However do please ask a member of your healthcare team about why you needed a blood transfusion. They will be able to answer any questions you may have.

Are blood transfusions safe?

Yes, the risk that a blood transfusion may make you ill is very low. More information about any potential infection risks, and all the measures that are taken to ensure your safety, is included in the leaflet 'Will I need a blood transfusion?'.

I'm a blood donor. Can I still donate?

As a precautionary measure to reduce the risk of transmitting variant Creutzfeldt-Jakob Disease (vCJD), people who have received a blood transfusion since 1980 are not currently able to donate blood.

Do I need to tell my doctor?

The hospital should include information in the discharge letter to your GP to tell them that you have had a blood transfusion, and to explain why it was carried out. The hospital should give you a copy of this letter; if they don't, you can ask the hospital for a copy.

Promotion of audit findings

NHS Blood and Transplant

National comparative audit of platelet transfusions 2010

Key Findings of the audit with regard to the inappropriate use of platelet transfusions

1. The audit found 28% (915/3296) inappropriate use of platelet transfusions using algorithms for defining appropriateness based on the most recent BCSH guidelines for platelet transfusions. Inappropriate transfusions were mostly because of prophylactic platelet transfusions above the recommended thresholds and the use of platelet transfusions for procedures such as bone marrow aspirate/trephine which can be safely conducted without platelet cover.[1]

2. The majority, 69% (2283/3296) of the platelet transfusions, were prophylactic and 34% (782/2283) of these were considered to be inappropriate, mostly 26% (602/2283) because of transfusion above the recommended platelet count threshold but also 8% (180/2283) were administered as prophylactic transfusions to patients with myelodysplastic syndrome (MDS) who did not have additional risk factors for bleeding. An additional 6% (126/2283) were indeterminate because no recent platelet count had been performed and possibly inappropriate.

3. 10% (220/2277) of prophylactic platelet transfusions were double-dose transfusions (in 6 cases the dose was not reported). The majority, 73% (161/220) of double-dose transfusions, were administered to inpatients. A recent large randomised controlled trial has shown no difference in the number of patients who had significant bleeding (WHO grade 2 or above) when they received single or double-dose platelet transfusions.[2]

4. Pre-invasive procedure platelet transfusions accounted for 15% (497/3296) of all transfusions and 23% (114/497) were inappropriate. The major reasons for inappropriateness were transfusions before bone marrows in 9% (45/497) (it is explicitly stated in the BCSH guidelines[1] that this usage is unnecessary) and use of too high a threshold in 14% (69/497).

5. Therapeutic transfusions accounted for 13% (412/3296) of all transfusions and fewer than 5% (19/412) were considered inappropriate.

6. The survey showed that the routine use of platelet transfusions in patients with long term bone marrow failure (e.g. MDS) (36% (43/119) sites surveyed) and prior to bone marrow trephines (23% (27/119) sites) reflected local guidelines that differed from those issued by BCSH.[1]

Recommendations of the audit with regard to the use prophylactic platelet transfusions

1. **Local guidelines should be based on existing BCSH guidelines, and fully implemented to avoid the inappropriate use of prophylactic platelet transfusions and those given before invasive procedures.** In particular, they should specify that a platelet transfusion is **not** required routinely: –
   - Prior to bone marrow aspiration and biopsy
   - As routine prophylaxis in stable patients with long term bone marrow failure

2. **Double-dose prophylactic platelet transfusions should not be used routinely.**

Platelets

Don't use two...

...when one will do

For prophylactic use in a 70kg adult, one adult therapeutic dose (ATD) typically gives an immediate rise in platelet count of

approximately 20 - 40 x 10^9/l (1)

Do not administer double dose platelets for prophylactic transfusions as this practice does not decrease the risk of bleeding (2)

Request and administer one unit/ATD, then reassess your patient.

