North Bristol NHS Trust

South West Regional Transfusion Committee

# Indications for Transfusion – triggers & targets

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# Mortality and morbidity in patients with very low postoperative Hb levels

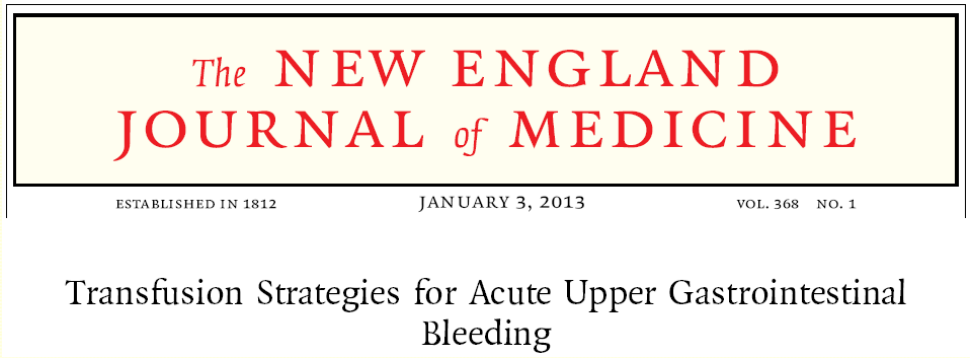
| Hb level (g/dl) | % mortality | % mortality/morbidity |
|---|---|---|
| 1.1 - 2.0 | 100% | 100% |
| 2.1 - 3.0 | 54.2% | 91.7% |
| 3.1 - 4.0 | 25% | 52.6% |
| 4.1 - 5.0 | 34.4% | 57.7% |
| 5.1 - 6.0 | 9.3% | 28.6% |
| 6.1 - 7.0 | 8.9% | 22% |
| 7.1 - 8.0 | 0% | 9.4% |

Odds of death in patients with post-op Hb <8 g/dl increased 2.5 fold for each gram decrease in Hb. (Transfusion 2002, 42, 812-818)

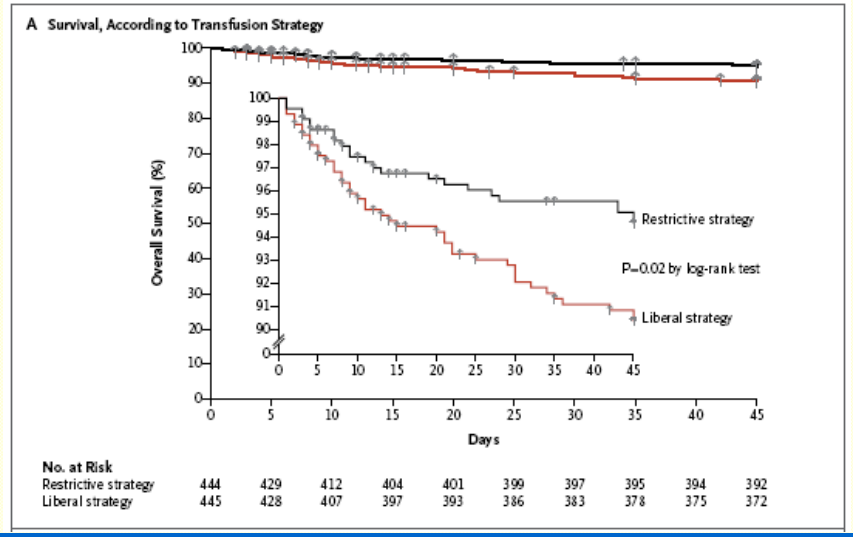
# Mortality, morbidity & transfusion

**Transfusion Triggers in Critically ill Patients** NEJM. 1999;340:409-417
Randomised to trigger Hb 7 or 10 g/dl. No difference in 1°outcome - death 30 days. Trend towards ↓ 30-day mortality in restrictive arm

**Liberal or Restrictive Transfusion in High-Risk Patients after Hip Surgery**
Carson JL, NEJM 2011;365:2453-62
Randomised prospective, n = 2016, > 50 with CVD/risk factors. < 10g/dl v < 8g/dl
No difference in 1°outcome - death or inability to walk 10 feet unaided at 60 days




Randomised to trigger Hb 70 or 90 g/L
n=921. 45 day mortality 5% (23) v 9% (41)



