

GAIN 

GUIDELINES AND AUDIT  
IMPLEMENTATION NETWORK

# MANAGEMENT OF ANAEMIA AND AVOIDANCE OF TRANSFUSION

A Regional Audit by the  
Northern Ireland Regional  
Transfusion Committee



February 2010



# CONTENTS

<b>Overview</b>	<b>3</b>
<b>Introduction</b>	<b>5</b>
<b>Project Methodology</b>	<b>6</b>
<b>Audit Design</b>	<b>8</b>
<b>Results and recommendations</b>	
Demographic details	10
Could transfusion have been avoided?	13
Inappropriate transfusion	14
Anaemia not identified before hospital admission	16
Anaemia identified but not investigated or treated before hospital admission	18
Anaemia identified and investigated but not treated	20
Areas for practice improvement	21
Over-transfusion	22
Referral to a specialist for investigation of anaemia	24



<b>Discussion</b>	<b>26</b>
<b>Action plan</b>	<b>28</b>
<b>References</b>	<b>30</b>
<b>Appendix 1</b>	<b>32</b>
<b>Appendix 2</b>	<b>40</b>
<b>Acknowledgements</b>	<b>41</b>



## OVERVIEW

Blood transfusion is regarded as very safe in the developed world and its appropriate and timely administration may decrease morbidity in some patients and indeed be life saving in others. However blood is a human derived product and its administration to another carries a number of potential risks. It is generally accepted that blood transfusion should be avoided when a patient does not need it or when their anaemia can be treated by other means. This audit builds on the 2006 Northern Ireland Regional Transfusion Committee's (NIRTC) Audit of the Appropriateness of Transfusion which identified that 85% of transfused patients were anaemic on admission to hospital.

This audit looks in detail at a large population of transfused adult patients in 14 hospitals across Northern Ireland who were identified as being anaemic on admission to hospital. Clinical notes were examined to ascertain if an opportunity existed for haematological optimisation in the period that the patient was known to healthcare professionals in the 6 months before transfusion. Similar to the 2006 Audit the transfusion episode of each patient was examined and determined to be appropriate or not. Finally the clinical notes were examined to ascertain the cause of the presenting anaemia and whether there had been appropriate follow up of the underlying causative conditions.

The audit report concludes that healthcare professionals had an opportunity in approximately one in four patients studied to avoid transfusion. This could have been achieved by proactive correction of anaemia or avoidance of inappropriate transfusion. Iron deficiency was the most common cause of correctable anaemia on hospital admission and in many cases there was little attempt to treat it. Patients with low grade chronic bleeding and malabsorption were identified to be particularly at risk of iron deficiency anaemia.

On a more positive note there appears to have been a considerable improvement in clinical practice since the 2006 Audit with a reduction in inappropriate transfusion from 19% to 6.7% and a reduction in overtransfusion from 29% to 16%.



This report recommends that healthcare professionals in both primary and secondary care need to be more proactive in their identification and management of anaemia to prevent avoidable transfusion. At risk groups for iron deficiency are highlighted and similar to the 2006 Audit it is recommended that all transfusions should be appropriate and overtransfusion should be avoided.

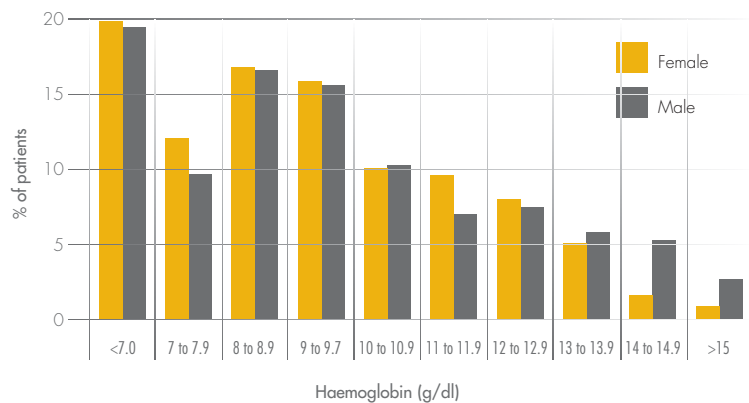


## INTRODUCTION

The NIRTC 2006 Regional Audit was a hospital based audit of the appropriateness of transfusion which identified that almost one in five transfusions could have been avoided and 29% of patients were overtransfused. This audit process led to a significant improvement in transfusion practice across Northern Ireland, as evidenced by a 15% decrease in the number of red cell units transfused from 2005 to 2008.

The 2006 Audit also identified that over 85% of transfused patients were found to be anaemic on hospital admission, as defined by the World Health Organisation:

### Haemoglobin on admission to hospital (2006 Audit)



The 2006 Audit was not designed to examine whether anaemia was diagnosed, investigated or treated correctly prior to transfusion.

Consequently an application was made on behalf of the Northern Ireland Regional Transfusion Committee to the Regional Multiprofessional Audit Group (*now the Guidelines and Audit Implementation Network - GAIN*) to fund a major regional audit project to assess the current management of anaemia. This was granted.



## PROJECT METHODOLOGY

The Regional Transfusion Committee formed a Lead Audit Group for this project. The 11 Transfusion Chairs within Northern Ireland were invited to be part of this group or to nominate a representative. Professor Mike Murphy - Professor of Transfusion Medicine, Oxford joined the group as an external expert to give advice and guidance at key stages of the audit. Additional skilled members were co-opted onto the group for guidance. The Lead Audit Group consisted of a multiprofessional group of medical specialities and transfusion related disciplines.

The Lead Audit Group identified a number of key standards for the audit which were relevant to a wide range of healthcare professionals:

- **Anaemia should be identified when first clinically suspected from suggestive signs or symptoms of anaemia**

*World Health Organisation – Worldwide Prevalence of Anaemia and NIRTC Lead Audit Group consensus*

- **Once anaemia is identified, it should be investigated appropriately by blood tests and other investigations to determine the cause of the anaemia**

*British Society Gastroenterology – Guidelines for the management of iron deficient anaemia and NIRTC Lead Audit Group consensus*

- **If an underlying deficiency is identified (e.g. iron deficiency), appropriate oral replacement therapy should be given**

*NIRTC Regional Appropriateness of Blood Transfusion 2006 Audit and British Society Gastroenterology – Guidelines for the management of iron deficient anaemia*

- **If an iron deficient patient is intolerant of or unable to absorb oral iron therapy, parenteral therapy should be used**

*Handbook of Transfusion Medicine and British Society Gastroenterology – Guidelines for the management of iron deficient anaemia*



- **Patients should only be transfused as per regional guidelines**

*NIRTC Regional Appropriateness of Blood Transfusion 2006 Audit Standards and Guidelines and Audit Implementation Network - Better Use Of Blood In Northern Ireland*

- **Patients should not be transfused more than 2.0g/dl above their transfusion threshold**

*NIRTC Regional Appropriateness of Blood Transfusion 2006 Audit Standards and Guidelines and Audit Implementation Network - Better Use Of Blood In Northern Ireland*

- **Patients requiring transfusion should be referred to a specialist for investigation unless it is considered inappropriate to do so**

*British Society Gastroenterology – Guidelines for the management of iron deficient anaemia and NIRTC Lead Audit Group consensus*



## AUDIT DESIGN

Transfused patients in 2007 who were anaemic, as defined by the World Health Organisation\* on admission to hospital were identified. These patients had their clinical notes examined retrospectively to determine if there was an opportunity to correct anaemia prior to transfusion

### Exclusions

- Children under 16 years.
- Repeated transfusion episodes in the same patient

### Audit sampling

The overall numbers of clinical notes to be examined in detail in each hospital was as follows:

- 120 case notes in the largest (>9000 transfused units per year) user hospitals,
- 60 case notes in the 4 intermediate (4000-7000 transfused units per year) user hospitals and
- 40 case notes in the 8 smaller (500-2000 transfused units per year) user hospitals.