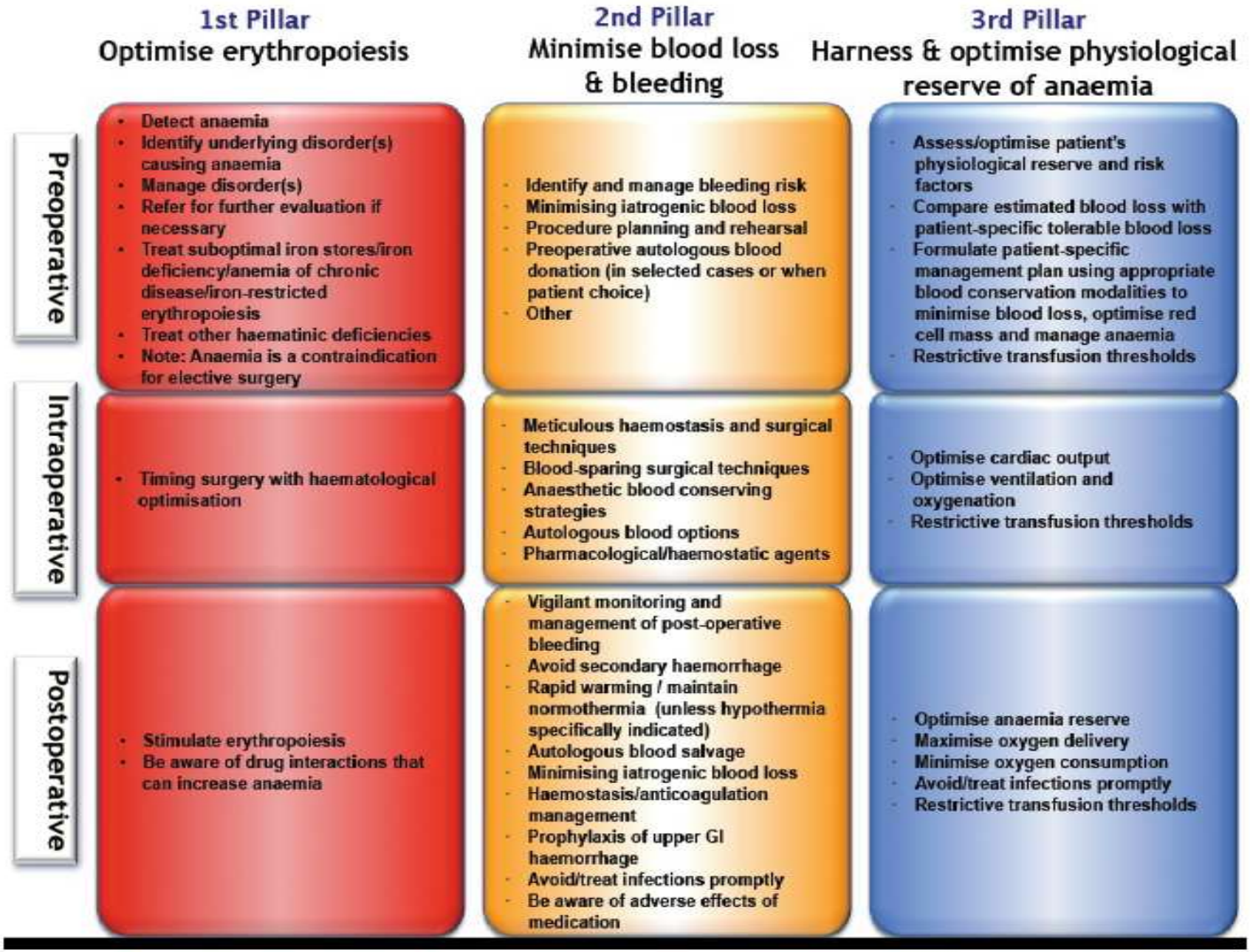
A platelet increment can be obtained 10 minutes after completion of the transfusion (3)

