GAIN

GUIDELINES AND AUDIT
IMPLEMENTATION NETWORK

PLATELET TRANSFUSION IN NORTHERN IRELAND

A Regional Audit by the
Northern Ireland Transfusion Committee

March 2015

CONTENTS

OVERVIEW

Platelet transfusions can be lifesaving. Their administration is essential to prevent or treat bleeding due to a low platelet count (thrombocytopenia) or when a patient has impaired platelet function.

Unlike other blood components the shelf life of platelets is short, so supply and demand must be closely matched to avoid shortages. Platelet transfusions cause more allergic or anaphylactic reactions than other blood components and they are also more likely to cause transfusion transmitted bacterial infections.

It is therefore essential that platelets are only transfused for an appropriate indication using an effective dose to reduce patient risk and to ensure that the small time-limited supply is available for those patients who absolutely require them.

This audit examined in detail the administration of more than 646 adult therapeutic doses of platelets to 402 individual patients across all 5 Healthcare Trusts in Northern Ireland (NI). It found that pre transfusion platelet count checks were not adequately performed in 10% of cases and that documentation of both indication and subsequent clinical response could be vastly improved upon.

The decisions to transfuse platelets were inappropriate in 7.3% of cases and an excessive dose of platelets was administered to almost 16% of patients.

In addition the audit found that tranexamic acid was infrequently administered for the management of major haemorrhage, despite strong evidence that it reduces blood loss in such situations.

Finally this audit demonstrated that when platelets were required to counteract the effects of antiplatelet medication, it was invariably when the emergency nature of a surgical intervention did not allow for planned discontinuation of such therapy.

INTRODUCTION

The supply of platelets in NI, 85% of which are from single donors (apheresis platelets), is highly dependent upon the good will of a small subgroup of the population. Platelet concentrates can only be stored for up to 7 days, during which time they must be kept on a platelet agitator to provide optimal platelet activity. When platelets are requested for one patient but not transfused, the opportunity to re-issue them to another patient, either in the same or a different hospital, may be limited.

Transfusion of donated platelets in NI has increased steadily by 15% over a three-year period since 2010 (see Table 1).

Table 1

Year	2010 - 2011	2011 - 2012	2012 - 2013	2013 - 2014
Platelet issues	7313	8028	8189	8412

Temporary shortages of this blood component have occurred on several occasions, impacting on individual patient care. The factors contributing to the recent increase in demand for platelets in NI are uncertain but may include an increase in clinical activity, longer survival rates in conditions that require platelets, an increase in inappropriate transfusions or an increase in wastage.

To date there has been limited information about the appropriateness of platelet transfusions in NI. This audit was designed to ascertain whether clinical practice complies with BCSH Guidelines for the Use of Platelet Transfusions (2003) and

the recommendations made following the 2007 and 2010 joint NHS Blood & Transplant and Royal College of Physicians National Comparative Audits of platelet transfusions by an assessment of:

- Clinical documentation, including the indication for transfusion
- Indications for prophylactic or therapeutic platelet transfusion
- Threshold triggers used for platelet transfusion
- Pre and post transfusion measurements of platelet count

A successful application was made on behalf of the Northern Ireland Transfusion Committee (NITC) to the Northern Ireland Guidelines Audit and Implementation Network (GAIN) for funding of a regional audit project to examine the use of platelet transfusions in NI.

PROJECT METHODOLOGY

Representatives from NI Healthcare Trust Transfusion Committees were invited to form the Project Group. It was comprised of Haemovigilance Practitioners, Blood Bank Biomedical Scientists and Clinicians, including Haematologists and Anaesthetists. This group agreed upon the methodology, patient sample and audit standards. Following a review of the medical literature and consideration of the BCSH Guidelines for the Use of Platelet Transfusions (2003) and recommendations from the 2007 and 2010 National Comparative Audits of platelet transfusions, the Project Group agreed upon the following key standards:

KEY STANDARDS

1. All patients should have a pre-transfusion platelet count performed at an appropriate time prior to platelet transfusion.

2. The rationale for the decision to give a platelet transfusion should be clearly documented in a patient's clinical notes.

3. There should be an appropriate indication for the platelet transfusion.

4. The dose of platelets administered should be appropriate for the clinical condition.

5. In the case of significant bleeding when red cell transfusion is required, coagulation factors and antifibrinolytic agents should be given as appropriate, to minimise on going blood loss and potentially reduce requirement for platelet transfusion.

6. Antiplatelet medication should whenever appropriate, be discontinued before surgery, to reduce blood loss and the requirement for platelet transfusion.

AUDIT DESIGN

The audit design was a retrospective review of clinical notes by trained data collectors. It was planned to audit platelet transfusions in at least 400 different patients.

AUDIT SAMPLING

An audit episode was defined as the transfusion of any number of adult therapeutic doses of platelets to a patient during a single 24-hour period. Some patients with conditions such as bone marrow failure have repeated platelet transfusions on a scheduled basis. In order to assess the breadth of clinical practice across as many patients and clinicians as possible – only one audit episode per patient was included in the audit.