# National Blood Transfusion Committee Indication Codes for Transfusion 2013

"The indications for transfusion taken from UK national guidelines for the use of blood components. Although clinical judgment plays an essential part in the decision to transfuse, the purpose of drawing available transfusion guidelines together into one short document is to help clinicians decide when blood transfusion is appropriate and to facilitate documentation of the indication "

# NBTC Indication codes (triggers) Poster & Bookmark

NHS

The Chief Medical Officer's
National Blood Transfusion Committee

Issued 11/11

## Indication Codes for Transfusion – an Audit Tool

The indications for transfusion provided below are taken from UK national guidelines for the use of blood components (see references). Although it is accepted that clinical judgement plays an essential part in the decision to transfuse or not, the purpose of drawing available transfusion guidelines together into one short document is to help clinicians decide when blood transfusion is appropriate and to facilitate documentation of the indication for transfusion. Each indication has been assigned a number, which may be used by clinicians when requesting blood or for documentation purposes. Specific details regarding the patient's diagnosis and any relevant procedures to be undertaken should also be provided. These are current guidelines and may change depending on new evidence.

### Red cell concentrates

R1. ***Acute blood loss*** [4,8,3]

In patients with haemorrhage, the haemoglobin concentration (Hb) is a poor indicator of acute blood loss and estimation of blood loss may be difficult. Empirical decisions about the immediate use of red cell transfusion are required by clinicians experienced in rescusctitation. The following is a guide to the likelihood of the need for blood transfusion:-

- < 30% loss of blood volume (< 1500ml in an adult): transfuse crystalloid/colloid. Red cell transfusion is unlikely to be necessary.
- 30-40% loss of blood volume (1500-2000ml in an adult): rapid volume replacement is required with crystalloid/colloid. Red cell transfusion will probably be required to maintain recommended Hb levels.
- >40% loss of blood volume (>2000ml in an adult): rapid volume replacement including red cell transfusion is required.

When normovolaemia has been achieved/maintained, frequent measurement of Hb (for example, by near patient testing) can be used to guide the use of red cell transfusion. Maintain circulating blood volume and Hb >7 g/dl in otherwise fit patients, and >8g/dl in elderly patients and those with known cardiovascular disease.

***Peri-operative transfusion*** [2,4]

Many patients undergoing elective surgical operations will not require transfusion support if their Hb is normal before surgery. Assuming normovolaemia has been maintained, the Hb can be used to guide the use of red cell transfusion.

R2. Hb <7g/dl.

R3. Hb <8g/dl in a patient with known cardiovascular disease, or those with significant risk factors for cardiovascular disease (e.g. elderly patients, and those with hypertension, diabetes mellitus, peripheral vascular disease).

***Critical Care*** [4]

R4. Transfuse to maintain the Hb >7g/dl, and >8g/dl in elderly patients and those with known cardiovascular disease.

***Post-chemotherapy***

R5. There is no evidence-base to guide practice. Most hospitals use a transfusion threshold of a Hb of 8 or 9g/dl.

***Radiotherapy***

R6. Limited evidence for maintaining Hb above 10-11g/dl in patients receiving radiotherapy for cervical and possibly other tumours.

***Chronic anaemia*** [4]

R7. Transfuse to maintain the haemoglobin concentration to prevent symptoms of anaemia. Many patients with chronic anaemia may be asymptomatic with a Hb >8g/dl.

### Fresh frozen plasma [6,3]

(Dose - 12 - 15ml/kg body weight equivalent to 4 units for an adult)

F1. Replacement of single coagulation factor deficiencies, where a specific or combined factor concentrate is unavailable e.g. factor V.

F2. Immediate reversal of warfarin effect, in the presence of life-threatening bleeding. Prothrombin complex concentrate is the treatment of choice. FFP only has a partial effect and is not the optimal treatment.

F3. Acute disseminated intravascular coagulation (DIC) in the presence of bleeding and abnormal coagulation results.

F4. Thrombotic thrombocytopenic purpura (TTP), usually in conjunction with plasma exchange.

F5. Massive transfusion. If emergency uncontrolled bleeding and massive haemorrhage is anticipated, early infusion of FFP (15ml/kg) is recommended to treat coagulopathy. Local protocols should be followed, and the later use of FFP should be guided by timely tests of coagulation including near patient testing. Where there is anticipated large volume blood loss associated with routine surgery, guidelines suggest the PT and APTT ratio should be maintained at <1.5. This is likely to occur after replacement of 1-1.5 x the patient's blood volume.

