

Identify The Need For Change Using Audit

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Objectives

- Identifying the need
- Developing a formula that works
- How one thing leads to another
- Impact of findings

N.I. Red Cell Guidelines (2001)

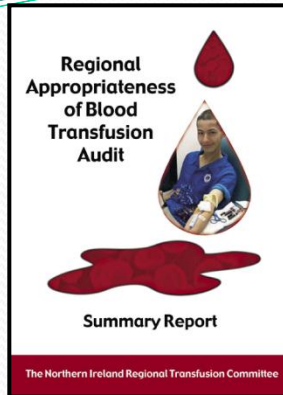
- If Haemoglobin is $> 10\text{g/dl}$ - don't transfuse
- If Haemoglobin is $< 7\text{g/dl}$ - transfuse
- If Haemoglobin is $7-10\text{g/dl}$ - transfuse if symptomatic

N.I. Audit

- Agreement of NITC
- Application for funding to GAIN (*Guidelines and Audit Improvement Network*)
- Development of lead audit group
- External peer reviewer
- Audit standards
- Proforma and pilot
- Training of auditors

Indication for red cell transfusion

| | |
|---|-----------------------|
| Age < 65yrs | Hb < 7 g/dl |
| Age > 65yrs | Hb < 8g/dl |
| Cardiac/cerebrovascular symptoms | Hb < 9 g/dl |
| Significant haemorrhage | > 500ml/hr |
| Bone marrow failure symptoms | Hb < 10g/dl |
| Patient on chemo/Radiotherapy | Hb < 10g/dl |
| Symptomatic of anaemia | Hb < 10g/dL |

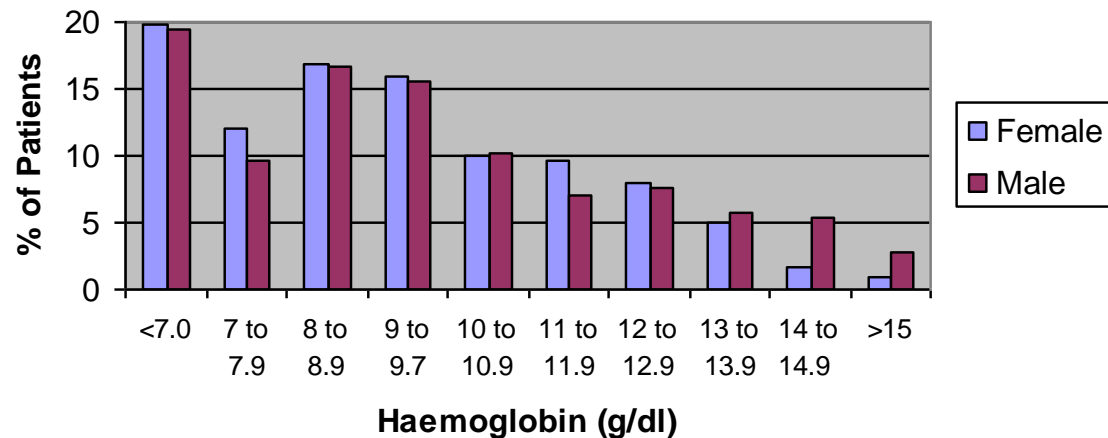


Red Cell Audit 2006

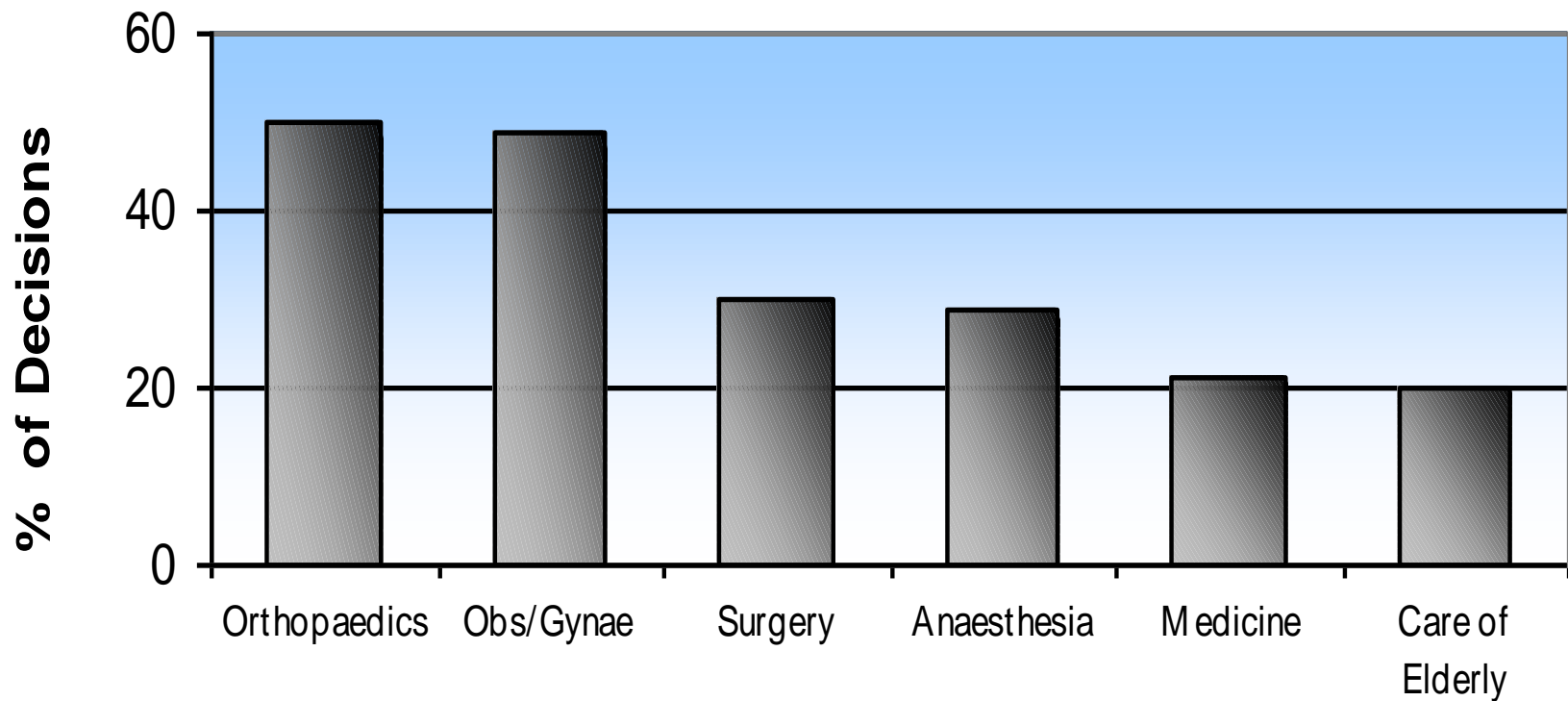
19% of patients had an inappropriate transfusion
29% of patients were overtransfused