All together 800 sets of clinical notes were to be examined with 40 sets considered the minimum number to be audited to provide meaningful local data. This led to a bias of auditing a higher proportion of patients transfused in the smaller hospitals. Consecutive notes were to be audited from the beginning of 2007 forward until the quota was reached. Every hospital had its own Local Hospital Co-ordinator who was the Transfusion Chair or their nominated representative.

---

\* Defined as male patients with a haemoglobin of <13g/dl, female patients <12g/dl and pregnant females lower than 11g/dl

## Data collectors and training

The data collectors for each hospital were recruited locally on the advice of each Transfusion Chair and came from many varied professional backgrounds. They included staff from haematology, medicine, anaesthesia, haemovigilance, laboratories and nursing. A full training day was attended by the data collectors so that they could:

- Understand the objectives of the audit
- Read the data form and ask questions
- Evaluate the pilot form on selected sets of casenotes
- Suggest changes to the audit form
- Be provided with feedback on their data extraction and interpretation of data.

### **Audit form**

Extensive consultation, trial and review of the audit proforma was undertaken before the final version was accepted (see Appendix 1 for audit proforma).

### **Instruction manual**

An instruction manual was sent to all data collectors to aid the selection of cases to be audited. Master log sheets were also sent out for completion.

### **Data collection**

Data collection took place between June 2008 and April 2009. Forms were checked by an audit facilitator as they came in for completeness and overall quality of data collection.

### **Expert review**

All forms were checked independently by two consultant reviewers. When the expert reviewers were not in complete agreement – the disputed forms were further examined and an agreed decision was reached. In all cases where it was considered that transfusion could have been avoided, a final review was undertaken.



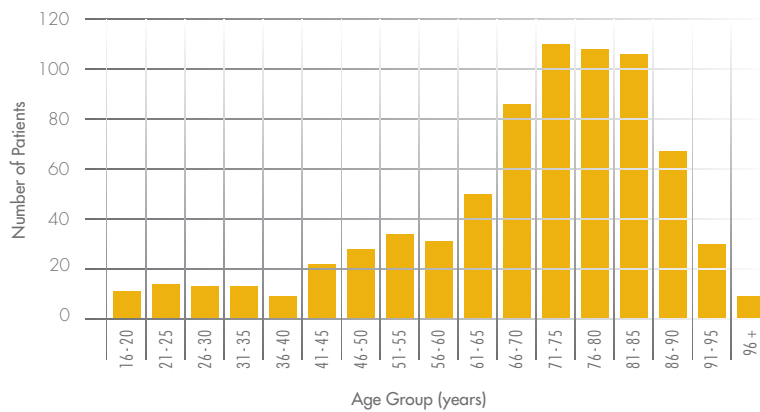
## RESULTS AND RECOMMENDATIONS

Fourteen hospitals participated in the audit. All hospitals audited the required number of case notes apart from one hospital which returned 57 rather than 120 forms. The final sample size was 743 out of the original 800 episodes proposed.

### Demographic details

The age distribution of the patients transfused is illustrated:

**Age distribution of transfused patients**

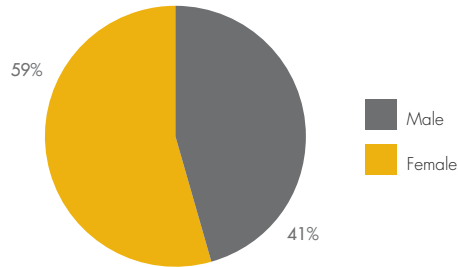


The mean age of the patients was 69 years and the median age was 73 years. This is a similar age distribution to the NIRTC 2006 Audit.

The breakdown of transfused patients by gender showed more audit episodes of transfused patients who were anaemic on admission to hospital occurred in females than in males. A preponderance of females amongst transfused patients was also a finding in the previous NIRTC 2006 Audit.

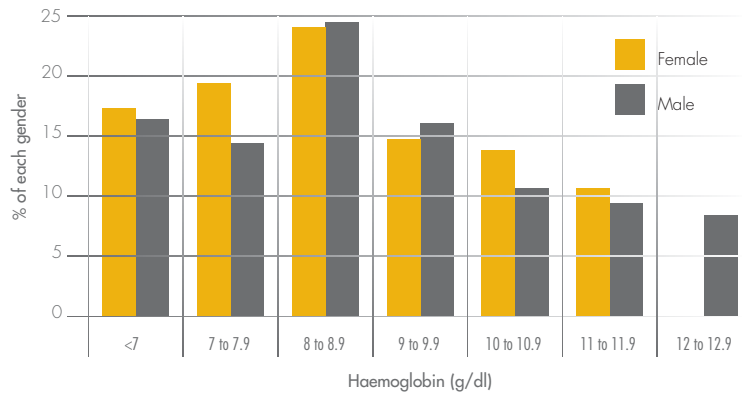


## Transfused patients by gender



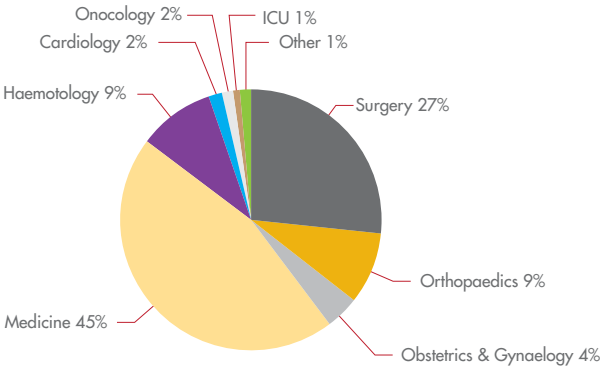
The profile of haemoglobin concentrations on admission of this preselected group of patients is illustrated in the diagram below:

## Transfused patients - Haemoglobin on hospital admission by gender



The audit showed that 60% of transfused patients were admitted under a medical speciality compared to 40% under a surgical speciality.

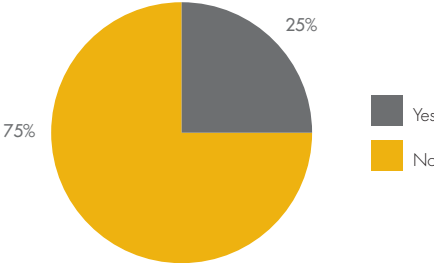
### Transfused patients by speciality



# Could transfusion have been avoided?

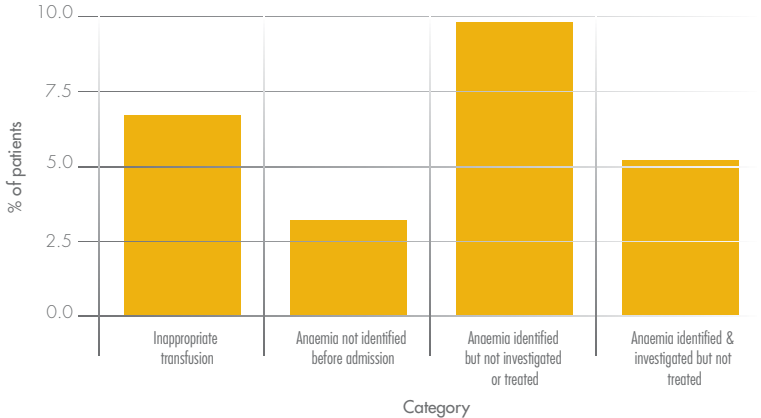
The audit sought to identify if opportunities had been missed to identify, investigate and treat anaemia in this group of patients who were subsequently transfused. Transfusions which did not meet the regionally agreed transfusion thresholds were also considered avoidable.