F6. Liver disease; there is no evidence of benefit from FFP in patients with a PT ratio of less than or equal to 1.5.

### Cryoprecipitate [6,3]

(Dose - 2 pooled units, equivalent to 10 individual donor units, for an adult (contains approximately 3g of fibrinogen ) Cryoprecipitate should be used in combination with FFP unless there is an isolated deficiency of fibrinogen.

C1. Acute disseminated intravascular coagulation (DIC), where there is bleeding and a fibrinogen level <1g/l.

C2. Advanced liver disease, to correct bleeding or as prophylaxis before surgery, when the fibrinogen level <1g/l.

C3. Bleeding associated with thrombolytic therapy causing hypofibrinogenaemia.

C4. Hypofibrinogenaemia secondary to massive transfusion. Maintain fibrinogen above 1g/l. A level of 1.5g/l may be required.

C5. Renal failure or liver failure associated with abnormal bleeding where DDAVP is contraindicated or ineffective.

C6. Inherited hypofibrinogenaemia, where fibrinogen concentrate is not readily available.

### Platelet concentrates [1,3,5,7]

(Dose - 15 ml/kg body weight for children <20kg; 1 adult therapeutic dose for adults and older children)

***Bone marrow failure***

P1. To prevent spontaneous bleeding in patients with reversible bone marrow failure when the platelet count <10 x $10^9$/l. Prophylactic platelet transfusions are not indicated in chronic stable thrombocytopenia.

P2. To prevent spontaneous bleeding when the platelet count <20 x $10^9$/l in the presence of additional risk factors for bleeding such as sepsis or haemostatic abnormalities.

P3. To prevent bleeding associated with invasive procedures. The platelet count should be raised to >50 x $10^9$/l before lumbar puncture, insertion of intravascular lines, transbronchial and liver biopsy, and laparotomy, to >80 x $10^9$/l before spinal epidural anaesthesia and to >100 x $10^9$/L before surgery in critical sites such as the brain or the eyes.

***Critical care/surgery***

P4. Massive blood transfusion. Empirical use of platelets, according to a specific blood component ratio, is reserved for the patients with severe trauma. Aim to maintain platelet count >75 x $10^9$/l and >100 x $10^9$/l if multiple, eye or CNS trauma.

P5. Acquired platelet dysfunction e.g. post-cardiopulmonary bypass, use of potent anti-platelet agents such as clopidigrel, with non surgically correctable bleeding.

P6. Acute disseminated intravascular coagulation (DIC) in the presence of bleeding and severe thrombocytopenia.

P7. Inherited platelet dysfunction disorders e.g. Glanzmanns thrombasthenia with bleeding or as prophylaxis before surgery.

***Immune thrombocytopenia***

P8. Primary immune thrombocytopenia, as emergency treatment in advance of surgery or in the presence of major haemorrhage. A platelet count of ≥80 is recommended for major surgery and a count of >70 x $10^9$/l for obstetric regional axial anaesthesia.

P9. Post-transfusion purpura, in the presence of major haemorrhage.

P10. Neonatal alloimmune thrombocytopenia, to treat bleeding or as prophylaxis to maintain the platelet count >30 x $10^9$/l.

recently updated indication codes


References

1. American Society of Hematology 2011 evidence-based practice guideline for immune thrombocytopenia. Blood 2011 117: 4190-4207.
2. Association of Anaesthetists of Great Britain and Ireland (2008). Blood transfusion and the anaesthetist: red cell transfusion (www.aagbi.org).
3. Association of Anaesthetists of Great Britain and Ireland (2010). Blood transfusion and thern anaesthetist: management of massive haemorrhage. *Anaesthesia*, 65, 1153-1161. (www.aagbi.org).
4. British Committee for Standards in Haematology (2001). Guidelines for the clinical use of red cell transfusion. *British Journal of Haematology*. 113, 24-31.
5. British Committee for Standards in Haematology (2003). Guidelines for the use of platelet transfusions. *British Journal of Haematology*. 122, 10-23.
6. British Committee for Standards in Haematology (2004a). Guidelines for the use of fresh-frozen plasma, cryoprecipitate and cryosupernatant. *British Journal of Haematology*. 126, 11-28.
7. British Committee for Standards in Haematology (2004b). Transfusion guidelines for neonates and older children. *British Journal of Haematology*. 124, 433-453.
8. Scottish Intercollegiate Guidelines Network (2008). Management of upper and lower gastrointestinal bleeding (www.sign.ac.uk).