85% of transfused patients were admitted to hospital with anaemia

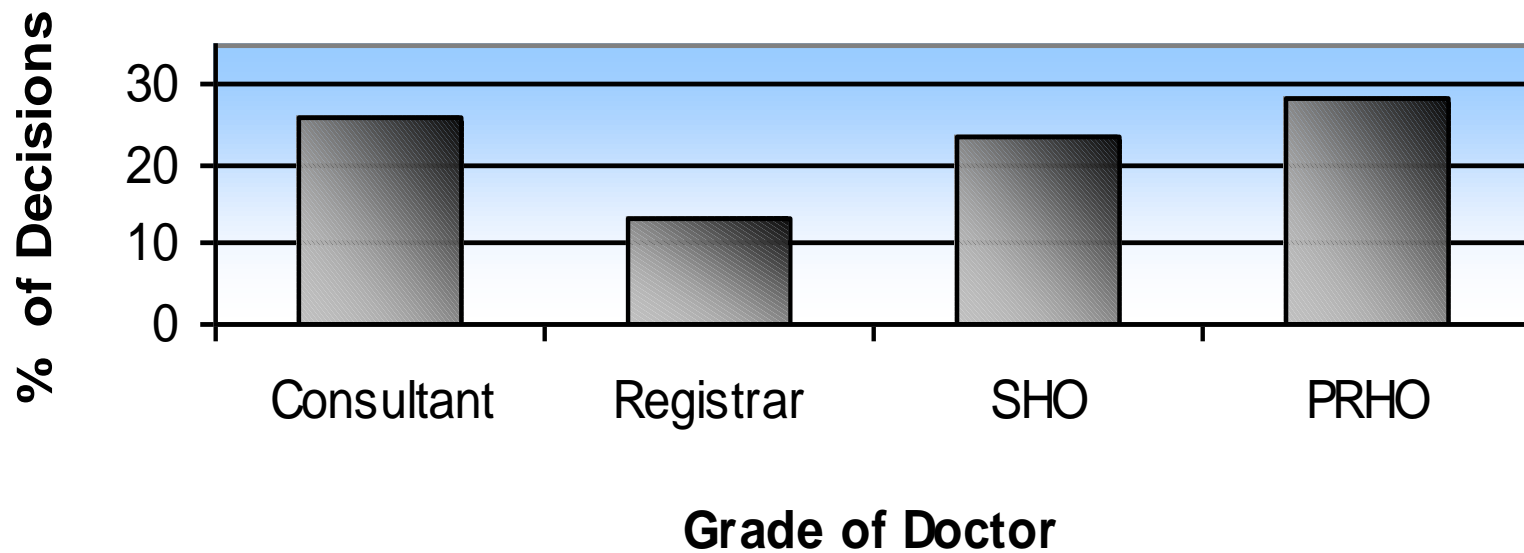
Haemoglobin on Admission to Hospital (2006 Audit)