## Could transfusion have been avoided?



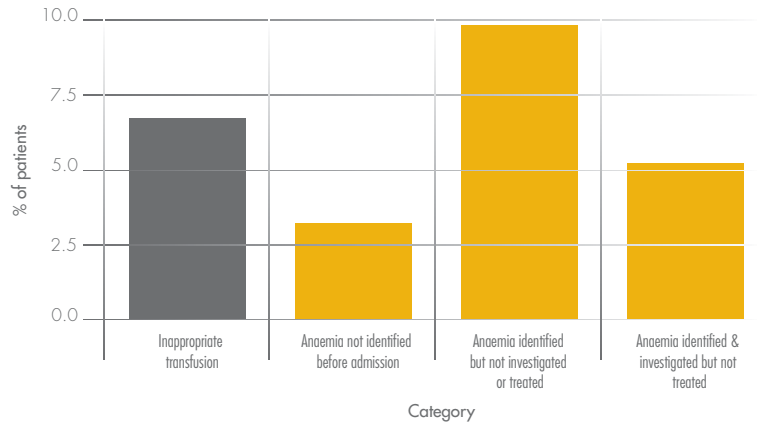
In 25% of the audit sample transfusion could have been avoided; the reasons for are illustrated in the graph below:

## How transfusion may have been avoided



## Inappropriate transfusion

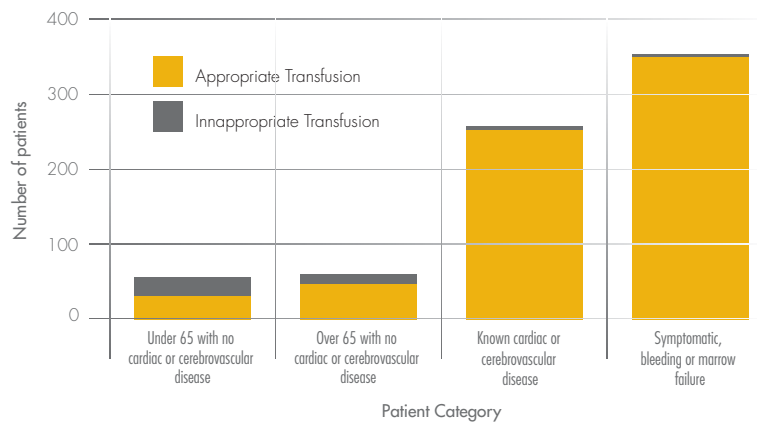
### How transfusion may have been avoided



The inappropriate transfusion rate in the audit was 6.7% based on the regionally agreed thresholds for transfusion (see Appendix 2). This compares favourably with the figure of 19% in the NIRTC 2006 Audit.

The distribution of appropriateness of transfusion for different transfusion thresholds is shown below:

### Transfusion by patient category





Of the 6.7% (50 patients) with inappropriate transfusions 52% (26 patients) occurred in asymptomatic, stable patients under 65 years of age. 26% (13 patients) of inappropriate transfusions occurred in patients over 65 years of age with no cardiac or cerebrovascular disease. Some 70% of patients receiving inappropriate transfusions in the 2006 Audit were similarly identified in these two categories.

### **Recommendation 1**

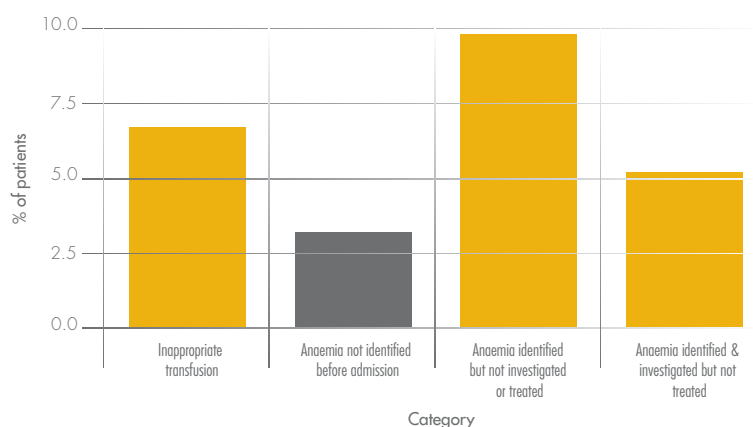
Patients should only be considered for transfusion if their haemoglobin concentration has fallen below their transfusion threshold. Particular attention should be paid to stable patients without cardiac or cerebrovascular disease who have lower transfusion thresholds.



## Anaemia not identified before hospital admission

In order to prevent transfusion associated with anaemia clinicians should have a high index of suspicion for anaemia, especially when risk factors are present. In 3.2% of cases – an obvious opportunity to detect anaemia was clearly missed:

### How transfusion may have been avoided



#### Example

A 41 year old lady with a history of menorrhagia was admitted for hysterectomy. On admission her haemoglobin was found to be 7.3g/dl, MCV 68fl and MCH 19pg. She had been seen pre-operatively by medical staff but her blood count had not been taken before admission and she was on no treatment. In hospital a diagnosis of iron deficiency anaemia was made and the patient was subsequently transfused 2 units.

Failure to check the blood count was a common problem, when patients presented to either primary care or hospital out-patient clinics with ongoing low grade bleeding such as menorrhagia, bleeding haemorrhoids or haematuria.



Some patients with malabsorption syndromes such as those with coeliac disease were also reviewed in out patient clinics without a blood count being checked until they became symptomatic and needed urgent transfusion. In almost all of these cases of chronic low grade bleeding and malabsorption – iron deficiency anaemia had developed, which if identified and treated earlier could have obviated the need for transfusion.

### **Recommendation 2**

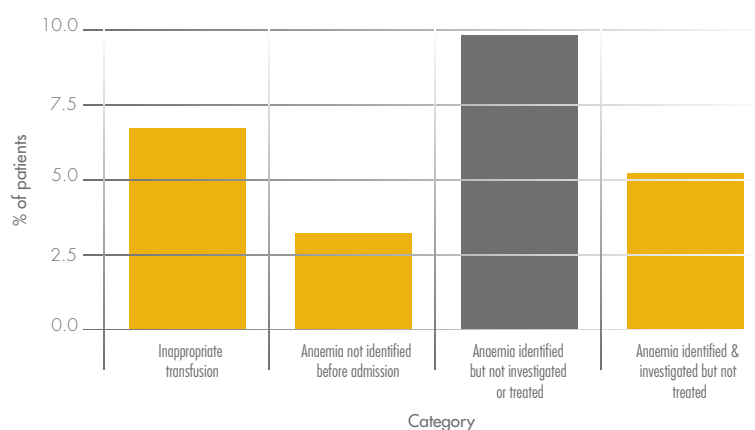
Healthcare professionals should have a high index of suspicion to check for correctable anaemia in patients with low grade chronic bleeding and malabsorption syndromes.



## Anaemia identified but not investigated or treated before hospital admission

In this group of patients a healthcare professional checked the blood count but the low haemoglobin result was not acted upon, to either identify the underlying cause or instigate corrective treatment. This was the largest group of patients identified (9.8%) where transfusion could have been avoided.