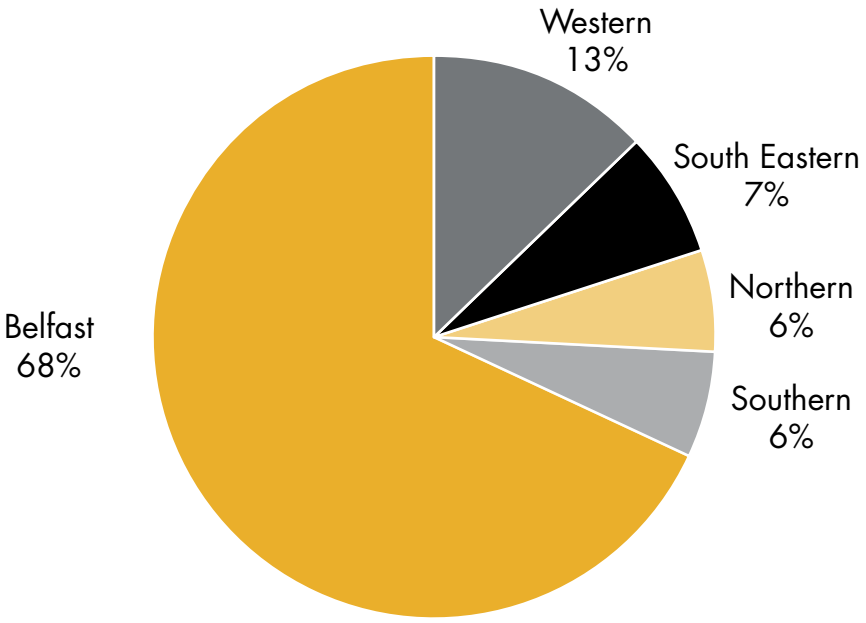
More than 8,000 platelet packs are used by NI Healthcare Trusts annually, of which approximately 70% are issued to the Belfast Trust and between 6% and 13% to each of the other 4 Healthcare Trusts (see Figure 1). In order to assess clinical use of platelet transfusions in all Healthcare Trusts, the number of audit episodes drawn from Belfast Trust was limited to 200 and 50 audit episodes were drawn from each of the other 4 Healthcare Trusts.

The sample population was selected from adult patients (over 16 years of age) who had platelet transfusions during a hospital admission in a NI Healthcare Trust between January 2011 and July 2011. Patients were sequentially selected in order of the date of transfusion and their clinical notes were audited if available, until the predetermined quota was reached.

Platelet transfusions are most frequently administered to haematology patients. However each Trust was requested to limit the number of haematology patients to a maximum of 60% of all episodes audited, so that platelet use in a variety of clinical disciplines could be examined. The number of cardiac surgery audit episodes was also limited to exactly 50 of the 200 patients audited in The Royal Group of Hospitals, to ensure that platelet transfusions in other specialties on this hospital site were also audited.

Figure 1

Platelet use by Healthcare Trust in 2011-2012 (8028 packs)



EXCLUSION CRITERIA

Children 16 years or younger

Repeated platelet transfusion episodes for the same patient outwith the audited 24-hour episode.

DATA COLLECTION FORMS

Three different data collection forms for 3 sub populations (Haematology, Cardiac Surgery and Miscellaneous) of transfused patients were developed and piloted for ease of interpretation and completion by Project Group members. (See Audit Tools section on GAIN web site)

DATA COLLECTORS AND TRAINING

Data collectors were nominated and supported by a Clinical Lead in each Trust. They were familiar with the use of platelet transfusions and were Haemovigilance Practitioners, Blood Bank Biomedical Scientists, Haematologists and Anaesthetists.

The data collectors attended a training day where they were presented with an overview of the rationale, audit standards and methodology involved. They were then given time to examine sample patient clinical notes and make data entries in each of the 3 data collection forms. Their feedback was incorporated into the final versions of the data collection forms before they were printed and disseminated to each Trust.

The data collectors were also given an instruction booklet on the use of the data collection forms, which included details of a coding system to ensure patient anonymity. The Project Lead's contact details were also provided in case there were any additional audit queries.

EXPERT REVIEW AND DECISION-MAKING.

Appropriateness of transfusion:
The decision on whether a platelet transfusion is appropriate involves expert interpretation of a complex set of clinical variables, including:

- Knowledge of the patient's underlying clinical condition and its recommended evidence based triggers for platelet transfusion (see Appendix 1)
- The patient's clinical status when the transfusion is requested, including the presence or absence of bleeding, infection and concurrent co morbidities
- Whether an invasive procedure is planned or not
- Recent antiplatelet medication
- The acute trend in platelet count changes in the 24 hours before platelet transfusion
- The absolute value and timing of the most recent platelet count before commencement of the platelet transfusion
- The clinical response to the platelet transfusion and the post transfusion platelet count
- The necessity for additional platelet transfusions during the patient's hospital stay
- Any other clinical factors considered to be relevant

The data collector recorded his or her judgement on the appropriateness of transfusion for each audit episode. All completed data collection forms were checked independently by at least two expert consultant reviewers. If the decision

on appropriateness of transfusion was not clear, two experts met to re-examine the relevant data collection forms and reach a consensus on the appropriateness of transfusion.

Number of platelet packs transfused:
The number of platelet packs transfused during an audit episode was independently assessed by at least two expert reviewers, to be appropriate, excessive or inadequate. This judgement required experienced interpretation of a number of clinical variables including:

- A knowledge of the patient's underlying clinical condition and its recommended evidence based thresholds for platelet transfusion (see Appendix 1)

- The patient's clinical status when the transfusion was requested, including the presence or absence of bleeding

- Whether the clinical status warranted transfusion of more than 1 pack of platelets when the post transfusion platelet count exceeded the recommended threshold for the particular clinical condition by more than 40 x 10^9

- Recent antiplatelet medication and other clinical factors known to affect platelet function