Professor Mike Murphy, Dr Jonathan Wallis, Dr Janet Birchall, October 2011

NHS

National Blood Transfusion Committee

## Guidance for the use of Blood Components

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

### Red Cell Concentrates

Consider single unit only transfusion if anaemia reversible.

- **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**.

### FFP (15ml/kg)

- **F1 Coagulation factor deficiency** where factor concentrate unavailable.
- **F2 Reversal of warfarin** if critical bleeding. Prothrombin complex concentrate is the treatment of choice.
- **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.

**Reference:**

National Blood Transfusion Committee Indication Codes – An Audit Tool (April 2013)

http://www.transfusionguidelines.org/docs/pdfs/nbtc_2014_04_recs_indication_codes_2013.pdf

PTO

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National Blood Transfusion Committee

### 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 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** if 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.**


August 2013 1314208

BLC675.1

# Why not transfuse ?

- No benefit
- Safety


  - Longer term outcome
- Shortage
- Cost

SERIOUS HAZARDS OF TRANSFUSION **SHOT**

| Risk of major morbidity and mortality per 1,000,000 components issued in 2013 | |
|---|---|
| Total morbidity | 51.8 |
| Total mortality | 8.0 |

| | Mortality | Major morbidity | Total cases |
|---|---|---|---|
| All errors | 2.2 | 5.1 | 346.2 |
| Acute transfusion reactions | 0.0 | 27.6 | 116.0 |
| Haemolytic transfusion reactions | 0.4 | 2.9 | 17.8 |
| Transfusion-related acute lung injury | 0.4 | 3.3 | 3.6 |
| Transfusion-associated circulatory overload | 4.4 | 12.3 | 34.8 |
| Transfusion-associated dyspnoea | 0.0 | 0.4 | 2.2 |
| Transfusion-associated graft versus host disease | 0.0 | 0.0 | 0.0 |
| Post-transfusion purpura | 0.4 | 0.0 | 1.1 |
| Cell salvage | 0.0 | 0.0 | 4.4 |
| Transfusion-transmitted infection | 0.0 | 0.0 | 0.0 |
| Unclassifiable complications of transfusion | 0.4 | 0.4 | 2.2 |
| Paediatric cases | 0.7 | 1.5 | 37.0 |

# Longer term outcome

- Preoperative anaemia associated with ↑ morbidity & mortality, ↓ quality of life and is major predictive factors for allogeneic blood transfusion.

  Correction with blood transfusion does not improve outcome and in addition → ↑ surgical infection, and in cancer patients, relapse, including distant metastasis. A dose-dependent relationship has been observed.

- Anaemia also linked with detrimental effects in medical patients such as ↑ cardiovascular events, hospitalisation, mortality and reduced quality of life.

# 2014-15
# Low stocks

## Red cells
## March 2015
## March 2014

## Platelets
## August 2014
## October 2014
## November 2014

NHS
Blood and Transplant

URGENT COMMUNICATION - ACTION REQUIRED

**An electronic copy of this fax can be found on the Hospitals & Science "Home Page" via the urgent area highlighted in red -** http://hospital.blood.co.uk/

**Date: Friday, 02 January 2015**

**To: All Transfusion Laboratory Managers in hospitals served by NHS Blood and Transplant (NHSBT)**

Dear Colleague,

**Stocks of O RhD Negative Red Cells - Action Required**

We wrote to you last week to request your support with stocks of O RhD negative red cell stocks. These have not recovered and have fallen further over the last few days. NHSBT has today launched a media appeal to encourage more donors to come forward today and over the weekend.

**Action required**

1. **Please continue to conserve stocks of group O negative red cells for group O negative patients in line with established guidelines.**
2. **We are not activating the emergency blood management plan and an amber alert is not being called today, however we are asking all hospital transfusion colleagues working over the next week to ensure that they have read and are familiar with actions in these plans.**

We apologise for any extra work that this will cause and thank you for your ongoing support during this challenging time. Efforts will continue to bring about an improvement at the earliest opportunity and we will ensure that you are kept regularly updated.