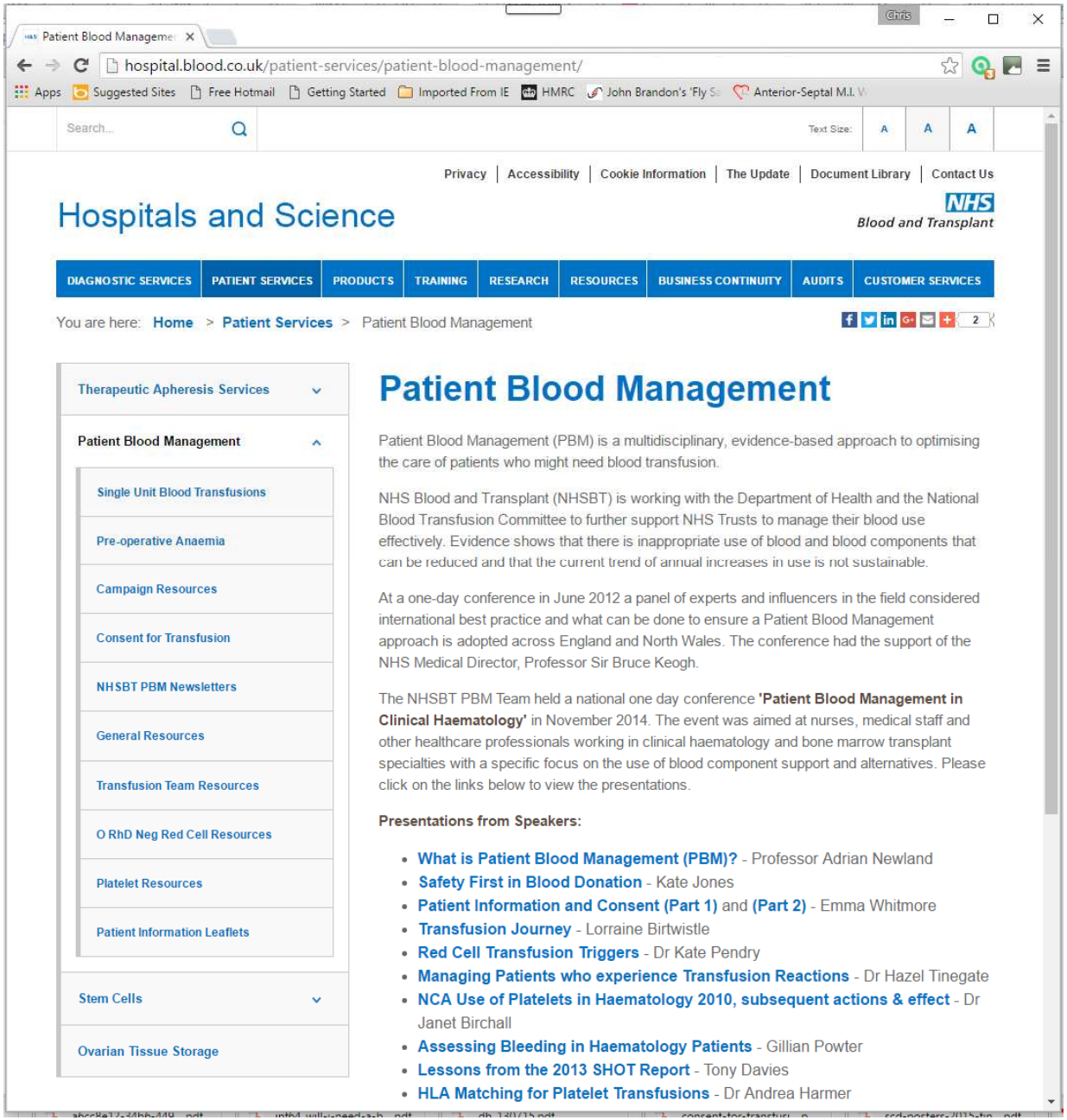
1. McClelland DBL (Ed) (2006) Handbook of Transfusion Medicine 4th Edition, The Stationery Office
2. Slichter SJ, Kaufman RM, Assmann SF, et al. Dose of prophylactic platelet transfusions and prevention of hemorrhage. N Engl J Med 2010;362:600-13.
3. O'Connell B, Lee EJ, Schiffer CA. The value of 10-minute post transfusion platelet counts. Transfusion 1988; 28: 66-67.

Further copies available from NHSBT.CustomerService@nhsbt.nhs.uk December 2011 V.1

1112 498

BETTER BLOOD TRANSFUSION TEAM


1st Pillar
Optimise erythropoiesis
2nd Pillar
Minimise blood loss & bleeding
3rd Pillar
Harness & optimise physiological reserve of anaemia
Preoperative
Detect anaemia
Identify underlying disorder(s) causing anaemia
Manage disorder(s)
Refer for further evaluation if necessary
Treat suboptimal iron stores/iron deficiency/anemia of chronic disease/iron-restricted erythropoiesis
Treat other haematinic deficiencies
Note: Anaemia is a contraindication for elective surgery
Identify and manage bleeding risk
Minimising iatrogenic blood loss
Procedure planning and rehearsal
Preoperative autologous blood donation (in selected cases or when patient choice)
Other
Assess/optimise patient's physiological reserve and risk factors
Compare estimated blood loss with patient-specific tolerable blood loss
Formulate patient-specific management plan using appropriate blood conservation modalities to minimise blood loss, optimise red cell mass and manage anaemia
Restrictive transfusion thresholds
Intraoperative
Timing surgery with haematological optimisation
Meticulous haemostasis and surgical techniques
Blood-sparing surgical techniques
Anaesthetic blood conserving strategies
Autologous blood options
Pharmacological/haemostatic agents
Optimise cardiac output
Optimise ventilation and oxygenation
Restrictive transfusion thresholds
Postoperative
Stimulate erythropoiesis
Be aware of drug interactions that can increase anaemia
Vigilant monitoring and management of post-operative bleeding
Avoid secondary haemorrhage
Rapid warming / maintain normothermia (unless hypothermia specifically indicated)
Autologous blood salvage
Minimising iatrogenic blood loss
Haemostasis/anticoagulation management
Prophylaxis of upper GI haemorrhage
Avoid/treat infections promptly
Be aware of adverse effects of medication
Optimise anaemia reserve
Maximise oxygen delivery
Minimise oxygen consumption
Avoid/treat infections promptly
Restrictive transfusion thresholds