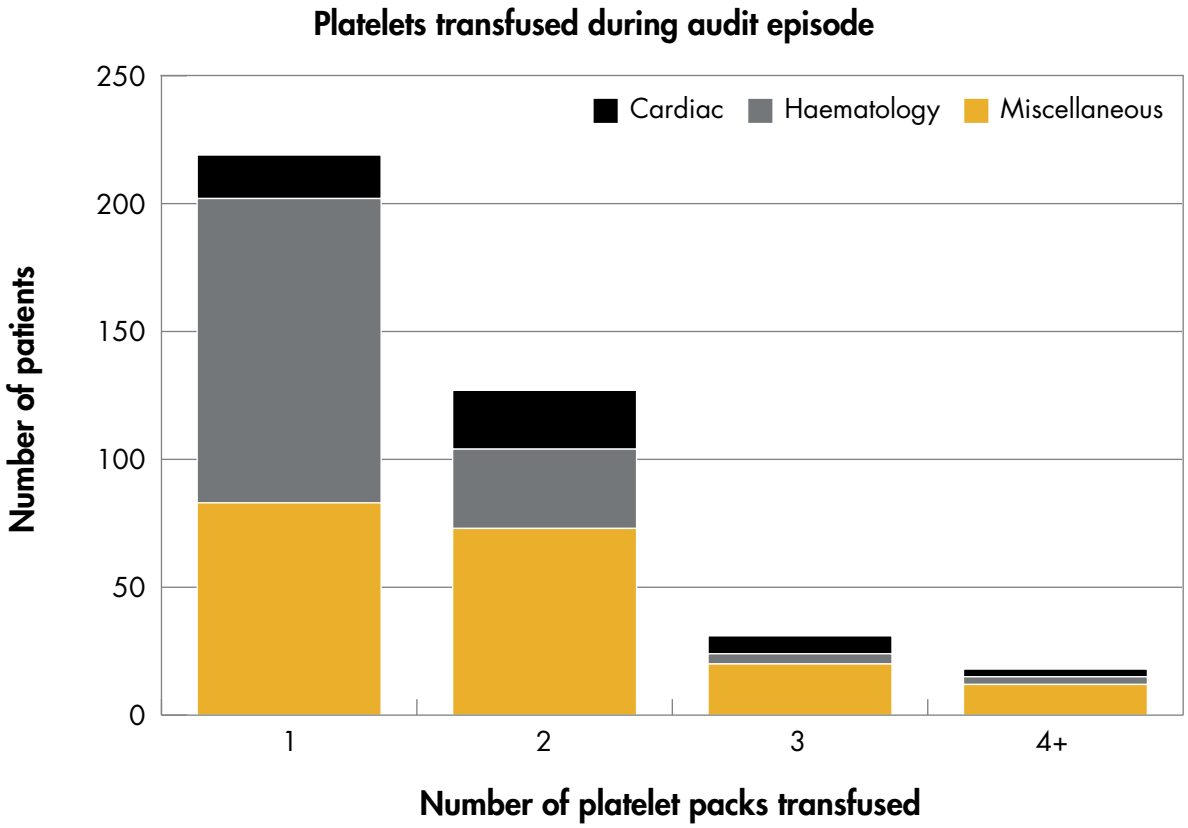
- The necessity for additional platelet transfusions during the patient's hospital stay

- Any other relevant clinical factors.

RESULTS AND RECOMMENDATIONS

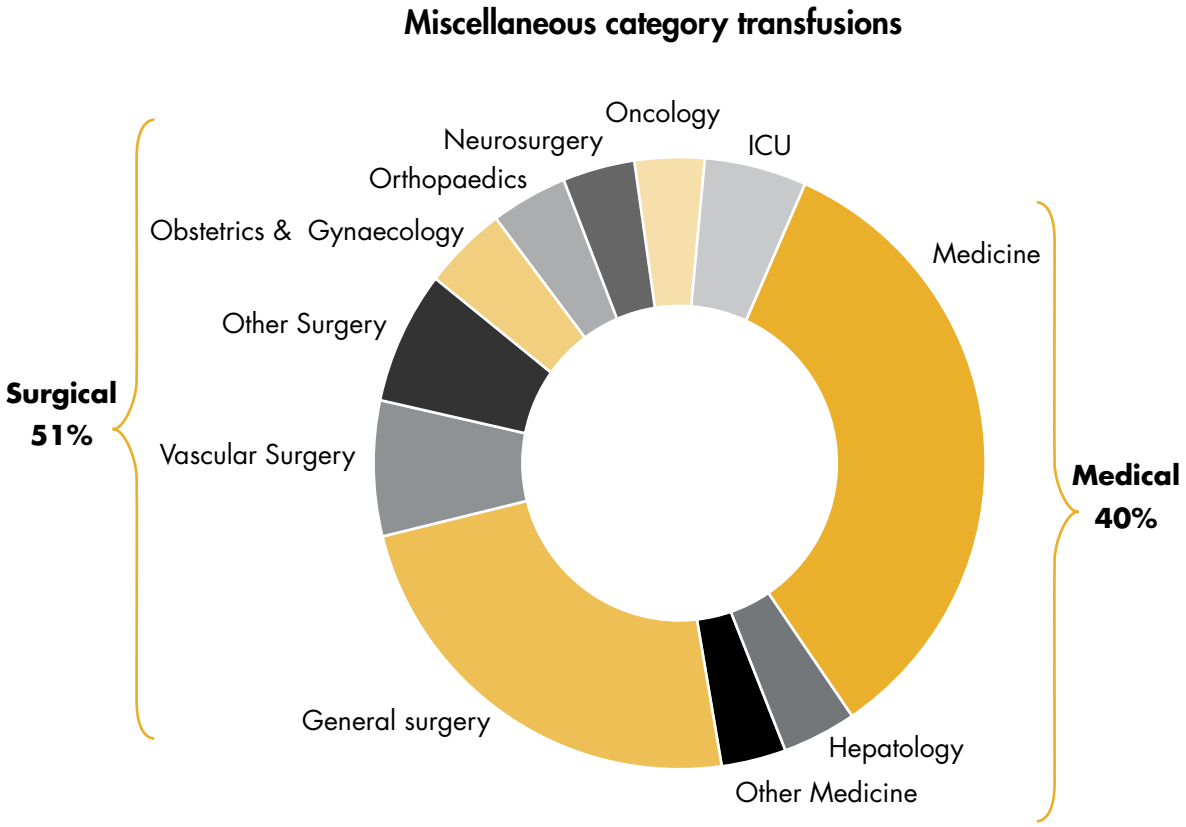
All 5 Healthcare Trusts participated in the audit and returned the required number of cases. The final sample size of 402 audit episodes comprised data collection forms for 188 Miscellaneous, 164 Haematology and 50 Cardiac patients. The number of platelet packs transfused was recorded in 395 (98.3%) of all audit episodes, amounting to a total of 646 platelet packs transfused – see Figure 2 below.