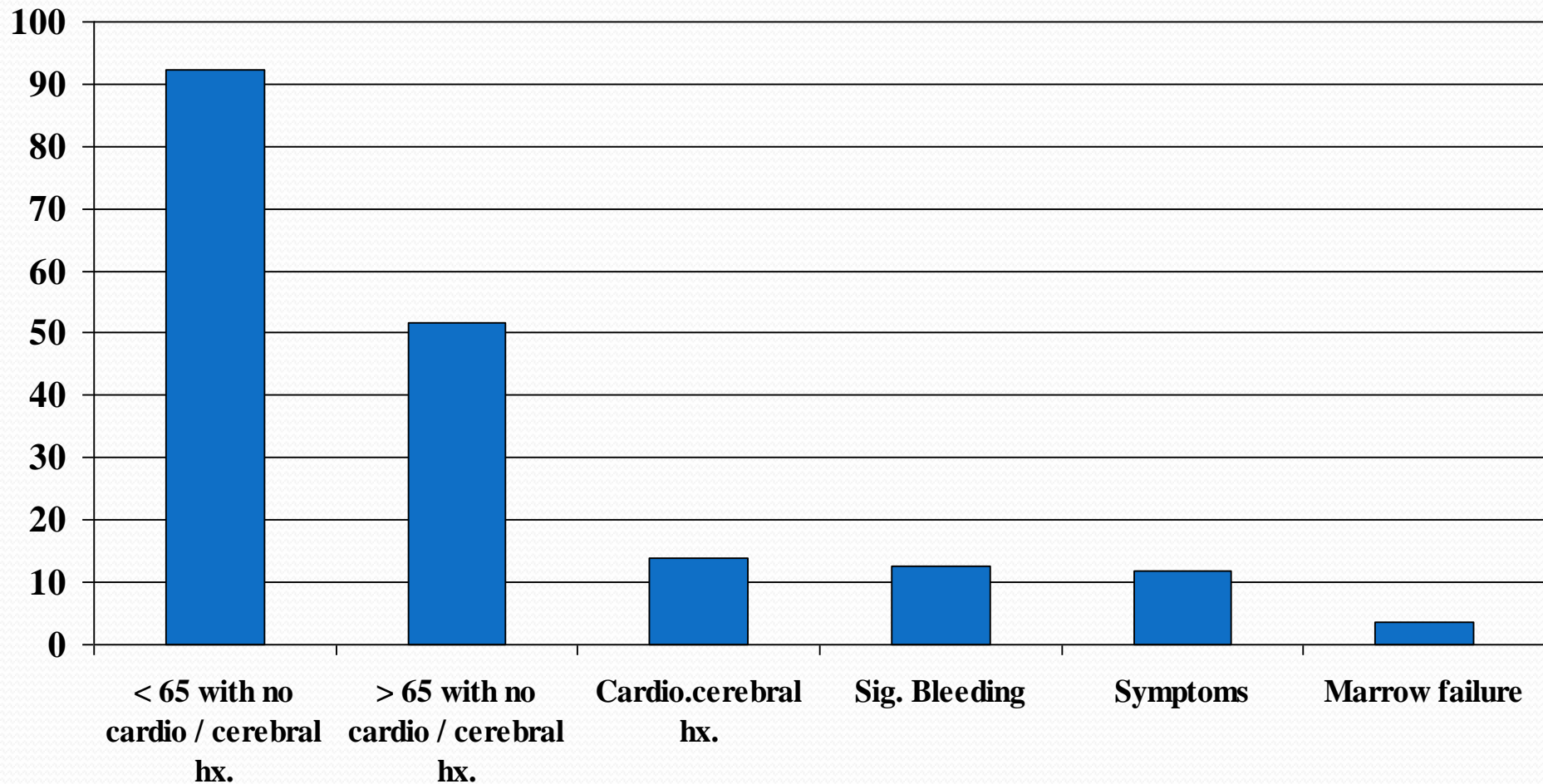
Inappropriate Transfusion By Selected Speciality



Inappropriate Transfusion By Grade Of Doctor

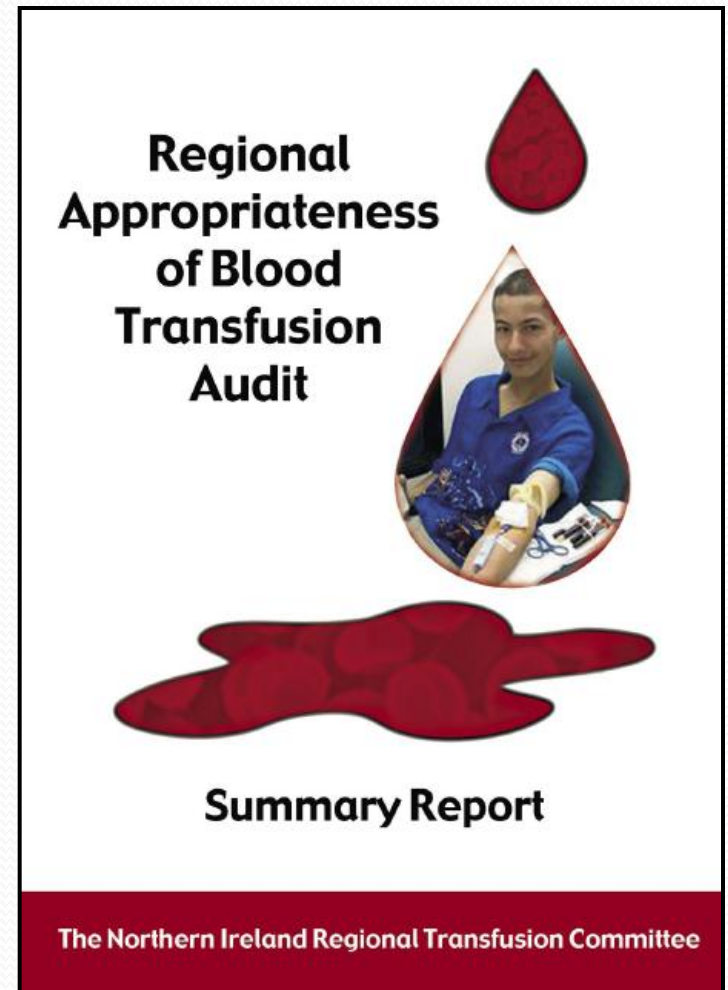


Inappropriateness of Transfusion by Patient Criteria



NIRTC Audit 2006

- Dissemination of results in hardcopy and PDF
- Multiprofessional conference



Northern Ireland Regional Transfusion Committee

TRANSFUSION THRESHOLDS

Is your patient a 7, 8, 9 or 10?