Patient Blood Management
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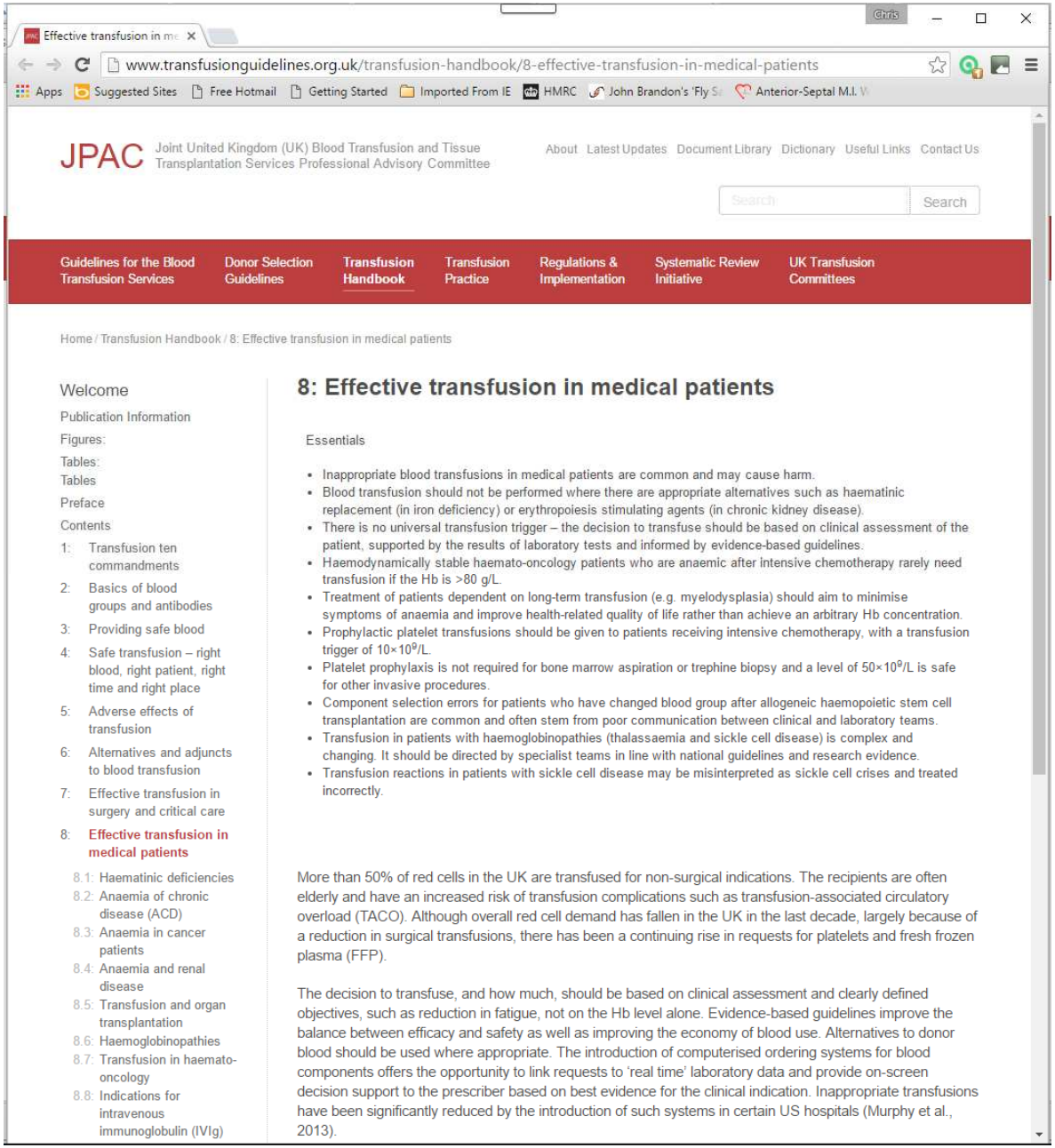
Consent for Transfusion
NHSBT PBM Newsletters
General Resources
Transfusion Team Resources
O RhD Neg Red Cell Resources
Platelet Resources
Patient Information Leaflets
Stem Cells
Ovarian Tissue Storage
Patient Blood Management
Patient Blood Management (PBM) is a multidisciplinary, evidence-based approach to optimising the care of patients who might need blood transfusion.
NHS Blood and Transplant (NHSBT) is working with the Department of Health and the National Blood Transfusion Committee to further support NHS Trusts to manage their blood use effectively. Evidence shows that there is inappropriate use of blood and blood components that can be reduced and that the current trend of annual increases in use is not sustainable.
At a one-day conference in June 2012 a panel of experts and influencers in the field considered international best practice and what can be done to ensure a Patient Blood Management approach is adopted across England and North Wales. The conference had the support of the NHS Medical Director, Professor Sir Bruce Keogh.
The NHSBT PBM Team held a national one day conference 'Patient Blood Management in Clinical Haematology' in November 2014. The event was aimed at nurses, medical staff and other healthcare professionals working in clinical haematology and bone marrow transplant specialties with a specific focus on the use of blood component support and alternatives. Please click on the links below to view the presentations.
Presentations from Speakers:
What is Patient Blood Management (PBM)? - Professor Adrian Newland
Safety First in Blood Donation - Kate Jones
Patient Information and Consent (Part 1) and (Part 2) - Emma Whitmore
Transfusion Journey - Lorraine Birtwistle
Red Cell Transfusion Triggers - Dr Kate Pendry
Managing Patients who experience Transfusion Reactions - Dr Hazel Tinegate
NCA Use of Platelets in Haematology 2010, subsequent actions & effect - Dr Janet Birchall
Assessing Bleeding in Haematology Patients - Gillian Powter
Lessons from the 2013 SHOT Report - Tony Davies
HLA Matching for Platelet Transfusions - Dr Andrea Harmer