Figure 2



The Miscellaneous category consisted of 95/188 (51%) surgical patients, 76/188 (40%) medical patients and 17/188 (9%) intensive care (ICU) and oncology patients.

Figure 3

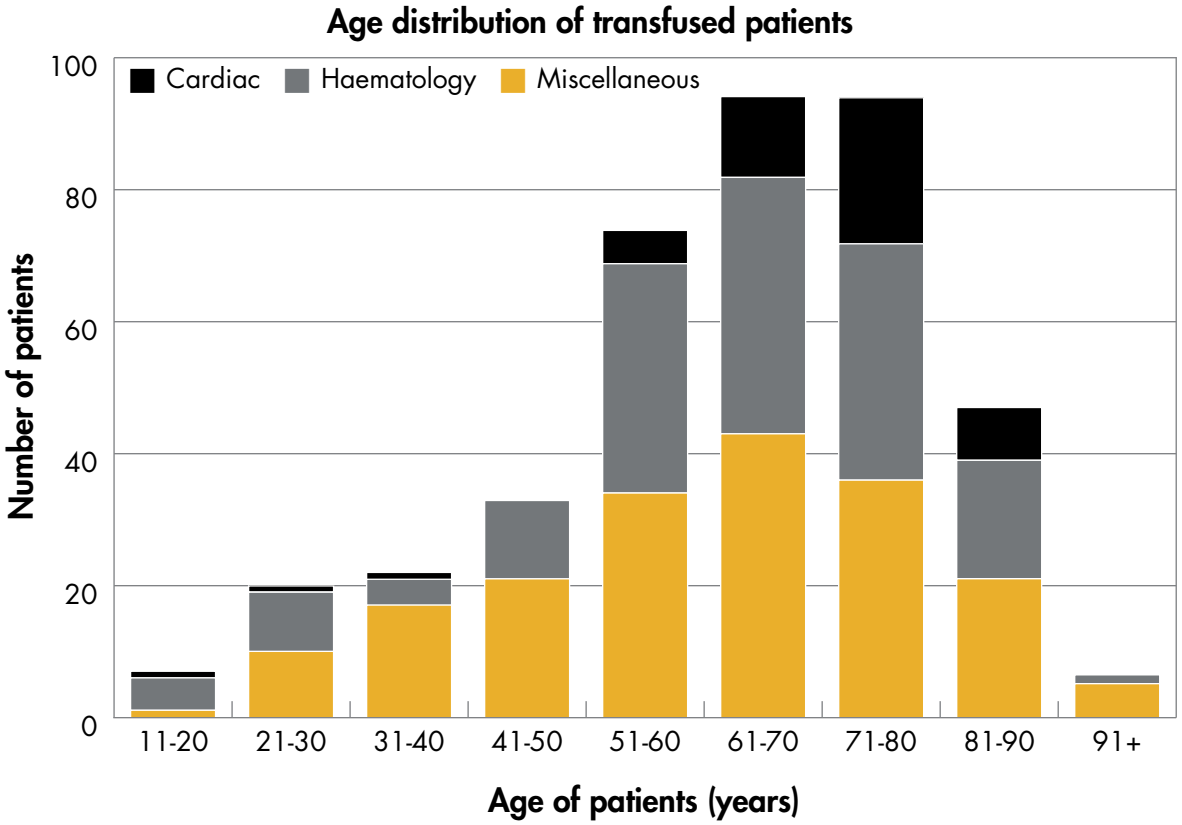


DEMOGRAPHIC DETAILS

The demographic results must be viewed in the knowledge that the original sampling had a predetermined maximum number of haematology patients, a fixed number of cardiac surgery patients and only one audit episode per patient.

