North Bristol NHS Trust

South West Regional Transfusion Committee

When to challenge requests for blood components – and why

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Why question ?

- Appropriate use
- Safety

  - Longer term outcome
- Shortage
- Cost

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)

2011 Medical Use of Blood Audit

Inappropriate transfusion - National 13%, NBT 9%

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

In NBT at least 13% transfused with iron deficiency

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

GAIN
GUIDELINES AND AUDIT IMPLEMENTATION NETWORK

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

Iron deficiency most common cause of correctable anaemia

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]

SERIOUS HAZARDS OF TRANSFUSION **SHOT**

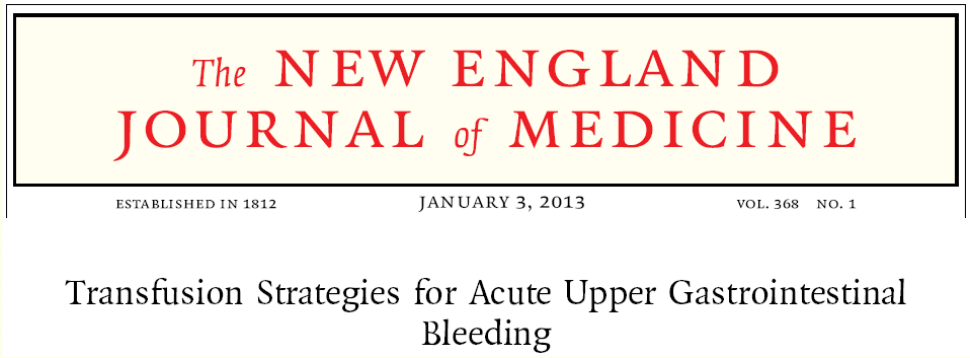
Risk of major morbidity and mortality per 1,000,000 components issued in 2013	
Total morbidity	51.8
Total mortality	8.0

	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

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

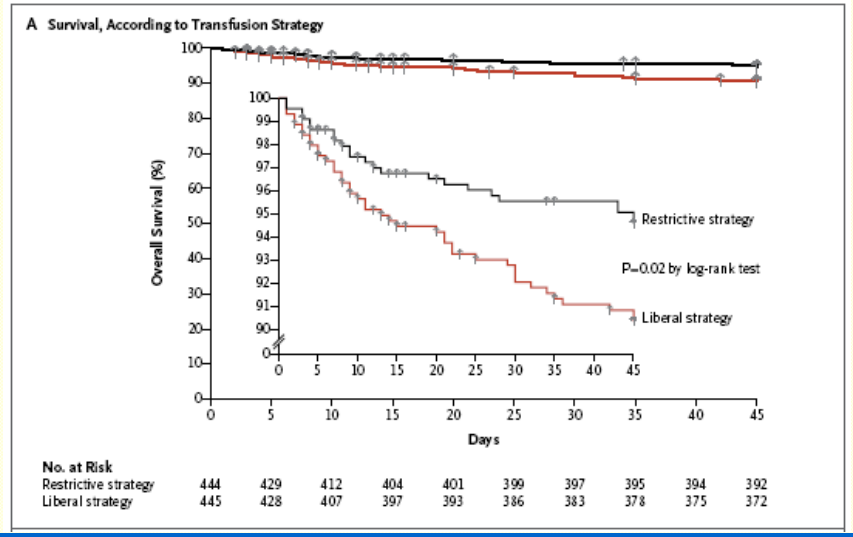
Liberal or Restrictive Transfusion in High-Risk Patients after Hip Surgery
Carson JL, NEJM 2011;365:2453-62
Randomised prospective, n = 2016, > 50 with CVD/risk factors. < 10g/dl v < 8g/dl
No difference in 1°outcome - death or inability to walk 10 feet unaided at 60 days


The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 JANUARY 3, 2013 VOL. 368 NO. 1

Transfusion Strategies for Acute Upper Gastrointestinal Bleeding

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



2014 Low stocks

Red cells
March

Platelets
August
October
November

NHS
Blood and Transplant

URGENT COMMUNICATION

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/.

25th March 2014

All Transfusion Laboratory Managers in hospitals served by NHS Blood and Transplant

Dear Colleague,

Update on Stocks of B RhD Negative and O RhD Negative Red Cells

On the 12th and 19th March we advised you that NHSBT were experiencing lower than normal levels of groups O RhD negative and B RhD negative red cells

Stock levels have increased and we have returned to business as usual and are able to supply to your needs.

We would like to thank you for your assistance and understanding whilst we rebuilt our stock levels.

If you have any queries regarding the above, please do not hesitate to contact an NHSBT Customer Service Manager, Hospital Services Manager or NHSBT Consultant. Alternatively please contact the Customer Service Response Desk on - 0208 201 3107 between the hours of 9:00 to 17:00, Monday to Friday.

Please also notify your Consultant with responsibility for the transfusion laboratory and your Transfusion Practitioner of this communication.