### How transfusion may have been avoided



### Example

A 63 year old man with cardiac disease was seen at a Urology out patient clinic for haematuria. His haemoglobin was checked and found to be 9.2 g/dl with MCV 75fl. No further investigations were undertaken and no treatment was started for the anaemia. 4 months later the patient was admitted in left ventricular failure with a haemoglobin of 7.8g/dl, MCV 65fl, MCH 19pg and ferritin 12ng/ml – all indicating severe iron deficiency anaemia. The patient was transfused 3 units of red blood cells and his Hb was 10.5g/dl on discharge.

The patient was discharged without iron therapy and when reviewed as an outpatient some three months later – he was still iron deficient. Only then was he commenced on oral iron therapy.



This group of patients commonly suffered from chronic low grade bleeding, malabsorption or nutritional deficiency. There were examples of transfused patients with bowel cancer presenting at primary care with tiredness, found to be anaemic, referred to a hospital outpatient clinic, underwent endoscopy with positive diagnosis and were later admitted for surgery. Over this 6 to 8 week period iron deficiency anaemia was neither assessed nor treated with iron replacement to potentially avoid transfusion. Transfused patients with haematuria and menorrhagia had a similar chronicle of events. There were several examples where patients were followed up over months prior to surgery when the anaemia was neither appropriately investigated nor treated.

Transfused medical patients with malabsorption syndromes, inflammatory bowel disease or nutritional insufficiency frequently had anaemia noted and medical efforts were primarily focused on correcting the underlying disease without treating the haematinic deficiency.

### Recommendation 3

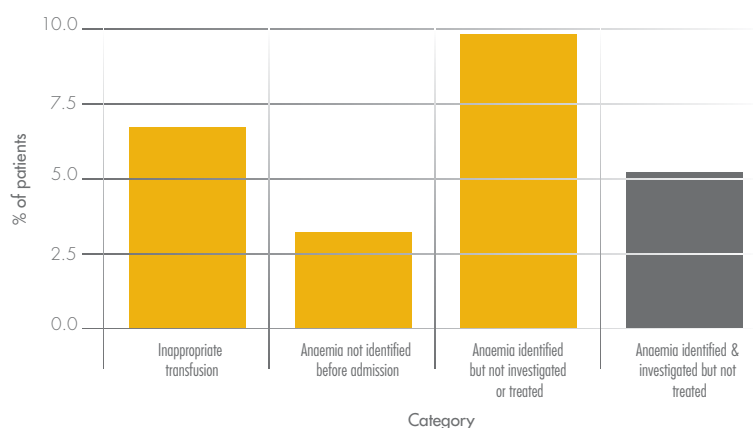
**Anaemia** is often the first sign of an underlying disease process which needs investigation and treatment. Anaemia should be investigated for simple haematinic deficiencies which can be treated in parallel with the investigation and treatment of the underlying cause.



## Anaemia identified and investigated but not treated

In the final category of transfused patients the cause of the anaemia had been investigated but appropriate treatment had not been administered.

### How transfusion may have been avoided



Some 5.2% of the patients in the audit were in this category.

#### **Example**

*A 24 year old female had several inpatient admissions where microcytic anaemia had been identified. Iron was prescribed but the patient did not comply and when she was admitted for major surgery - her haemoglobin was 8g/dl, MCV 67fl and MCH 19pg – all consistent with severe iron deficiency anaemia. The patient was transfused 3 units of red blood cells peri-operatively.*

There were several reasons why an anaemia already identified and investigated was not treated. Reasons included failure to prescribe haematinic treatment and patient non compliance.

#### **Recommendation 4**

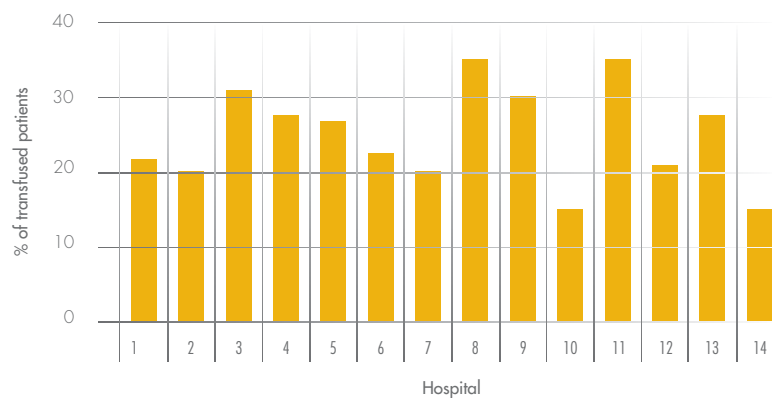
**Healthcare professionals** have a duty of care to anaemic patients with a clear underlying deficiency to ensure that they receive the appropriate haematinic medication to treat their anaemia and to avoid transfusion. If the oral route cannot be used then parenteral therapy should be considered.



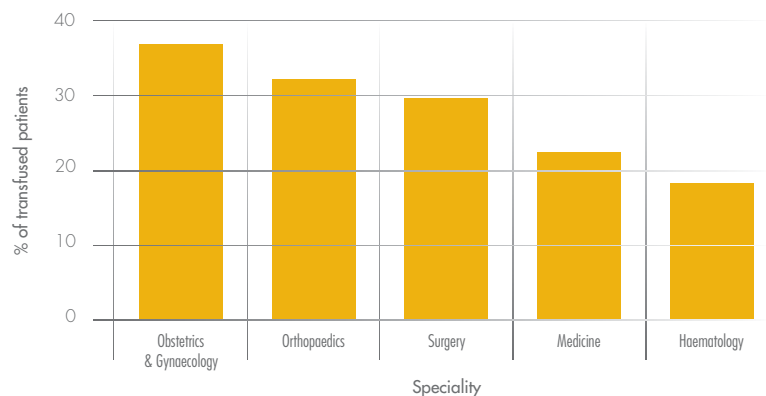
## Areas for practice improvement

Opportunity existed within all hospitals and all major admitting specialities to avoid transfusing patients:

### Avoidable transfusion by hospital



### Avoidable transfusion by admitting speciality



Professionals in primary care also had many opportunities to identify, investigate and treat patients before their hospital admission and subsequent transfusion.

### Recommendation 5

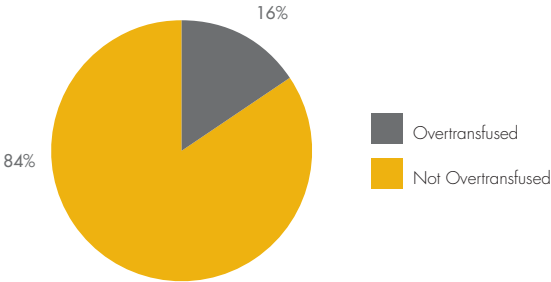
Education on strategies to prevent avoidable transfusion should be conducted regionally across all areas of care