- In healthy stable adults under 65 years old without cardiac or cerebrovascular disease. Consider transfusion only when haemoglobin is **below 7g/dl**
- In older healthy adults without cardiac or cerebrovascular disease who are above 65 transfusion should only be considered when the haemoglobin is **below 8g/dl**
- In patients with known cardiac or cerebrovascular disease, consideration should be given if the haemoglobin is **below 9g/dl** and is probably indicated below 8g/dl
- In sustained heavy bleeding (>500ml/hour) without likelihood of stopping, it may be necessary to transfuse when the haemoglobin is **below 10g/dl**
- *"Tiredness" is not an adequate symptom alone to transfuse*
- In truly symptomatic patients with either dyspnoea, angina, hypertension, tachycardia, orthostatic hypotension and syncope that is due to anaemia - transfusion is appropriate for haemoglobin levels **below 10g/dl**

The NIRTC Regional Transfusion Audit of 1220 cases showed an inappropriate transfusion rate of 19% of patients and an overtransfusion rate of 29%

- **Overtransfusion** (>2g/dl above the threshold level) is common and a single unit in small patients may raise the haemoglobin by 2.5g/dl or more

Advice compatible with NIRTC recommendations 2006, CMO letter 2006 & CREST guidelines 2007

Northern Ireland Regional Transfusion Committee

IS BLOOD TRANSFUSION NECESSARY?

- There is no 'universal' trigger for blood transfusion
- Transfusion given at any haemoglobin level can cause morbidity and mortality

Unnecessary transfusion increases the risk

- Transfusion should not be used to treat iron deficiency anaemia - the treatment of choice here is oral iron or if this is not tolerated or adequate - intravenous iron

CONSENT FOR BLOOD TRANSFUSION

When a decision to transfuse has been taken - it is important to explain the following so that the patient can make an informed choice about receiving the transfusion.

- Explain **why** the transfusion is being given and the perceived benefit
- Explain that there is no suitable alternative treatment
- Explain that receiving a transfusion unfortunately means the patient can never be a blood donor (*concern over the possible spread of CJD*)
- Discuss minor common problems with transfusion (3-5%) - high temperature, rash, shivering
- Discuss major but less common problems, e.g. incompatible transfusion and major reactions (approximately 1 in 10,000 per unit transfused)

New N.I. Standards



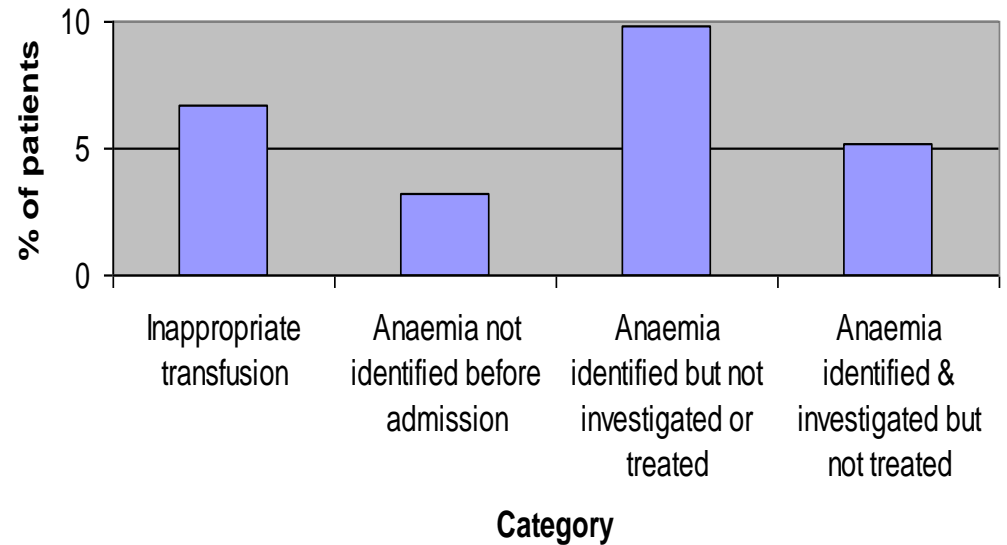
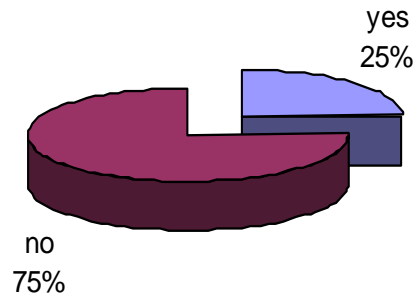
2006 Audit

**85% of transfused patients were admitted
to hospital with anaemia**

- Audit not designed to examine whether anaemia was diagnosed, investigated or treated correctly prior to transfusion.
- An application to investigate pre hospital admission anaemia was made to GAIN
- Same approach with modified lead audit group

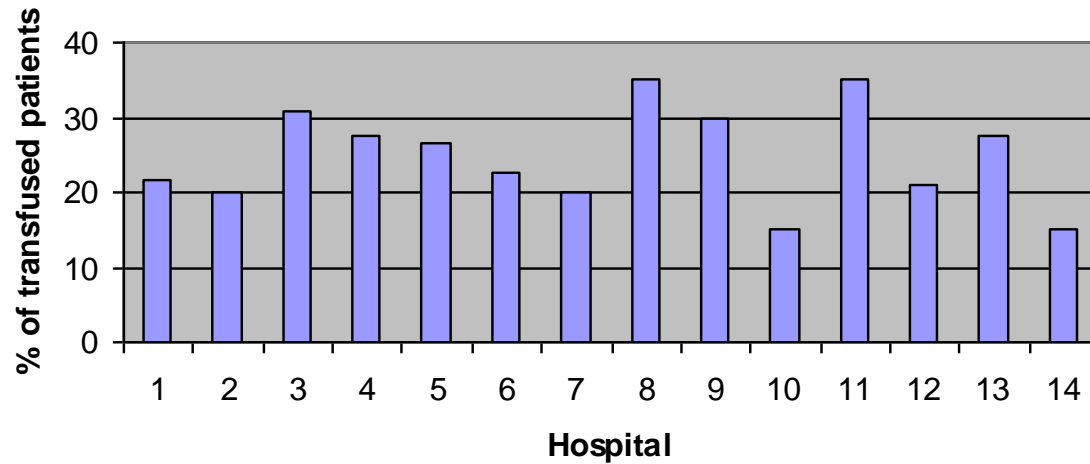
Key Findings

Could transfusion have been avoided?