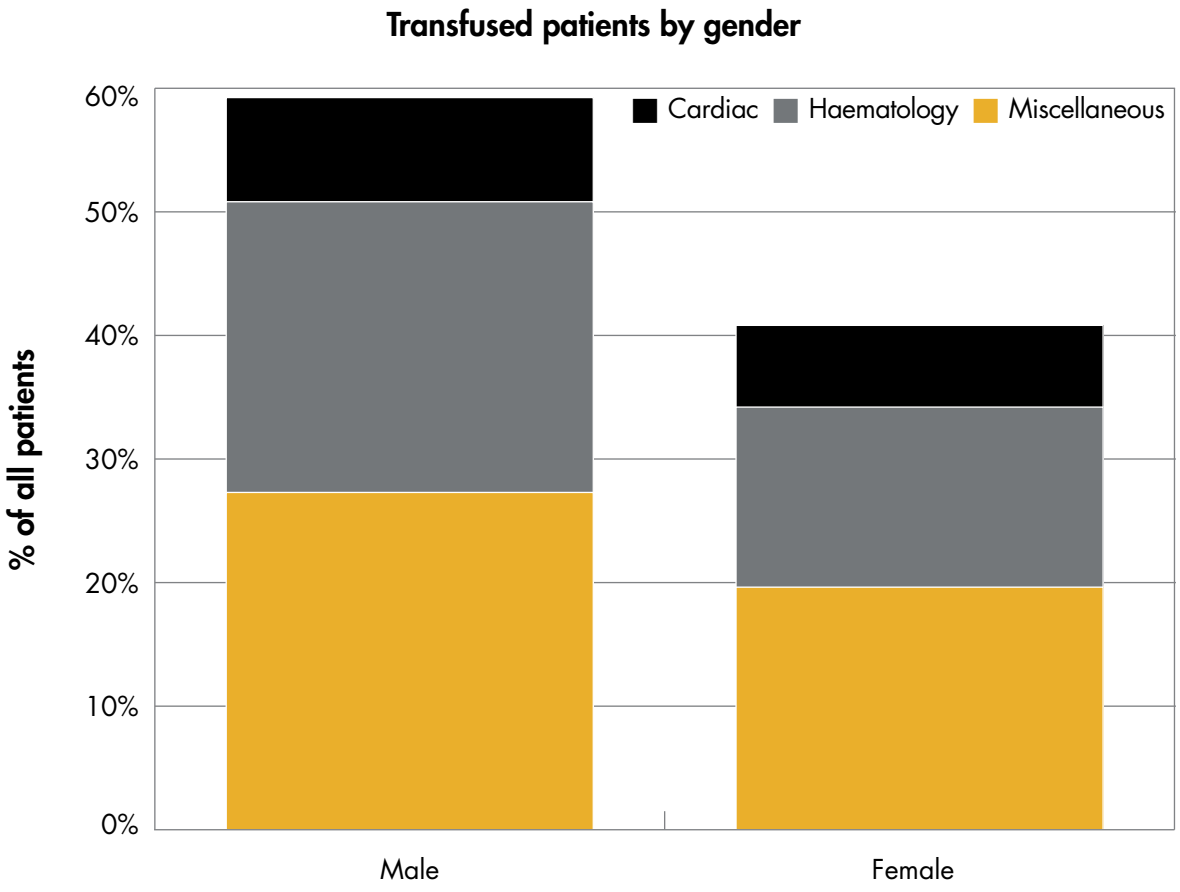
The age group most commonly transfused in the patient sample was 61 - 80 years for all three categories, as illustrated below. The median age for transfusion was 64 years in the Miscellaneous group, 65 years in the Haematology category and 72 years in the Cardiac surgery group.

Figure 4



There was a preponderance of male patients in all categories audited; 59% of all audited transfusion episodes were in male patients compared to 41% in female patients. This gender ratio was closely replicated in the Miscellaneous and Haematology patient categories. The ratio of 2:1 male compared to female patients transfused in the Cardiac surgery group is in keeping with the greater number of male patients undergoing cardiac surgery.

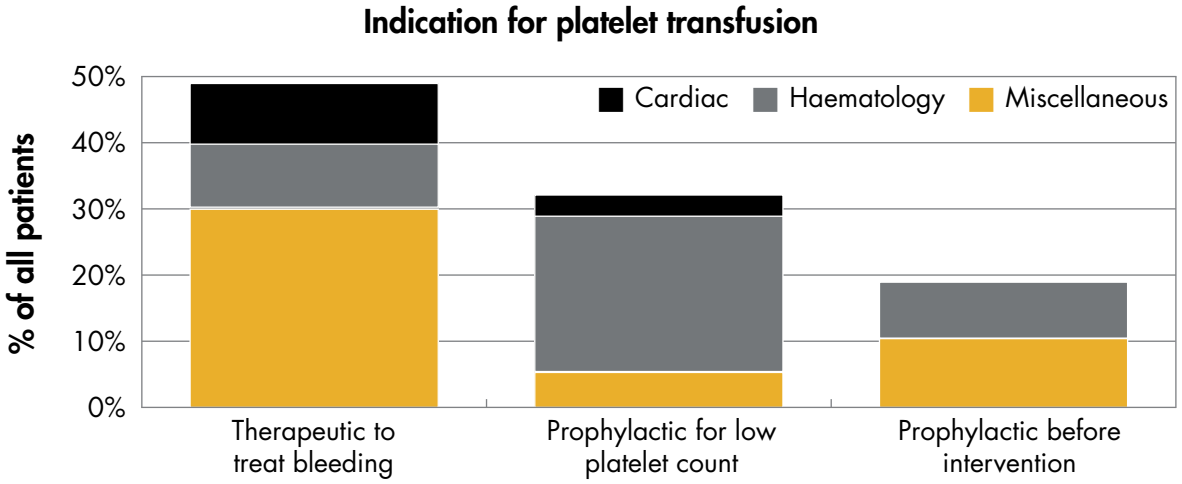
Figure 5



INDICATION FOR TRANSFUSION

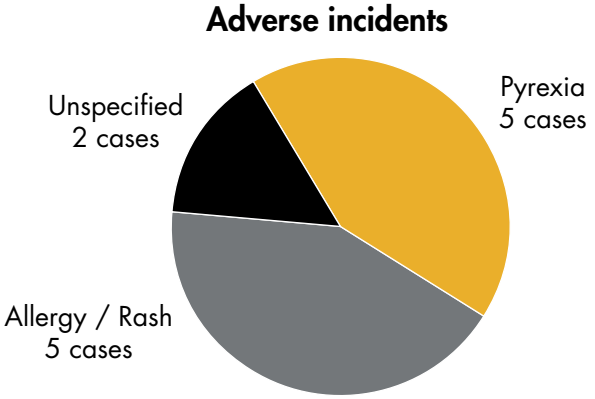
The most common indication for platelet transfusion in the Cardiac and Miscellaneous categories was for the treatment of bleeding, whereas the majority of haematology patients were transfused platelets to increase a low platelet count (see Figure 6).