# Overtransfusion

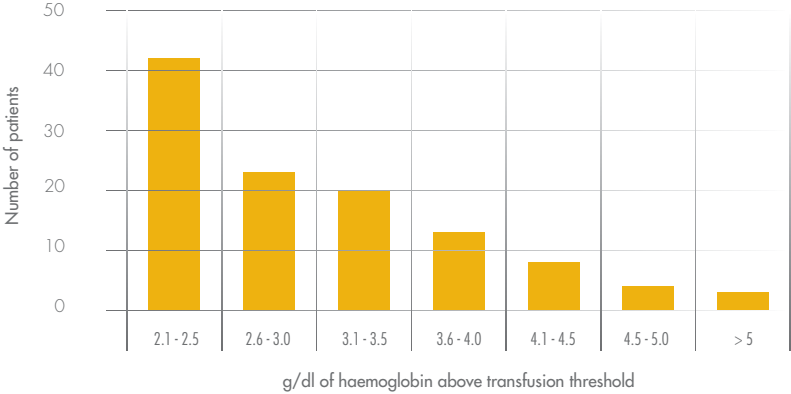
**Overtransfusion** is defined as transfusion to a haemoglobin value more than 2.0g/dl above a patient’s transfusion threshold for that episode. This was identified in 16 % of transfused patients:

**Occurrence of overtransfusion**



This graph below illustrates the extent of overtransfusion:

**Rise in haemoglobin above transfusion threshold in overtransfused patients**

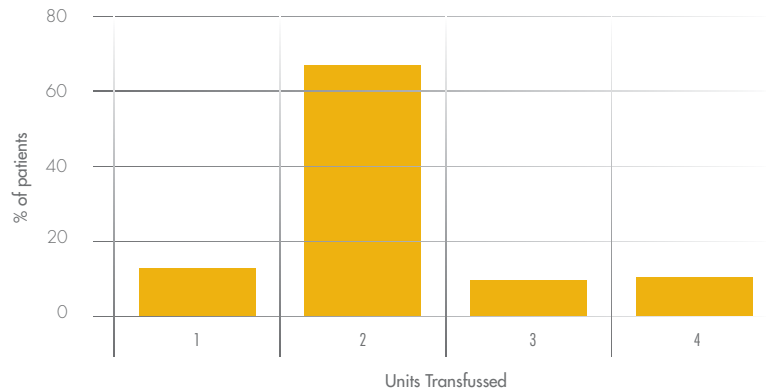


Overtransfusion occurred most often following a transfusion of 2 units of red cells, suggesting that sometimes a single unit transfusion is sufficient.



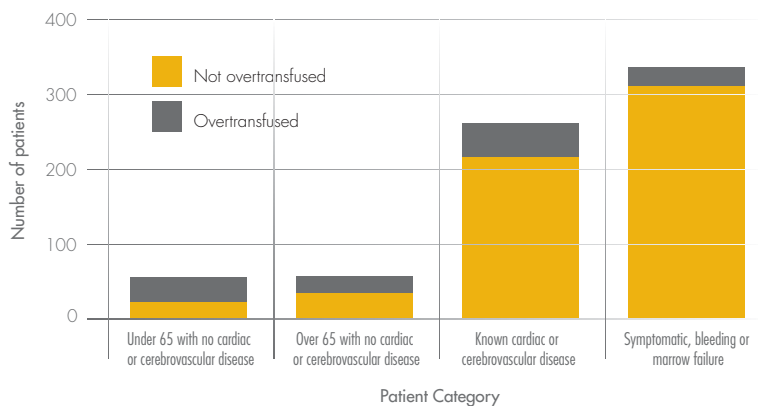


## Number of units transfused in overtransfused patients



The relative incidence of overtransfusion was highest in the lower transfusion threshold groups ranging from 58% in the lowest group, to less than 8% in the highest threshold group.

## Overtransfused by transfusion threshold



### Recommendation 6

**Overtransfusion** should be avoided. When deciding on the number of units to transfuse, consideration should be given to the transfusion threshold of the patient, the size of the patient and whether or not significant active bleeding is present. Single unit transfusions may be appropriate in some cases.



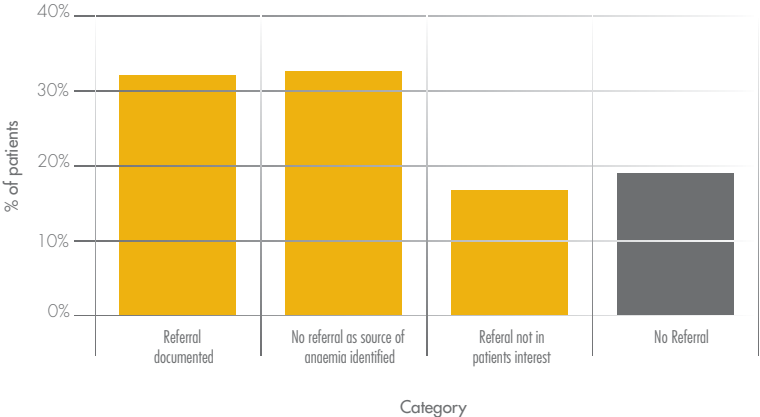
# Referral to a specialist for investigation of anaemia

## Example

A 77 year old lady was pre-assessed before a hip replacement and found to be anaemic with a haemoglobin of 10.1g/dl, MCV 84.8fL and ferritin 11.0ng/ml, indicating iron deficiency. She was admitted to hospital 7 weeks later with haemoglobin of 10.3g/dl and was transfused a single unit of red cells in the peri-operative period. She was discharged two days after transfusion and there was no documented letter or note of either any ongoing investigations or referral to a specialist for followup of the iron deficiency anaemia.

When patients are discovered to have a previously undiagnosed anaemia – particularly when it is caused by an underlying iron deficiency – they should be referred to a specialist for investigation of the underlying disease process. This referral should be clearly documented in the notes or the reason for not doing so clearly outlined. The breakdown of referral documentation is illustrated below:

## Documented referral to specialist for investigation of anaemia



32% of patients had a specialist referral clearly documented and another 32.5% had a known cause for the anaemia. In 16.5% of cases - investigations were not considered to be in the patient's best interest. In 19% of cases a specialist referral was not documented in the notes.

### **Recommendation 7**

Healthcare Professionals should ensure that all patients with unexplained anaemia are investigated for an underlying cause unless it is not in the patient's best interest to do so.

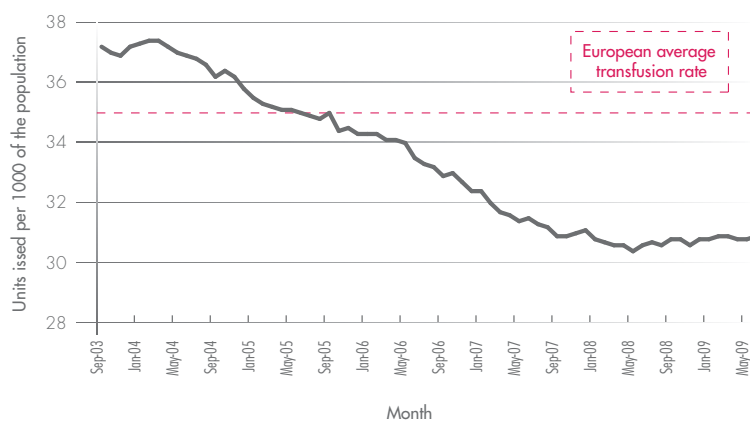


## DISCUSSION

Limitations of this audit include the fact that patients who were not anaemic on admission and subsequently transfused were excluded, only one transfusion episode per patient was audited, considerable case note unavailability interfered with successive case note auditing in several hospitals and transfusion episodes in the smaller hospitals were overrepresented – all of which may have introduced some bias. Also in terms of the overall management of patients with anaemia the audit only represents a sample of anaemic patients who were subsequently transfused. It does not consider patients who were found to be anaemic, were appropriately investigated, treated and not transfused.