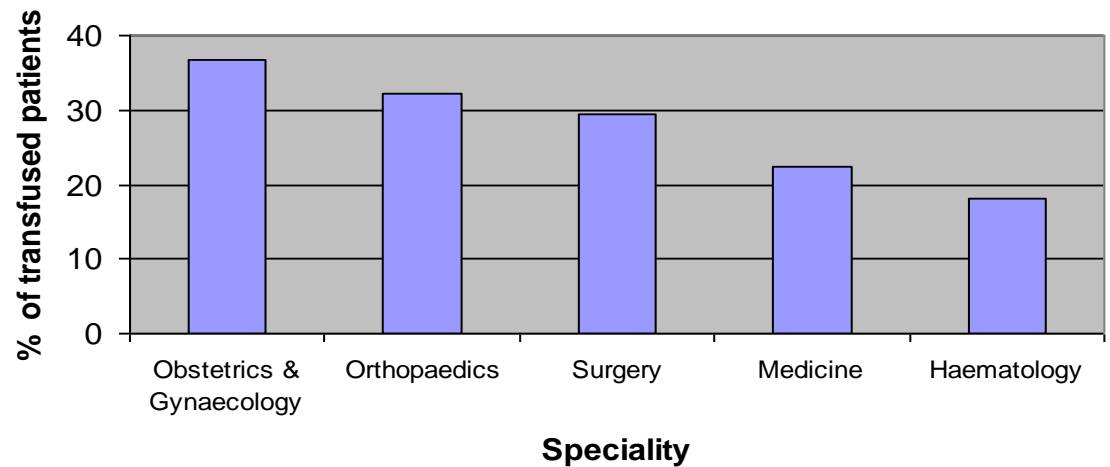


Key Findings

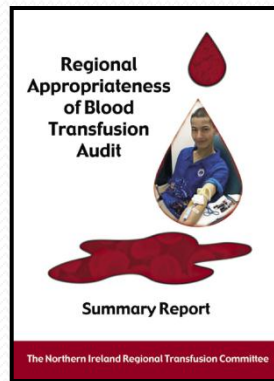
Avoidable transfusion by hospital



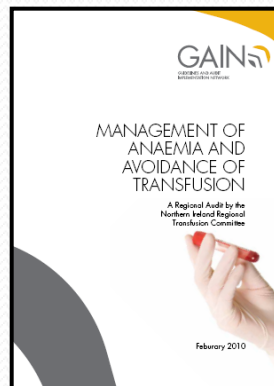
Avoidable transfusion by admitting speciality