Figure 6



A total of 12 adverse reactions during platelet transfusion episodes were documented by the data collectors, which affected 10 haematology patients, 1 general surgery patient and 1 in Hepatology. This was equivalent to an incidence of 3% of all patients audited, which is similar to other reports of adverse incidents. The signs of these adverse reactions were as illustrated below:

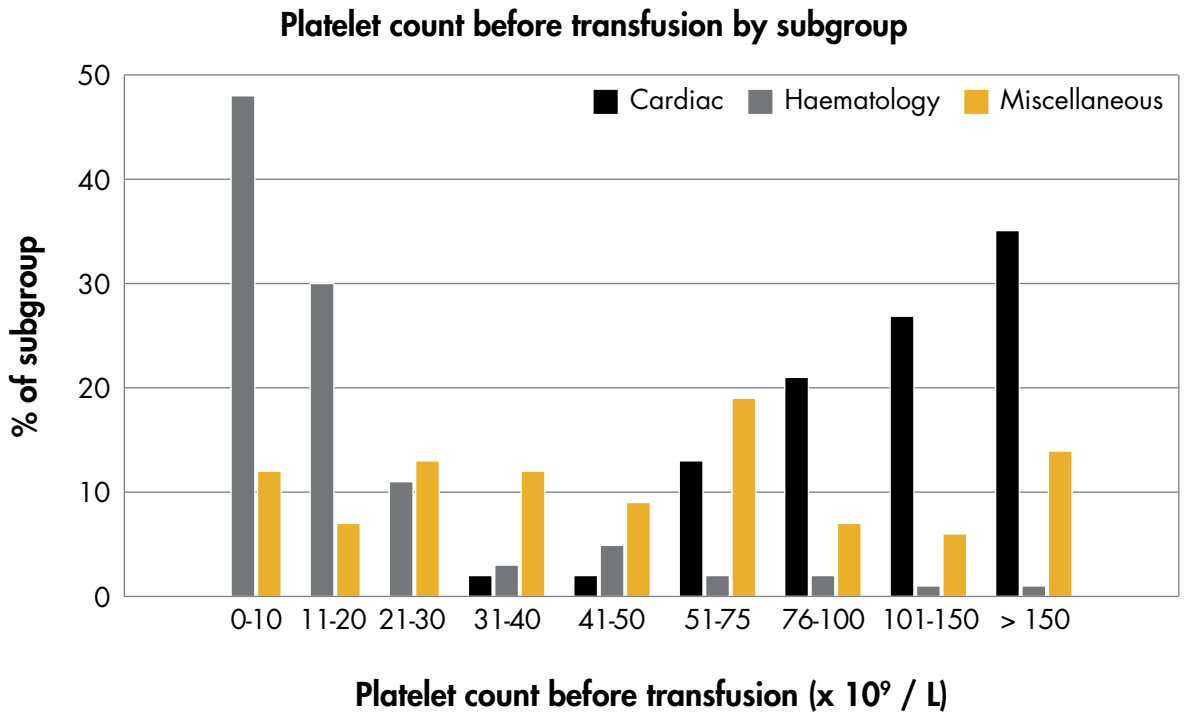
Figure 7



CHECKING THE PLATELET COUNT BEFORE TRANSFUSION

The absolute value of the most recent platelet count and its timing in relation to the transfusion are important factors in making the decision to transfuse platelets. In this audit pre transfusion platelet count varied between the 3 categories.