While the audit populations in the NIRTC 2006 Audit into the Appropriateness of Blood Transfusion and the current audit are not the same populations because of the particular inclusion nature of the audits – they have some demographic similarities as evidenced by patient age distribution and gender mix. It is noted inappropriate transfusion has decreased from 19% in the 2006 audit to 6.7% in this current audit and likewise overtransfusion has decreased from 29% to 16%. This suggests a considerable improvement in clinical practice since the NIRTC 2006 Audit was published and further evidence for this is the marked reduction in the number of red cells issued regionally as illustrated below:

### 12 Monthly issue of red cells in Northern Ireland (Moving average)



Red cell issues decreased by over 15% from 2005 to 2008 and this transfusion index now remains steady between 30 to 31 units per 1000 of the population.

Northern Ireland as a developed healthcare system within the European Union now has a very restrictive transfusion regime with a transfusion index 15% below the EU average. However additional improvement is possible and this audit report marks out scope for further reduction in red cell transfusion by the appropriate identification, investigation and treatment of anaemia before transfusion is necessary.

The detailed action plan on the following pages provides a framework for doing this.



## ACTION PLAN

### Statement of intent

*“It is a duty of care for healthcare professionals to have an awareness of anaemia and its investigation and management in their patients to avoid transfusion and its possible complications”*

- The results of the audit should be widely distributed to all Trusts and healthcare professionals

**Action: NI Regional Transfusion Committee and Lead Audit Group**

- An educational presentation of this audit should be made available to all Hospital Transfusion Committees and Haemovigilance Practitioners

**Action: NI Regional Transfusion Committee and Lead Audit Group**

- A regional education study day on anaemia should be organised to highlight the issues in this audit

**Action: NI Regional Transfusion Committee**

- The investigation and treatment of anaemia should be part of the training of Healthcare Professionals.

**Actions: Trusts, Hospital Transfusion Committees, Haemovigilance Practitioners and Medical Educators.**

- Healthcare professionals should have increased awareness of iron deficiency anaemia in at risk patient groups such as patients with bowel cancer, haematuria, menorrhagia, inflammatory bowel disease and those with nutritional deficiencies.

**Action: NI Regional Transfusion Committee, Haemovigilance Practitioners, Hospital Transfusion Committees**



- A regional pathway for the initial investigation and treatment of anaemia should be developed and made available to all healthcare professionals

**Action: NI Regional Transfusion Committee**

- In cases of iron deficiency – Usually patients should be treated with a trial of oral iron initially and reviewed after 3 weeks to check for response. When there is no response which may be due to intolerance or poor compliance – parenteral iron should be considered

**Action: All healthcare professionals**

- Trusts should ensure that there are adequate arrangements for the pre-operative assessment of patients. For planned surgery, the arrangements for pre-operative assessment should permit the diagnosis and correction of anaemia in advance of surgery and optimisation of haemostatic function peri-operatively.

**Actions: Trusts and Pre-assessment Clinics**

- Trusts should ensure the 2009 GAIN Guidelines for Blood Transfusion Practice are implemented and monitored.

**Actions: Trusts, Hospital Transfusion Committees and Haemovigilance Practitioners**

- Trusts should regularly audit avoidable transfusion to promote improvement in practice

**Actions: Trusts, Hospital Transfusion Committees and Haemovigilance Practitioners**



## REFERENCES

### **Better Use Of Blood In Northern Ireland**

Guidelines for Blood Transfusion Practice

Guidelines and Audit Implementation Network March 2009.

### **Blood Conservation In Elective Orthopaedic Surgery**

British Orthopaedic Association April 2005

### **Blood Transfusion And The Anaesthetist**

Red Cell Transfusion 2

Association of Anaesthetists of Great Britain and Ireland (2008)

### **Guidelines for the Management of Iron Deficiency Anaemia**

British Society of Gastroenterology May 2005

### **Guidelines for the Use of Red Cell Transfusions**

British Committee for Standards in Haematology Blood Transfusion Task Force (2001).

### **Handbook of Transfusion Medicine** 4th Edition January 2007

### **Health Services Circular HSC 2002/009**

Better Blood Transfusion – Appropriate use of blood

### **HSS Circular MD6/03**

Better Blood Transfusion – Appropriate use of blood 2003

### **Minutes from September 2006 – September 2009**

The Northern Ireland Regional Transfusion Committee





**Northern Ireland Blood Issues 2003-2009**

Northern Ireland Blood Transfusion Service

**Perioperative Blood Transfusion for Elective Surgery**

Scottish Intercollegiate Guidelines Network 2001

**Regional Appropriateness of Blood Transfusion Audit – Summary Report**

The Northern Ireland Regional Blood Transfusion Committee 2006

**Serious Hazards of Transfusion (SHOT) reports 2007 and 2008**

**Worldwide Prevalence of Anaemia 1993–2005**

World Health Organisation (2008)



# APPENDIX 1

## NIRTC 2007 PRE TRANSFUSION ANAEMIA AUDIT PROFORMA

1. Hospital Code Number:      
*Identifier code – Number allocated to hospital and will remain the same for the entire data collection period.*
2. Patient Code Number:      
*This number must be an individual identifier code number that is generated so that the chart can be traced at a later date if required for peer review. At the conclusion of the audit the master record will be destroyed*
3. Date of red cell transfusion:   /   /    
*Actual date patient received blood*
4. Gender:  Male  Female
5. Speciality patient admitted under: ..... *Enter the admitting speciality the patient comes under e.g. medicine/surgery*
6. Patient age:     Years  
*At time of transfusion*
7. Patient postal code:          
 B T 1 5 3 A B
8. Admission date:   /   /    
 Day Month Year  
*Date of the admission to hospital in the admission episode that the patient was transfused*
9. Admitting condition/diagnosis/reason for admission:  
*Usually found in the doctors or nurses admission notes e.g. Pneumonia, Heart Failure, Knee surgery etc*  
 .....
10. Co-Morbidity (Please tick relevant box/boxes as indicated):  
*All diseases the patient may have on admission – can be found on the admission notes ( include admitting condition)*

<b>Cardiac</b> Previous MI, Angina, Heart failure <input type="checkbox"/> Peripheral vascular disease <input type="checkbox"/> Hypertension <input type="checkbox"/>  <input type="checkbox"/> Inflammatory Bowel Disease <input type="checkbox"/> Other Gastrointestinal Diseases  <input type="checkbox"/> Current Chemotherapy, Radiotherapy or Marrow failure (or treatment in last 3 months)  <input type="checkbox"/> Other morbidities, please specify	<input type="checkbox"/> Cerebrovascular <i>Previous CVA (Stroke), TIA</i>  <input type="checkbox"/> Chronic Obstructive Airways Disease  <input type="checkbox"/> Bowel Cancer <input type="checkbox"/> Patient on Aspirin / NSAIDS	<input type="checkbox"/> Arthritic Disease  <input type="checkbox"/> Renal Impairment  <input type="checkbox"/> Liver Impairment  <input type="checkbox"/> Coeliac Disease
--	--	--



15.

### Outpatient and Pre-assessment reviews.

*(If none 6 months before transfusion – go to Q 18)*

**All Outpatient and Pre-assessment reviews within 6 months of transfusion date**

Speciality	Days before Transfusion	Did patient attend?	Tests <i>(enter values please)</i>							Documented as anaemic?	Treatments <i>(please tick)</i>						
			Hb	MCV	Iron	Ferritin	Serum Folate	Red Cell Folate	Serum B12		Oral Iron	IV Iron	Vitamin C	Vitamin B12	Folic Acid	Erythropoietin	

16. Was there a missed opportunity to identify / treat the patients anaemia before hospital admission from the information above? Yes  No  Unsure

17. Additional notes / comments on above:

### Patient Influences

18. Compliance of patient to treatment from notes *(read comments from medical/nursing notes etc)*

- Good
- Poor  Not Applicable
- Can't tell

19. If non Compliance – reasons:

- Intolerant of oral medication
- Non compliant
- Can't tell
- Other .....