If you have any queries please contact an NHSBT Consultant, Customer Service Manager or Hospital Service Manager. Alternatively please contact the Customer Service Response Desk 0208 201 3107 between 08:30 to 16:30, Monday to Friday.

**Please notify the consultant responsible for transfusion and your Transfusion Practitioner of this communication.**

Yours sincerely,

Teresa Allen
Assistant Director – Customer Services
**Tel:** 01865 38 1013
**email** teresa.allen@nhsbt.nhs.uk

Dr Edwin Massey
Associate Medical Director
**Tel:** 01179217462
**email:** edwin.massey@nhsbt.nhs.uk

# Contingency Plan for Shortage

| Category 1 | Category 2 | Category 3 |
|---|---|---|
| Active major bleeding | Cancer surgery (palliative) Urgent but not emergency surgery | Elective surgery, likely to require Tx |
| Emergency surgery | Not life threatening anaemia | |
| Life threatening anaemia | | |

# Price List 2013/2014

NHS Blood and Transplant

## NHS

## Blood and Components

### Red Cell Components / Supplements

| Item Code | Item Description | Price £ 2013/2014 |
|---|---|---|
| N12 | Standard Red Cells | £ 122.09 |
| N13 | Neonatal Red Cells | £ 48.38 |
| N14 | Frozen Red Cells, Thawed & Washed | £ 420.20 |
| N15 | Red Cells for Exchange Transfusion | £ 184.60 |
| N16 | Red Cells for Intrauterine Transfusion | £ 168.64 |
| N18 | Red Cells- Large Volume Neonates/Infants | £ 146.32 |
| N21 | Premium for CMV -ve Red Cells | £ 8.38 |
| N22 | Premium for Irradiated Red Cells | £ 8.36 |
| N23 | Premium for Cell Washing | £ 115.94 |
| N29 | Discounted Cell Washing (24 Hour) | £ 30.14 |

### Platelet Components / Supplements

| Item Code | Item Description | Price £ 2013/2014 |
|---|---|---|
| N31 | Neonatal Platelets | £ 89.16 |
| N32 | Platelets (1.0 ATD) | £ 208.09 |
| N34 | Platelets for IUT | £ 316.00 |
| N39 | Buffy Coats | £ 67.23 |
| N41 | Premium for CMV -ve Platelets | £ 8.38 |
| N42 | Premium for Irradiated Platelets | £ 8.36 |
| N43 | Premium for HLA Selected Platelets | £ 180.09 |
| N44 | Premium for HPA Selected Platelets | £ 180.09 |
| N45 | Premium for Cell Washing/Additive Soluti | £ 31.78 |
| | Optimised Pooled Granulocyte | £ 1,041.10 |

### Plasma Components

| Item Code | Item Description | Price £ 2013/2014 |
|---|---|---|
| N51 | Clinical FFP (UK sourced) | £ 27.98 |
| N53 | Cryo-depleted Plasma | P.O.R |
| N54 | Cryoprecipitate | £ 31.70 |
| N58 | Paediatric MBFFP (Non UK Sourced) | £ 177.01 |
| N59 | Neonatal MBFFP (Non UK Sourced) | £ 49.75 |
| N5A | Pooled Cryoprecipitate | £ 193.53 |
| N5C | MB Cryoprecipitate Neonatal (Non UK ) | £ 137.49 |

**Foot Notes:**

# 2011 Medical Use of Blood Audit

## Inappropriate transfusion - National 13%

### Iron deficiency

| Parameter | Men | Women |
|---|---|---|
| Total number | 4791 | 4335 |
| With ferritin result (%) | 1774 (37%) | 1725 (40%) |
| With ferritin ≤ 20 mcg/l (male) or ≤ 15 mcg/l (female) | 248 | 341 |
| With transferrin saturation ≤ 20 in cases without ferritin results | 58 | 78 |
| With MCV ≤ 78 fl in cases without ferritin or iron studies | 210 | 264 |
| **Total possible iron deficiency** | **516** | **683** |

### Overall 13% of all patients transfused

**Management of anaemia and avoidance of Transfusion.** Audit in NI February 2010

743 transfusion episodes audited. 1 in 4 could have been avoided.