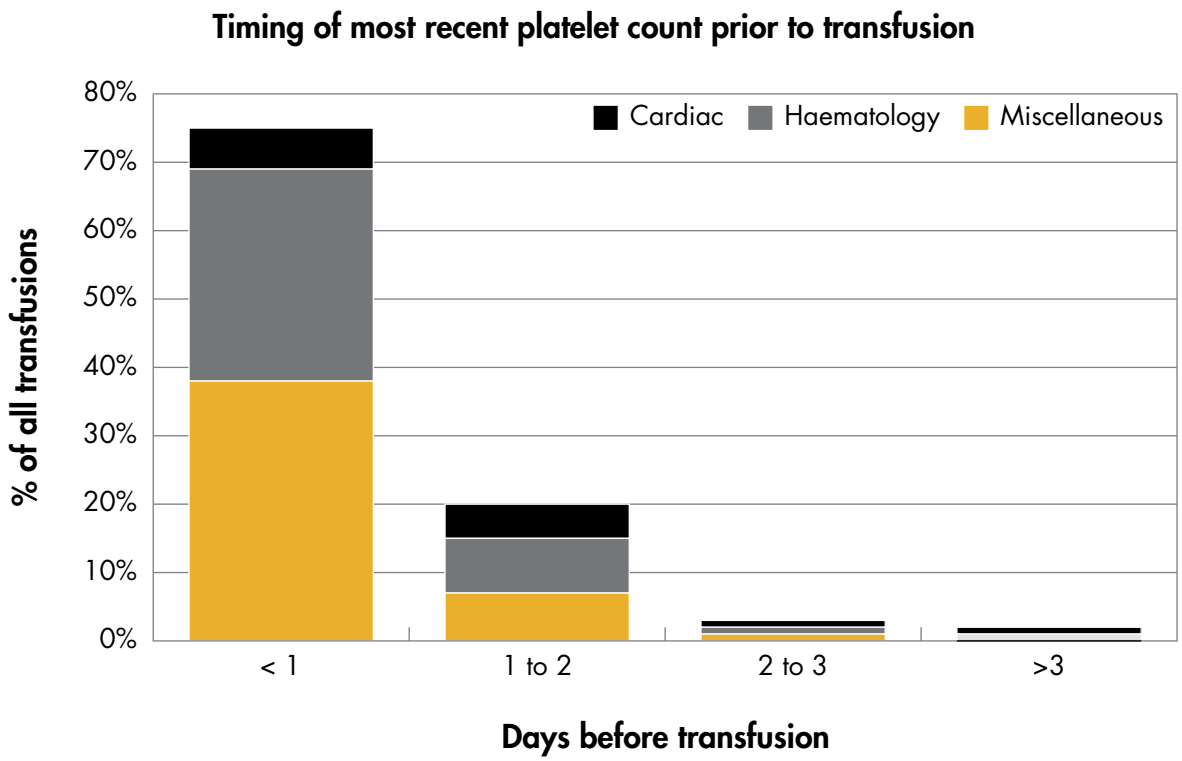
Figure 8



The majority of the haematology patients did not have active bleeding, were haemodynamically stable and had prophylactic transfusions for low platelet counts. In contrast, perioperative bleeding and platelet dysfunction in cardiac surgery triggered transfusion at higher platelet counts. There was wide variation in pre transfusion platelet count in the Miscellaneous category, which was in keeping with a range of different indications for platelet transfusion.

An up to date platelet count is essential to determine whether platelet transfusion is necessary and also to indicate if more than one adult therapeutic pack may be required, e.g. before invasive procedures when the platelet count may be very low. In 75% of audit episodes the pre transfusion platelet count was checked on the same day as transfusion, which is good clinical practice.

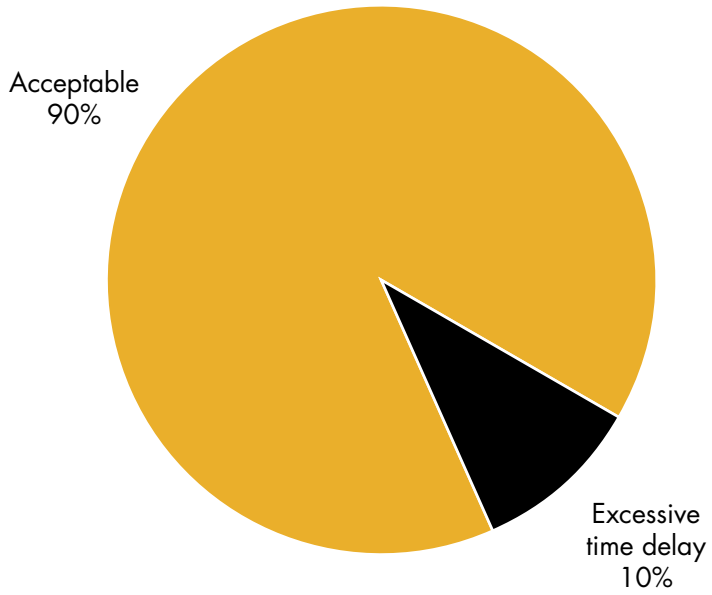
Figure 9



In circumstances of known low platelet counts, a gap of up to 24 hours for inpatients (or 48 hours for outpatients) between the last platelet count check and the time of platelet transfusion may be deemed acceptable across the 3 subgroups. In 10% of patients the pre-transfusion platelet count to transfusion interval exceeded best practice guidelines.