20. Were alternatives offered / considered / given IV iron  Vitamin B<sub>12</sub>  None

Other .....

## Summary of Pre Hospital Diagnosis

21. What was the diagnosed cause of the anaemia before the patient was admitted to hospital

- |                              |                          |
|------------------------------|--------------------------|
| Iron deficiency anaemia      | <input type="checkbox"/> |
| Anaemia of chronic disease   | <input type="checkbox"/> |
| Megaloblastic Anaemia        | <input type="checkbox"/> |
| Active Bleeding              | <input type="checkbox"/> |
| Haemolytic anaemia           | <input type="checkbox"/> |
| Other known cause of anaemia | .....                    |
| Unknown cause                | <input type="checkbox"/> |
| Not Investigated             | <input type="checkbox"/> |
| Not Anaemic before hospital  | <input type="checkbox"/> |

22. Other relevant information (*Other tests, compliance issues etc*)

.....

## The Hospital Admission

23. Route of admission

- |                                |                          |
|--------------------------------|--------------------------|
| GP                             | <input type="checkbox"/> |
| A&E                            | <input type="checkbox"/> |
| From Outpatient Clinic         | <input type="checkbox"/> |
| Transfer from another hospital | <input type="checkbox"/> |
| Outpatient transfusion         | <input type="checkbox"/> |

24. Results on admission to hospital:

*This should be the haemoglobin result from the Full Blood Count done on the day the patient was admitted to hospital or the first haemoglobin done in the hospital – use lab computers if result is not in notes.*

- |                   |  |
|-------------------|--|
| Haemoglobin       | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> g/dl |
| MCV on admission: | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>                               |
| MCH on admission  | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>                               |

25. Was a diagnosis already made / confirmed of this anaemia at admission

- |                            |                          |
|----------------------------|--------------------------|
| Iron deficiency anaemia    | <input type="checkbox"/> |
| Anaemia of chronic disease | <input type="checkbox"/> |
| Megaloblastic Anaemia      | <input type="checkbox"/> |
| Haemolytic Anaemia         | <input type="checkbox"/> |
| Active Bleeding            | <input type="checkbox"/> |
| Unknown cause              | <input type="checkbox"/> |
| Other                      | .....                    |



26. What treatments was the patient on admission to hospital  
*(Examine medical/nursing admission notes)*

None	<input type="checkbox"/>			<b>Other list below</b>
Oral Iron	<input type="checkbox"/>	Vitamin B <sub>12</sub>	<input type="checkbox"/>	.....
I.V. Iron	<input type="checkbox"/>	Folic Acid	<input type="checkbox"/>	.....
Vitamin C	<input type="checkbox"/>	Erythropoietin	<input type="checkbox"/>	.....

27. If the cause of the anaemia was either not established or uncertain - were appropriate further investigations of this anaemia carried out before transfusion?

			Results
Low MCV	Iron	<input type="checkbox"/>	.....
	Ferritin	<input type="checkbox"/>	.....
	Coeliac Serology	<input type="checkbox"/>	.....
Normal MCV	Blood film examined	<input type="checkbox"/>	.....
	Iron	<input type="checkbox"/>	.....
	Ferritin	<input type="checkbox"/>	.....
	Vitamin B <sub>12</sub>	<input type="checkbox"/>	.....
	Red Cell Folate	<input type="checkbox"/>	.....
	Serum Folate	<input type="checkbox"/>	.....
	Renal Function	<input type="checkbox"/>	.....
	Liver Function	<input type="checkbox"/>	.....
	Haemolysis screen	<input type="checkbox"/>	.....
	Autoimmune screen	<input type="checkbox"/>	.....
	Bone marrow	<input type="checkbox"/>	.....
Other	<input type="checkbox"/>	.....	
High MCV	Vitamin B <sub>12</sub>	<input type="checkbox"/>	.....
	Serum Folate	<input type="checkbox"/>	.....
	Red Cell Folate	<input type="checkbox"/>	.....
	Liver Function	<input type="checkbox"/>	.....
	Thyroid Function	<input type="checkbox"/>	.....

28. What was the **final in hospital** diagnosis of the anaemia leading to transfusion

*(Check notes / discharge notes to see if different to the pre hospital diagnosis)*

- |                            |                          |                          |                          |
|----------------------------|--------------------------|--------------------------|--------------------------|
| Iron deficiency anaemia    | <input type="checkbox"/> | Not Investigated         | <input type="checkbox"/> |
| Anaemia of chronic disease | <input type="checkbox"/> | Investigated but unknown | <input type="checkbox"/> |
| Megaloblastic Anaemia      | <input type="checkbox"/> | Other                    | .....                    |
| Haemolytic Anaemia         | <input type="checkbox"/> |                          | .....                    |
| Active Bleeding            | <input type="checkbox"/> |                          | .....                    |
| Surgery                    | <input type="checkbox"/> |                          | .....                    |

29. What was the range of the Haemoglobin while patient was in hospital prior to transfusion

*Highest to lowest results from lab computer/notes*  g/dl to  g/dl

30. What was the MCV range during this time  to

31. Additional corrections for anaemia in hospital *(tick all used)*

- |           |                          |                         |                          |                  |
|-----------|--------------------------|-------------------------|--------------------------|------------------|
| None      | <input type="checkbox"/> |                         |                          | Other list below |
| Oral Iron | <input type="checkbox"/> | Vitamin B <sub>12</sub> | <input type="checkbox"/> | .....            |
| I.V. Iron | <input type="checkbox"/> | Folic Acid              | <input type="checkbox"/> | .....            |
| Vitamin C | <input type="checkbox"/> | Erythropoietin          | <input type="checkbox"/> | .....            |

32. Who decided that the patient was to have the blood transfusion?  Unknown

Identify the most senior person involved in this decision from the documented notes

Speciality: (if known) ..... Grade of doctor: (if known) .....

33. Date of documented decision:

*This is the date in the notes that there was a decision made to give blood* //  Unknown  
Day Month Year

34. Documented reason for transfusion request *(From Notes)*  Not

- Documented
- |             |                          |                             |                          |
|-------------|--------------------------|-----------------------------|--------------------------|
| Anaemia     | <input type="checkbox"/> | Bleeding                    | <input type="checkbox"/> |
| Symptomatic | <input type="checkbox"/> | Other <i>(Please State)</i> | .....                    |

35. Patients Transfusion Threshold  g/dl

*Based on NIRTC guidelines*

36. Pre-transfusion haemoglobin:  g/dl

*This should be the haemoglobin immediately (or closest) prior to the patient being transfused – if not documented you may need to use lab computer. For outpatients use the most recent pre-transfusion haemoglobin result.*

37. Date of this haemoglobin result //

*Date of above result* Day Month Year

38. Was this an appropriate transfusion? Yes  No

*Based on NIRTC thresholds*

39. How many units were transfused within a 24 hour period following this episode?  units

*On compatibility form or fluid balance sheet. All blood transfusions before the next haemoglobin check or within a 24 hour period after starting that transfusion if the haemoglobin is not checked is to be regarded as one episode*

40. Patient's haemoglobin after this transfusion:    g/dl  
*First haemoglobin done after transfusion*

41. Date of this haemoglobin result   /   /    
Day Month Year

42. Did the haemoglobin after transfusion suggest an overtransfusion?  
*(i.e. more than 2g/dl above the Transfusion Threshold in Q. 38?)* Yes  No