Overtransfusion

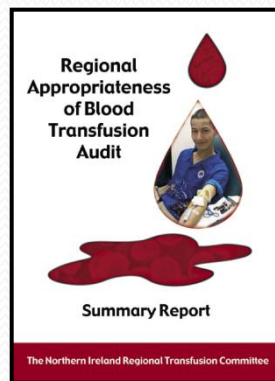


29%

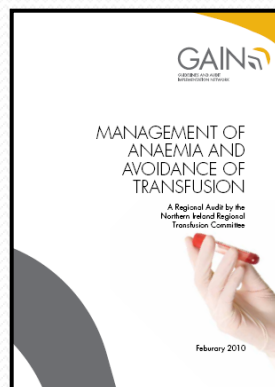


16%

Inappropriate Transfusion



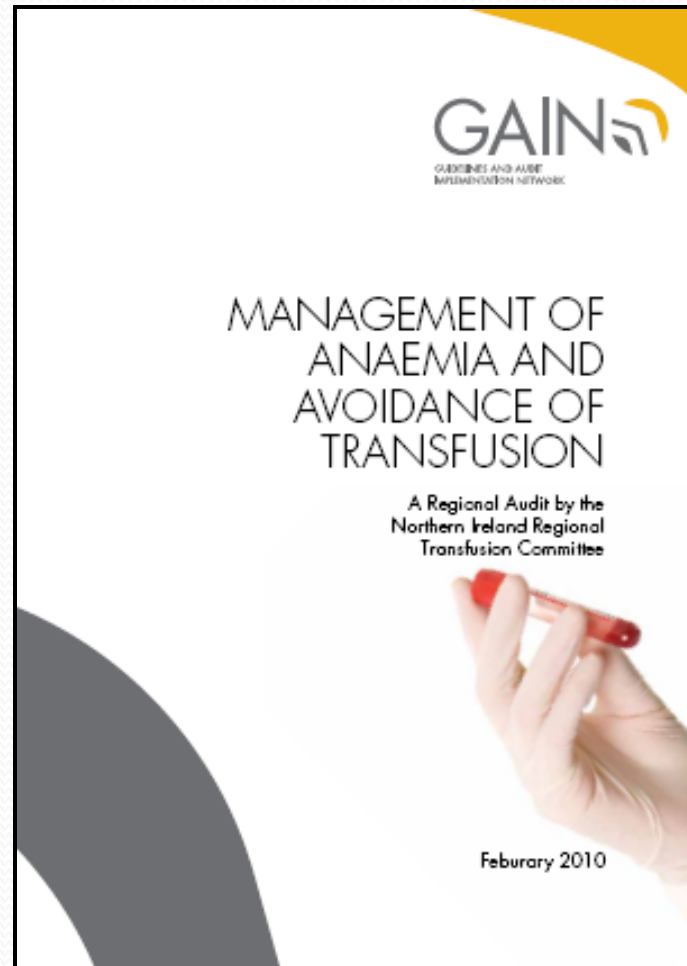
19%



6.7%

Dissemination of Results

- Audit results circulated
- Multiprofessional conference



STEPS IN THE INVESTIGATION AND MANAGEMENT OF THE ADULT PATIENT WITH ANAEMIA

STEP 1

Perform FBP test for Hb, MCV and MCH

If patient anaemic as per * WHO Classification of anaemia follow steps below

STEP 2

MCV or MCH low: perform iron studies (including serum ferritin)

MCV & MCH normal range: perform iron studies & renal function tests, serum folate & vitamin B12 levels

MCV or MCH high: perform LFTs, thyroid function, serum folate and vitamin B12 levels

STEP 3

1. Start appropriate corrective therapy for anaemia without delay (e.g. oral iron therapy)

AND

2. Investigate cause of anaemia unless already known or further investigation is not in the patient's best interests (e.g. palliative care)

STEP 4

1. Monitor response to corrective therapy for anaemia, including rise in Hb

AND

2. Treat the cause of anaemia (e.g. surgery for carcinoma of bowel)

* WHO Classification of anaemia

Haemoglobin: < 13 g/dl in adult male
< 12 g/dl in adult female
< 11 g/dl in pregnancy

Abbreviations used:

FBP: full blood picture

Hb: Haemoglobin

MCV: Mean corpuscular volume

MCH: Mean corpuscular haemoglobin

WCC: white blood cell count

CRP: C-reactive protein

TIBC: total iron binding capacity

TSAT: transferrin saturation

LFTs: liver function tests

ESA: erythrocyte stimulating agent or recombinant erythropoietin

eGFR: estimated glomerulofiltration rate

CKD: chronic kidney disease

Sickle cell disease – perform Sickledextest if positive family history or patient's genetic origin is West Africa

4 STEPS IN THE INVESTIGATION AND MANAGEMENT OF THE ADULT PATIENT WITH ANAEMIA MACROCYTIC ANAEMIA

STEP 1

- Full Blood Picture Test

If haemolysis detected in FBP
(~~confirmed~~ on repeat testing)

Refer to a haematologist

**** MCV > 100 fl or
MCH > 32 pg**
Macrocytic anaemia

**** Normal range values may differ between
hospital laboratories**

STEP 2

- Test se folate, vitamin B12
- Urea, creatinine, eGFR
- Liver function tests

Low se folate and / or low vitamin B12 level

FOLATE AND/OR VITAMIN B12
DEFICIENCY

Normal renal function, se folate &
B12 levels

Go to STEP 3

STEP 3:

- Correct anaemia
- Investigate cause if unknown

FOLATE DEFICIENCY

- Start oral folic acid 5 mg daily
If co-existing vitamin B12 deficiency start vitamin B12 injections at same time to avoid neurological complications
- Consider cause such as - poor diet, liver disease, alcohol misuse, gastro-intestinal surgery, recent pregnancy, chronic inflammatory disease (e.g. Crohn's disease or TB), malignancy and drug therapy (e.g. anticonvulsants)

VITAMIN B12 DEFICIENCY

- Hydroxocobalamin IM injections: 1 mg alternate days for 2 weeks, then 1 mg every 3 months for life
- Assess for malabsorption and consider postgastrectomy, terminal ileum disease or resection as cause

MACROCYTIC ANAEMIA OF UNKNOWN CAUSE

Assess for liver disease, alcohol misuse, hypothyroidism and drug causes (e.g. cytotoxic therapy) of anaemia

If myelodysplasia or myeloma suspected or if cause of anaemia still unknown refer to a haematologist

STEP 4

- Monitor response to replacement therapy
- Treat disease causing the anaemia

FOLATE INDUCED ANAEMIA

Monitor Hb and reticulocyte count after 4 months replacement therapy

Treat cause if identified

VITAMIN B12 DEFICIENCY INDUCED ANAEMIA

Monitor Hb and reticulocyte count
- after 10 days for response
- after 8 weeks to check if Hb has returned to normal range

MACROCYTIC ANAEMIA not due to folate or vitamin B12 deficiency

Monitor Hb

Treat and monitor cause if identified

4 STEPS IN THE INVESTIGATION AND MANAGEMENT OF THE ADULT PATIENT WITH ANAEMIA MICROCYTIC ANAEMIA

STEP 1

- Full Blood Picture Test

**** MCV < 76fl or MCH < 27pg**
Microcytic anaemia

**** Normal range values may differ between hospital laboratories**

STEP 2

- Iron studies (include ferritin and TIBC or TSAT)
- CRP

Se ferritin < 30 mcg/l when CRP < 30 mg/l
Se ferritin < 70 mcg/l when CRP > 30 mg/l
TIBC increased or TSAT < 20%

Manage as IRON DEFICIENCY ANAEMIA

Se ferritin > 70 mcg/l, CRP normal or increased
TIBC normal or decreased, TSAT > 20%

Go to STEP 3

STEP 3:

- Correct anaemia
- Investigate cause if unknown (unless further investigation is not in the patient's best interests)

IRON DEFICIENCY ANAEMIA

a) Start oral iron therapy to normalise Hb and replenish iron stores

Start with parenteral iron therapy if:

- History of oral iron intolerance or poor compliance
- Impaired gastrointestinal absorption
- Haemodialysis
- Major surgery must take place in < 3 weeks

b) Review history & examination for source of chronic bleeding

Refer to gastroenterologist if

- Adult male
- Postmenopausal female
- Premenopausal female with gastro-intestinal symptoms or bleeding

Refer to gynaecologist if

- Post menopausal bleeding
- Menorrhagia

MICROCYTIC ANAEMIA NOT DUE TO IRON DEFICIENCY

Assess for acute or chronic inflammatory disease, chronic infection, malignancy and liver disease – check differential WCC, LFTs

If thalassaemia or sideroblastic anaemia suspected or cause of anaemia unknown refer to a haematologist

STEP 4:

- Monitor response to replacement therapy
- Treat disease causing the anaemia

IRON DEFICIENCY ANAEMIA

Perform FBP after 3 weeks of oral iron therapy

If improvement in Hb (1-2 g/dl increase):

- Check if Hb normalised after 2-4 months iron therapy
- Continue iron therapy for another 3 months to replenish iron stores

If no improvement consider:

- Switch to parenteral iron therapy

ANAEMIA OF CHRONIC DISEASE

A diagnosis of exclusion

Unresponsive to parenteral iron unless iron deficiency also present

Treat and monitor the underlying cause

4 STEPS IN THE INVESTIGATION AND MANAGEMENT OF THE ADULT PATIENT WITH ANAEMIA NORMOCYTIC ANAEMIA

STEP 1

- Full Blood Picture Test

** MCV 76 - 100 fl
MCH 27-32pg
Normocytic anaemia

** Normal range values may differ between hospital laboratories

STEP 2

- Iron studies (include se ferritin + TIBC or TSAT)
- Se folate and vitamin B12
- Urea, creatinine, eGFR

Se ferritin < 30 mcg/l when CRP < 30 mg/l
 Se ferritin < 70 mcg/l when CRP > 30 mg/l
TIBC increased or TSAT < 20%

Treat as IRON DEFICIENCY ANAEMIA
See STEP 3 for microcytic anaemia

Se ferritin > 30 mcg/l ***
TIBC decreased, TSAT > 20%
Normal vitamin B12 level
Low or normal se folate level

Se creatinine high, eGFR < 60 ml/min

CHRONIC KIDNEY DISEASE

Se ferritin > 30 mcg/l
TIBC decreased, TSAT > 20%

Normal se folate and vitamin B12 levels
Normal renal function

Go to STEP 3

STEP 3:

- Correct anaemia
- Investigate cause if unknown

CHRONIC KIDNEY DISEASE

Refer to a nephrologist if new diagnosis or deterioration of renal function

Consider ESA + iron therapy to improve Hb
(seek advice from nephrologist or haematologist)

If on regular haemodialysis seek advice from patient's nephrologist

NORMOCYTIC ANAEMIA OF UNKNOWN CAUSE

Assess for acute or chronic inflammatory disease, chronic infection, malignancy and liver disease – check differential WCC, LFTs

If cause still unknown refer to a haematologist

STEP 4

- Monitor response to replacement therapy
- Treat disease causing the anaemia (if appropriate)

CHRONIC KIDNEY DISEASE

Monitor Hb, platelet count, TIBC or TSAT
 se folate and renal function

Iron and folate deficiency can also occur in chronic kidney disease

ANAEMIA OF CHRONIC DISEASE

A diagnosis of exclusion, unresponsive to parenteral iron

Iron deficiency may also be present

Monitor and treat the underlying cause

MANAGEMENT OF THE ANAEMIC ADULT PATIENT PRIOR TO SCHEDULED MAJOR SURGERY

(Also applicable to other invasive procedures with potential for blood loss)

WHO definition of anaemia²: adult male < 13g/dl; adult female < 12g/dl; pregnant female < 11g/dl

Pre assess patient at least 4 - 6 weeks before surgery
Assess medical and drug history
Test Full Blood Picture – if anaemic (see below)

Additional blood tests to determine type of anaemia

- Serum ferritin
- TIBC or TSAT
- Urea & electrolytes
- Liver function tests
- Serum folate and
- Vitamin B12 levels

Investigate cause of anaemia

- Refer to a clinical specialist (e.g. gastroenterologist) unless:
 - The cause has already been identified
 - or
 - It is not in the patient's best interests (e.g. palliative care patient)

Medication and other substances taken by patient

- Note which drugs and other substances (e.g. herbal remedies) could increase perioperative blood loss
- Advise patient to discontinue herbal remedies 2 weeks before surgery³

Follow 4 Steps algorithm for subsequent management of the adult patient with anaemia

Correct anaemia without delay

- Prescribe appropriate replacement therapy
- Monitor response to treatment after 3 weeks
- Continue or adjust therapy as appropriate
- Aim to have Hb in normal range before surgery¹.
- Delay date of surgery, unless it is not in the patient's best interests

Treat the cause of anaemia

- Refer to appropriate clinical specialist for treatment as appropriate
- For newly detected anaemia it may be beneficial to fully evaluate the cause and associated clinical status before major surgery is undertaken²

Reduce perioperative blood loss

- Discontinue NSAIDs 24 hour preoperatively
- Consider risks vs benefits of preoperative discontinuation of anti platelet drugs (e.g. clopidogrel)
- Consider preoperative switch from warfarin to:
 - Low dose prophylactic LMWH
 - or
 - Bridging therapy with therapeutic LMWH (seek local guidance + expert advice)