Effective transfusion in me
www.transfusionguidelines.org.uk/transfusion-handbook/8-effective-transfusion-in-medical-patients
Apps
Suggested Sites
Free Hotmail
Getting Started
Imported From IE
HMRC
JPAC
Joint United Kingdom (UK) Blood Transfusion and Tissue Transplantation Services Professional Advisory Committee
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Donor Selection Guidelines
Transfusion Handbook
Transfusion Practice
Regulations & Implementation
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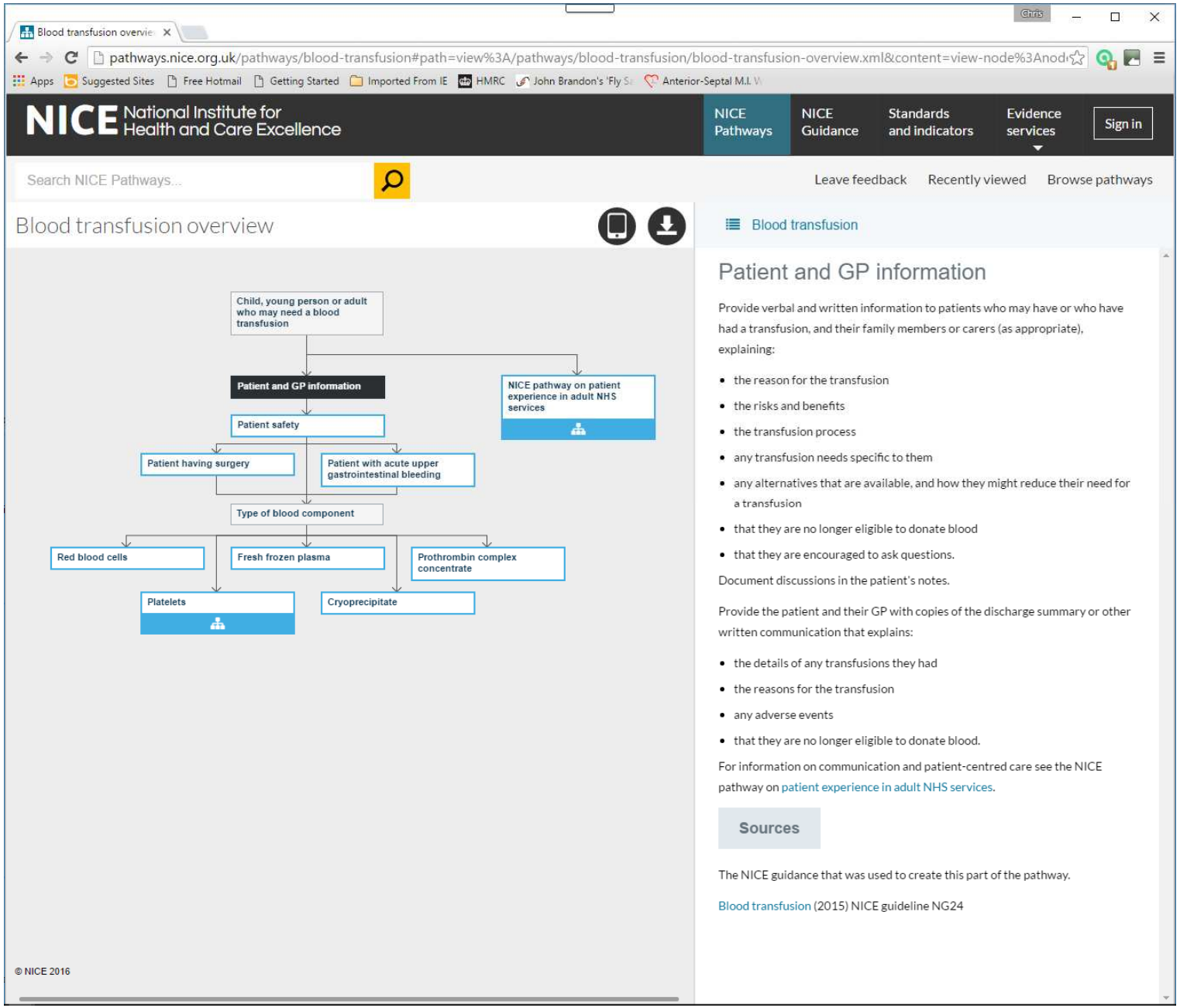
2: Basics of blood groups and antibodies
3: Providing safe blood
4: Safe transfusion – right blood, right patient, right time and right place
5: Adverse effects of transfusion
6: Alternatives and adjuncts to blood transfusion
7: Effective transfusion in surgery and critical care
8: Effective transfusion in medical patients
8.1: Haematinic deficiencies
8.2: Anaemia of chronic disease (ACD)
8.3: Anaemia in cancer patients
8.4: Anaemia and renal disease
8.5: Transfusion and organ transplantation
8.6: Haemoglobinopathies
8.7: Transfusion in haemato-oncology
8.8: Indications for intravenous immunoglobulin (IVIg)
8: Effective transfusion in medical patients
Essentials
Inappropriate blood transfusions in medical patients are common and may cause harm.
Blood transfusion should not be performed where there are appropriate alternatives such as haematinic replacement (in iron deficiency) or erythropoiesis stimulating agents (in chronic kidney disease).
There is no universal transfusion trigger – the decision to transfuse should be based on clinical assessment of the patient, supported by the results of laboratory tests and informed by evidence-based guidelines.
Haemodynamically stable haemato-oncology patients who are anaemic after intensive chemotherapy rarely need transfusion if the Hb is >80 g/L.
Treatment of patients dependent on long-term transfusion (e.g. myelodysplasia) should aim to minimise symptoms of anaemia and improve health-related quality of life rather than achieve an arbitrary Hb concentration.
Prophylactic platelet transfusions should be given to patients receiving intensive chemotherapy, with a transfusion trigger of 10×10⁹/L.
Platelet prophylaxis is not required for bone marrow aspiration or trephine biopsy and a level of 50×10⁹/L is safe for other invasive procedures.
Component selection errors for patients who have changed blood group after allogeneic haemopoietic stem cell transplantation are common and often stem from poor communication between clinical and laboratory teams.
Transfusion in patients with haemoglobinopathies (thalassaemia and sickle cell disease) is complex and changing. It should be directed by specialist teams in line with national guidelines and research evidence.
Transfusion reactions in patients with sickle cell disease may be misinterpreted as sickle cell crises and treated incorrectly.
More than 50% of red cells in the UK are transfused for non-surgical indications. The recipients are often elderly and have an increased risk of transfusion complications such as transfusion-associated circulatory overload (TACO). Although overall red cell demand has fallen in the UK in the last decade, largely because of a reduction in surgical transfusions, there has been a continuing rise in requests for platelets and fresh frozen plasma (FFP).
The decision to transfuse, and how much, should be based on clinical assessment and clearly defined objectives, such as reduction in fatigue, not on the Hb level alone. Evidence-based guidelines improve the balance between efficacy and safety as well as improving the economy of blood use. Alternatives to donor blood should be used where appropriate. The introduction of computerised ordering systems for blood components offers the opportunity to link requests to 'real time' laboratory data and provide on-screen decision support to the prescriber based on best evidence for the clinical indication. Inappropriate transfusions have been significantly reduced by the introduction of such systems in certain US hospitals (Murphy et al., 2013).