Iron deficiency most common cause of correctable anaemia

GAIN
GUIDELINES AND AUDIT IMPLEMENTATION NETWORK

# National comparative audit of platelet transfusions 2010

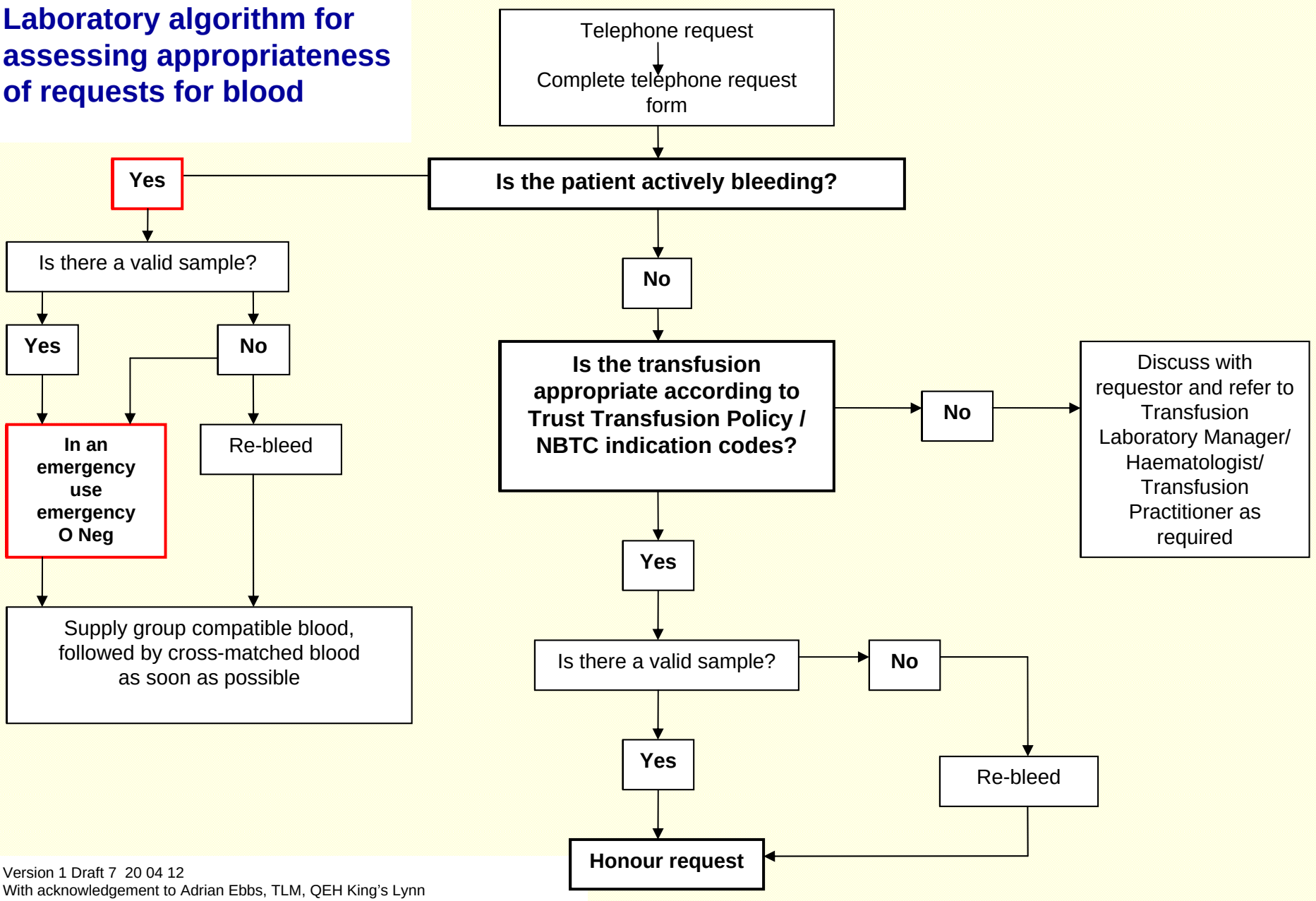
## Key Findings of the audit with regard to the inappropriate use of platelet transfusions

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]

# Laboratory algorithm for assessing appropriateness of requests for blood




Version 1 Draft 7 20 04 12

With acknowledgement to Adrian Ebbs, TLM, QEH King's Lynn

# Summary

Discuss unclear requests for reasons of -

- Appropriate use
- Safety – short and long term
- Potential shortage
- Cost
- Use National Blood Transfusion Committee Indication Codes and South West RTC laboratory algorithm as part of Patient Blood Management