Yours sincerely,

Teresa Allen
Assistant Director - Customer Service
Email: teresa.allen@nhsbt.nhs.uk

Prof. Mike Murphy
Clinical Director – Patients
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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:

Patient Blood Management

- Aim to achieve better patient outcome by relying on patients own blood rather than donor blood
- Goes beyond appropriate use as pre-empts and ↓ need for donor blood by addressing modifiable risk factors
  - Maximise patients red cell mass
  - Minimise bleeding
  - Optimise patients physiological reserve

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

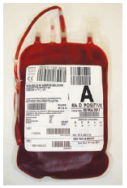
The indications for transfusion provided below are taken from UK national guidelines for the use of blood components (see references). Although it is accepted that clinical judgement plays an essential part in the decision to transfuse or not, the purpose of drawing available transfusion guidelines together 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

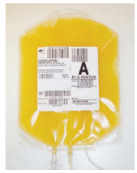
P1. To prevent spontaneous bleeding in patients with reversible bone marrow failure when the platelet count <10 x 10^9/l. Prophylactic platelet transfusions are not indicated in chronic stable thrombocytopenia.

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

NHS

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)

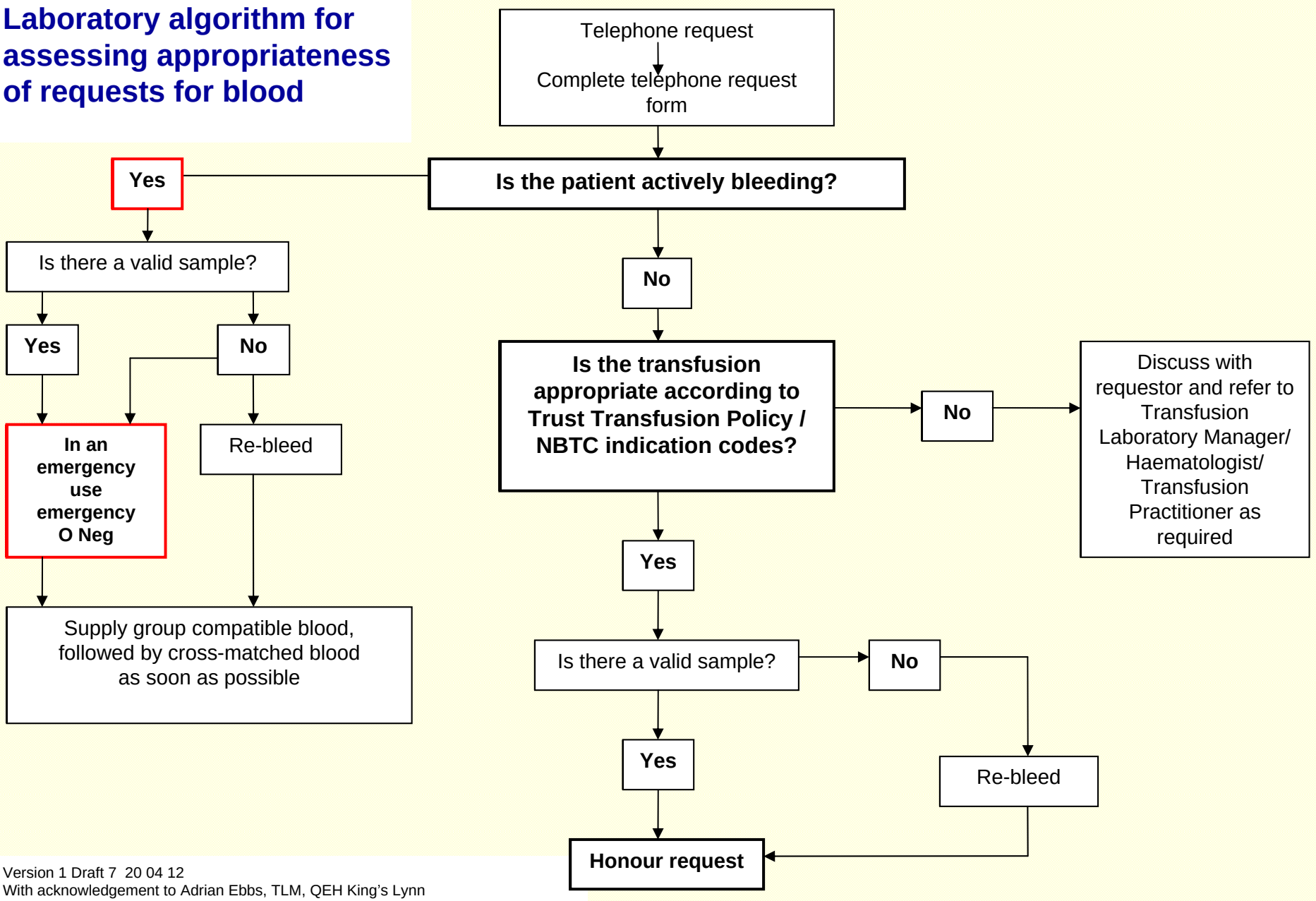
- **C1 DIC and bleeding** when fibrinogen <1g/l.
- **C2 Liver disease** with bleeding or pre-surgery when fibrinogen <1g/l.
- **C3 Bleeding with thrombolytic therapy** causing hypofibrinogenaemia.
- **C4 Massive transfusion** maintain fibrinogen >1.5g/l.
- **C5 Renal or liver failure** with abnormal 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

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 PBM