Blood transfusion overvie
pathways.nice.org.uk/pathways/blood-transfusion#path=view%3A/pathways/blood-transfusion/blood-transfusion-overview.xml&content=view-node%3Anod
Apps
Suggested Sites
Free Hotmail
Getting Started
Imported From IE
HMRC
John Brandon's 'Fly
Anterior-Septal M.I.
NICE National Institute for Health and Care Excellence
NICE Pathways
NICE Guidance
Standards and indicators
Evidence services
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Search NICE Pathways...
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Browse pathways
Blood transfusion overview
Child, young person or adult who may need a blood transfusion
Patient and GP information
NICE pathway on patient experience in adult NHS services
Patient safety
Patient having surgery
Patient with acute upper gastrointestinal bleeding
Type of blood component
Red blood cells
Fresh frozen plasma
Prothrombin complex concentrate
Platelets
Cryoprecipitate
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Blood transfusion
Patient and GP 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
that they are no longer eligible to donate blood
that they are encouraged to ask questions.
Document discussions in the patient's notes.
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
that they are no longer eligible to donate blood.
For information on communication and patient-centred care see the NICE pathway on patient experience in adult NHS services.
Sources
The NICE guidance that was used to create this part of the pathway.
Blood transfusion (2015) NICE guideline NG24