43. Total number of units transfused on this admission \_\_\_\_\_ Units

44. Medicines on discharge

Iron	<input type="checkbox"/>
Vitamin B12	<input type="checkbox"/>
Folic acid	<input type="checkbox"/>
Not Known	<input type="checkbox"/>
Not Discharged	<input type="checkbox"/>

45. Haemoglobin at discharge \_\_\_\_\_ g/dl *(closest result to discharge date)*

46. Date of discharge   /   /    
Day Month Year

47. Was there either a referral to a specialist for full investigation of anaemia ( e.g. to a specialist GI physician / surgeon / haematologist) or were investigations carried out locally as per as per best practice  
*(If unsure - see best practice guidance with instructions)*

Yes – referral documented in notes	<input type="checkbox"/>
No indication <i>(obvious source of anaemia identified)</i>	<input type="checkbox"/>
No referral or investigations ongoing or carried out	<input type="checkbox"/>
Referral appears not to be in clinical interests of the patient <i>(e.g. in some severe chronic/ terminal disease states)</i>	<input type="checkbox"/>



48. Summary of Investigations and treatment:

*From information you have filled in already on pages 1 to 7 – fill in as many of the 3 columns below that you can*

	GP or A & E	Out Patient Reviews	Hospital
Seen by Above	Yes / No <i>If no go to next column ----&gt;</i>	Yes / No <i>If no go to next column -----&gt;</i>	Yes / No
FBC Check	Yes / No	Yes / No	Yes / No
Patient known to be Anaemic at this time from either history or results	Yes / No <i>If no to above go to next column ----&gt;</i>	Yes / No <i>If no to above go to next column -----&gt;</i>	Yes / No
<b>Cause of Anaemia Investigated</b>	Yes / No	Yes / No	Yes / No
Diagnosis Already Known	Yes / No	Yes / No	Yes / No
No Investigations	Yes / No	Yes / No	Yes / No
Blood Investigations	Yes / No	Yes / No	Yes / No
Specialist Referral	Yes / No	Yes / No	Yes / No
<b>Cause of Anaemia Diagnosed</b>	Yes / No	Yes / No	Yes / No
Diagnosis Already Known	Yes / No	Yes / No	Yes / No
Diagnosis made <i>(if none write None)</i>			
<b>Anaemia Appropriately Treated</b> <i>(by Treatments given)</i>	Yes / No	Yes / No	Yes / No

49. In your opinion could transfusion have been avoided in this patient

*Consider both better optimisation and avoidance of inappropriate transfusion*

Yes  No

*If no go to Q. 51*

50. Explain how you feel transfusion may have been avoided:

Inappropriate Transfusion

Anaemia not identified before admission

Anaemia identified but not adequately investigated (or treated)

Anaemia identified and investigated but not adequately treated

Other

51. **Comments/Discrepancies Noted:**

*Please record below any discrepancies / incidents noted during data collection i.e. incorrect results recorded in notes and acted upon, results available but not acted upon, multiple transfusions with correctable cause etc.*

## APPENDIX 2

<b>Stable Patients</b>	<b>Transfusion Threshold</b>
< 65 years old with no cardiovascular or cerebrovascular problems.	Usually only consider transfusion when Hb < 7g/dl
> 65 years old with no cardiovascular or cerebrovascular problems.	Usually only consider transfusion when Hb < 8g/dl
Known cardiovascular or cerebrovascular history (previous myocardial infarction, angina, hypertension, heart failure, peripheral vascular disease pulmonary oedema).	Usually only consider transfusion when Hb < 9g/dl

<b>Patients with symptoms due to anaemia Unstable patients bleeding heavily Impaired marrow function</b>	<b>Transfusion Threshold</b>
Symptoms (dyspnoea, angina, palpitations, tachycardia, orthostatic hypotension, syncope) likely to be due to the anaemia.	Consider transfusion when Hb < 10g/dl
Note - Tiredness alone is not an appropriate symptom for transfusion	
Documented/obvious evidence of ongoing significant bleeding at time of transfusion causing symptoms as above or bleeding more than 500ml per hour and not stopping.	Consider transfusion when Hb < 10g/dl
Current or recent (within 3 months) marrow failure or chemotherapy or radiotherapy.	Consider transfusion when Hb < 10g/dl



## ACKNOWLEDGEMENTS

### **The Northern Ireland Regional Transfusion Committee (NIRTC) Project Lead Audit Group**

Dr Damien Carson	<i>Project Lead</i>	
Dr Kieran Morris	} <i>Assistant Projects Leads</i>	
Shirley Murray		
Professor Mike Murphy	<i>External expert guidance and review</i>	
Dr Susan Atkinson	Mary Dornan	Kenneth McLoughlin
Dr Norman Chestnutt	Dr Don Hull	Debbie Schofield
Dr Patricia Dunlop	Patricia Mackey	

### **Hospital Coordinators**

Dr Susan Atkinson	Dr Norman Chestnutt	Dr John McCollum
Dr Maloud El Agnaf	Dr Lorraine Harrison	Dr Raymond Nethercott
Dr Pamela Bell	Dr John Harty	Dr John O'Hanlon
Dr Philip Burnside	Dr Don Hull	Dr Philip Windrum

Other members of the NIRTC who from September 2006 have supported, endorsed and contributed to the discussion of the project.

Catriona Briers	Veronica McBride	Dr Joanne Murdock
Doris Campbell	Áine McCartney	Bronagh O'Neill
Karen Carter	Dr Morris McClelland	Lorna Palmer
Sinead Carty	Mary McFadden	Mairead Richmond
Maureen Entwistle	Tom McFarland	Audrey Savage
Alison Geddis	Geraldine McIlwaine	Maureen Spence
Geoff Geddis	Emma McLoughlin	Maree Stewart
Dr Ghandhi	Patricia McMillan	Eileen Taylor
Matthew Hackett	Mary P McNichol	Ruth Thompson
David Hamilton	Dr Liz Mitchell	Vicky Toner
Dr Frank Jones	Josephine Monaghan	Patricia Watt
Fionnuala Lennon	Dr Curly Morris	Dr John Williams
John Madden	Tom Morton	Dr Paddy Woods
Roy Marshall	Aaron Mullan	John Wylie



## **Audit Facilitation and Support at the Ulster Hospital**

Julie Hall

*Audit Assistance*

Claire Robinson

*Main data entry and analysis*

Debbie Schofield

*Audit Facilitation Lead*

### **Data Collectors**

Dr Susan Atkinson

Raymond Haffey

Shirley Murray

Lois Curran

Dr Lorraine Harrison

Shelley-Anne Porter

Mary Dornan

Patricia Mackey

Bronagh Totten

Patricia Devlin

Frances McAuley

Gail Watson

Dr Patricia Dunlop

Áine McCartney

Matthew Hackett

Mary P McNicholl

Also many thanks to the medical record departments in all the participating hospitals for facilitating the case note retrieval.



NOTES







Copies of this Audit report may be  
obtained from the GAIN Office

GAIN Office  
DHSSPS  
Room C4.17  
Castle Buildings  
Stormont  
BELFAST  
BT4 3SQ

Telephone: 028 9052 0629

Email: [gain@dhsspsni.gov.uk](mailto:gain@dhsspsni.gov.uk)

Alternatively you may visit the GAIN website  
at: [www.gain-ni.org](http://www.gain-ni.org)

ISBN: 978-1-906805-10-4