TIBC = Total Iron Binding Capacity TSAT = transferrin saturation in %
NSAIDs = Non Steroidal Anti-Inflammatory Drugs, e.g. ~~Diclofenac~~, Ibuprofen
LMWH = Low Molecular Weight Heparin, e.g. ~~Enoxaparin~~, ~~Enoxaparin~~

1. Musallam et al. Preoperative anaemia and postoperative outcomes in non-cardiac surgery: a retrospective cohort study. www.thelancet.com October 2011.
2. World Health Organisation. Worldwide Prevalence of Anaemia 1993-2005. WHO, 2008
3. Goodnough et al. Detection, evaluation, and management of preoperative anaemia in the elective orthopaedic surgical patient: NATA guidelines BJA 2011; 106: 13-22
4. Skinner CM and ~~Ragupathi~~. Preoperative use of herbal medicines: a patient survey J BJA 2002; 89: 792-5

Advantages of Funded Audits

- Ownership of result
- Ability to carryout large scale audits
- Option to carryout audit within or outside of NHS hours
- Multi-professional auditors
- Support from commissioners and N.I. Blood Safety Advisory Committee more readily available
- Admin and conference support

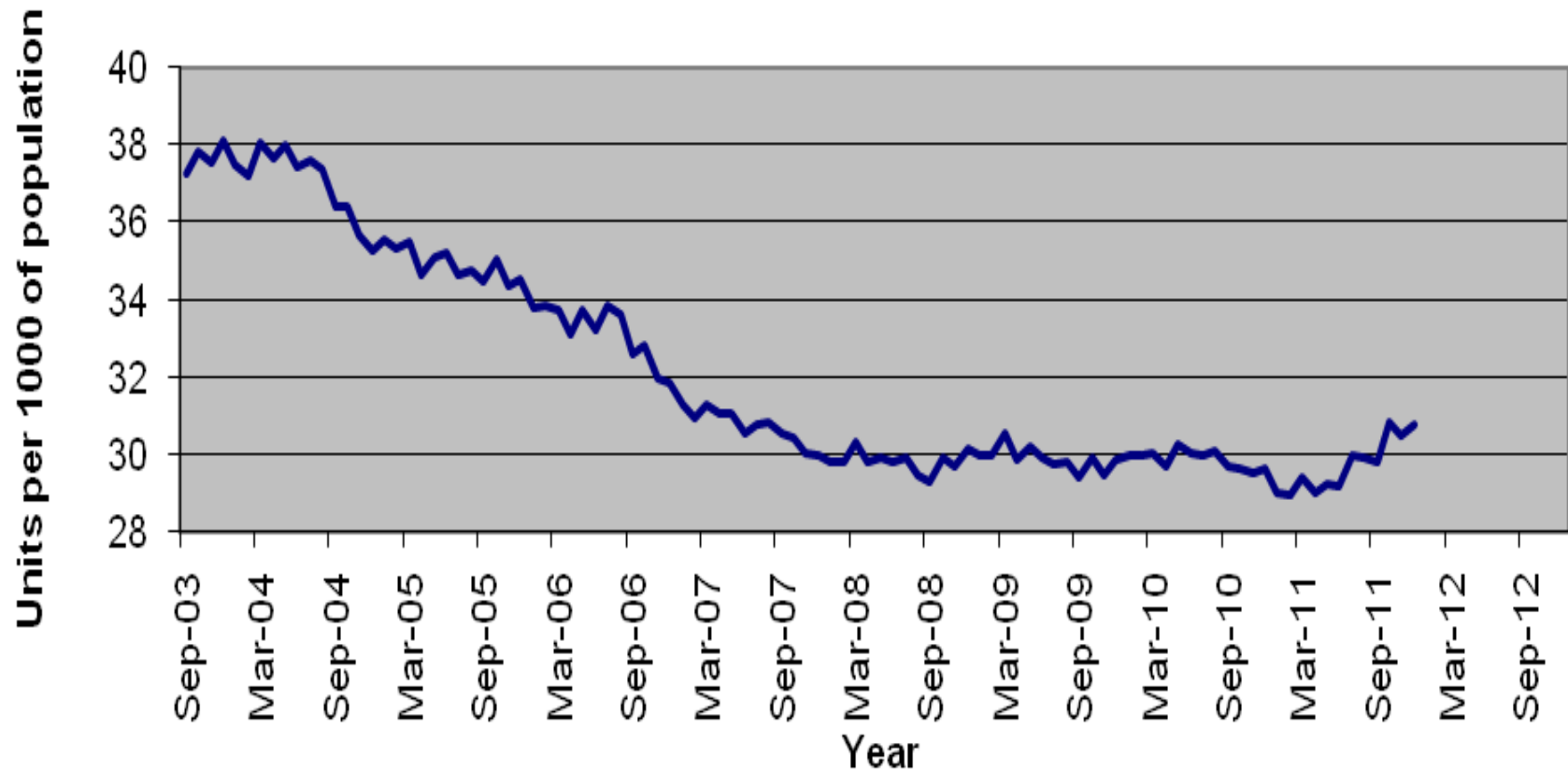
Audit Funding to Date

| | |
|--------------------------------|---------|
| Appropriate use of red cells | £29,918 |
| Pre hospital admission anaemia | £25,000 |
| Appropriate use of IgG | £26,400 |
| Appropriate use of platelets | £18,060 |
| Appropriate use of FFP | £5,000 |
| Appropriate use of Anti D | £28,000 |

£142,378

Red Cell issues

6 Monthly Moving Average



Estimated Product and Component Cumulative Savings

- All funded audits plus unfunded 5% Albumin audit.
Based on pre-audit trends

£10,000,000 over 7 years