NICE National Institute for Health and Care Excellence

Does the patient need a blood transfusion?

Yes

Is the patient having surgery?

Yes

Consider alternatives for blood transfusion as follows:

- 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.
- Offer oral iron before and after surgery to patients with iron-deficiency anaemia.
- 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
- For guidance on managing anaemia in patients with chronic kidney disease, see the NICE guideline on anaemia management in chronic kidney disease.
- Offer tranexamic acid to adults undergoing surgery who are expected to have at least moderate blood loss (greater than 500 ml)
- Consider tranexamic acid for children undergoing surgery who are expected to have at least moderate blood loss (greater than 10% blood volume).
- Do not routinely use cell salvage without tranexamic acid.
- 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).

No

Consider other alternatives for blood transfusion

For example, treatment of any underlying cause for anaemia, such as iron deficiency. (not covered in this guideline)

Does the patient ***still*** need a blood transfusion?

Yes

Identify appropriate blood component / product to be transfused

- For guidance on managing blood transfusions for people with acute upper gastrointestinal bleeding, see section 1.2 in the NICE guideline on acute upper gastrointestinal bleeding.

Give appropriate verbal and written information to the patient and/or carer

- 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.
- Document discussions in the patient's notes.
- 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
  - that they are no longer eligible to donate blood.

Transfuse the patient following the appropriate recommendations for each component / product (see below)

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

Transfuse the patient following the appropriate recommendations for each component / product (see below)

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

Red blood cells recommendations

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

Doses

- 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.
- 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.

Platelets recommendations

- Offer platelet transfusions to patients with thrombocytopenia who have clinically significant bleeding (World Health Organization [WHO] grade 2) and a platelet count below 30×10^9 per litre.
- Use higher platelet thresholds (up to a maximum of 100×10^9 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).
- 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.
- Consider prophylactic platelet transfusions to raise the platelet count above 50×10^9 per litre in patients who are having invasive procedures or surgery.
- Consider a higher threshold (for example $50\text{-}75\times10^9$ 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.
- Consider prophylactic platelet transfusions to raise the platelet count above 100×10^9 per litre in patients having surgery in critical sites, such as the central nervous system (including the posterior segment of the eyes).
- 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.
- 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.
- Do not routinely transfuse more than a single dose of platelets.
- 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).
- Reassess the patient's clinical condition and check their platelet count after each platelet transfusion, and give further doses if needed.

Fresh frozen plasma recommendations

- 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).
- 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.
- 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.
- Reassess the patient's clinical condition and repeat the coagulation tests after fresh frozen plasma transfusion to ensure that they are getting an adequate dose, and give further doses if needed.

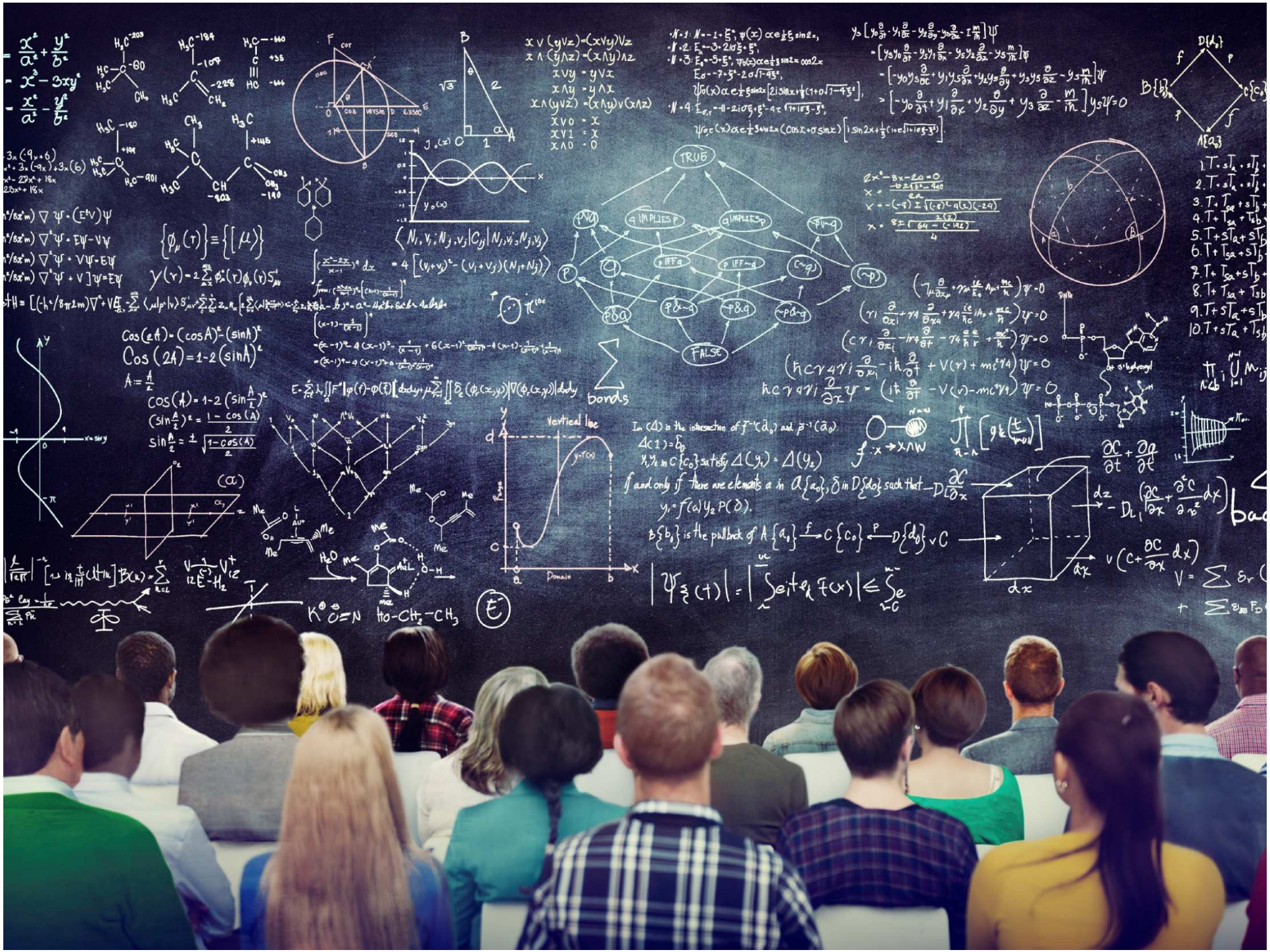
Cryoprecipitate recommendations

- Consider cryoprecipitate transfusions for patients without major haemorrhage who have:
  - clinically significant bleeding **and**
  - a fibrinogen level below 1.5 g/litre.
- 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.
- 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.
- 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).
- Reassess the patient's clinical condition, repeat the fibrinogen level measurement and give further doses if needed.

Prothrombin complex concentrate recommendations

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

- 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.
- Observe patients who are having or have had a blood transfusion in a suitable environment with staff who are able to monitor and manage acute reactions.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