Figure 10

Time delay between platelet check and transfusion

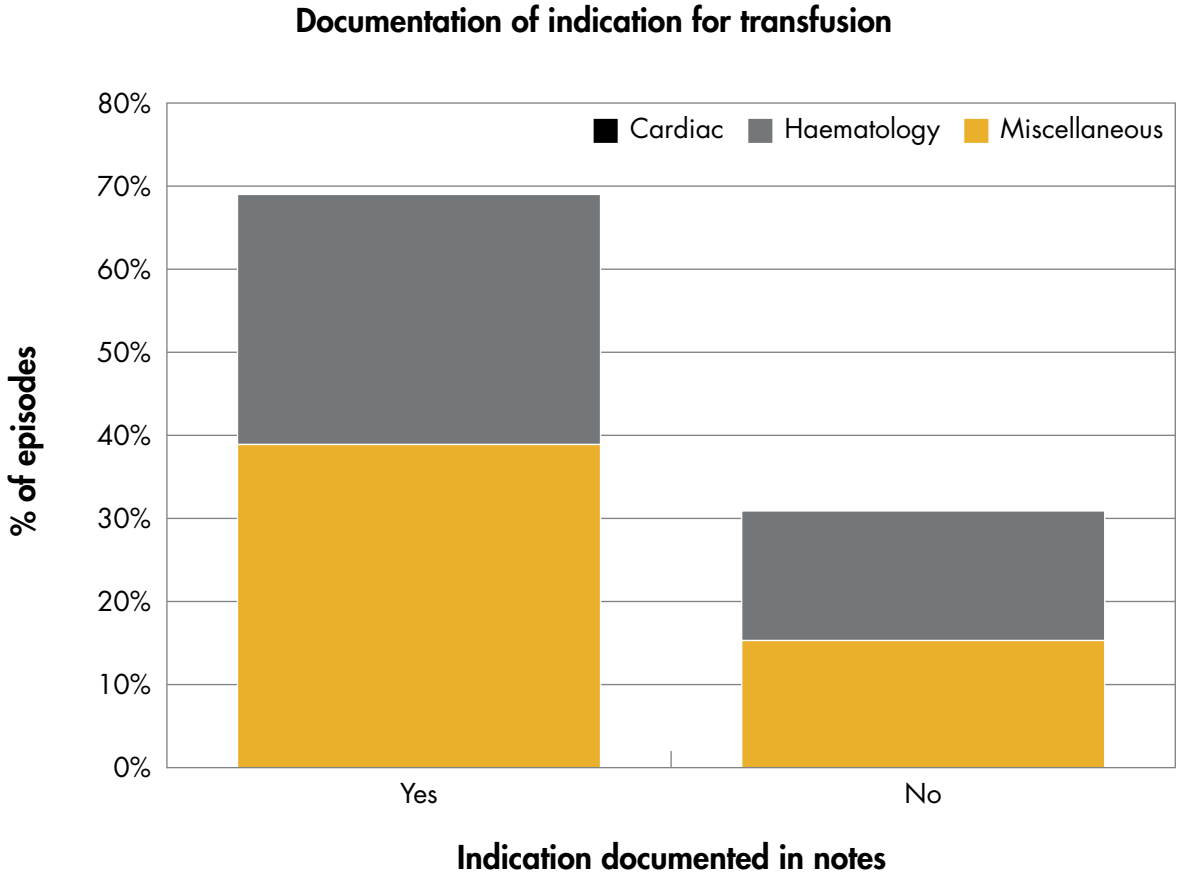


Recommendation 1
All patients should have a pre-transfusion platelet count performed at an appropriate time prior to platelet transfusion.

DOCUMENTATION IN THE CLINICAL NOTES

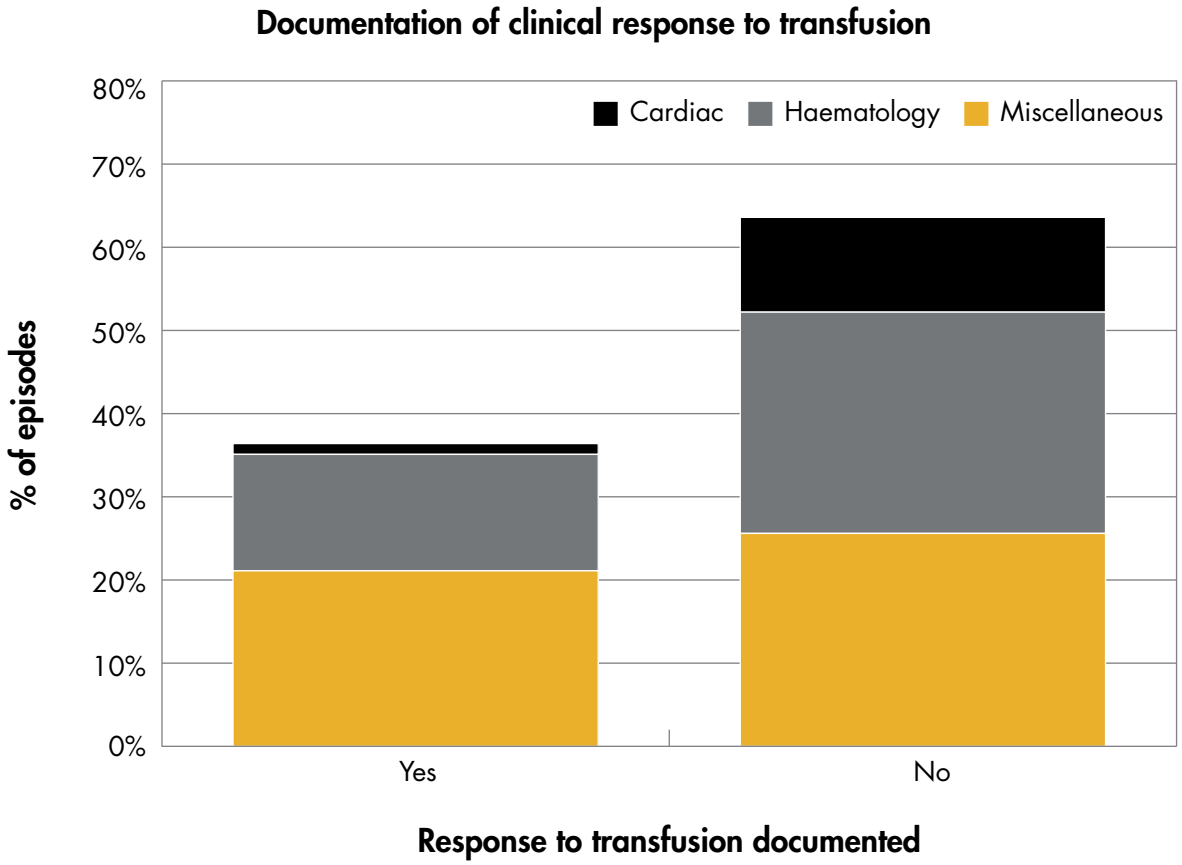
The indication for platelet transfusion should be evident in a patient's clinical notes. Within the Cardiac surgery group the data collectors could determine that platelets were administered on 72% of occasions to treat bleeding, 20% of occasions to improve platelet count and in 8% of instances to cover both indications. However the indication for platelet transfusion was not evident in more than 30% of episodes audited in the Haematology and Miscellaneous subgroups.

Figure 11



It is also important that there is clear documentation within the notes concerning the clinical response to platelet transfusion, to guide other clinicians in a patient's further management. When all subgroups were examined this documentation was not evident in 63.7% of cases.

Figure 12

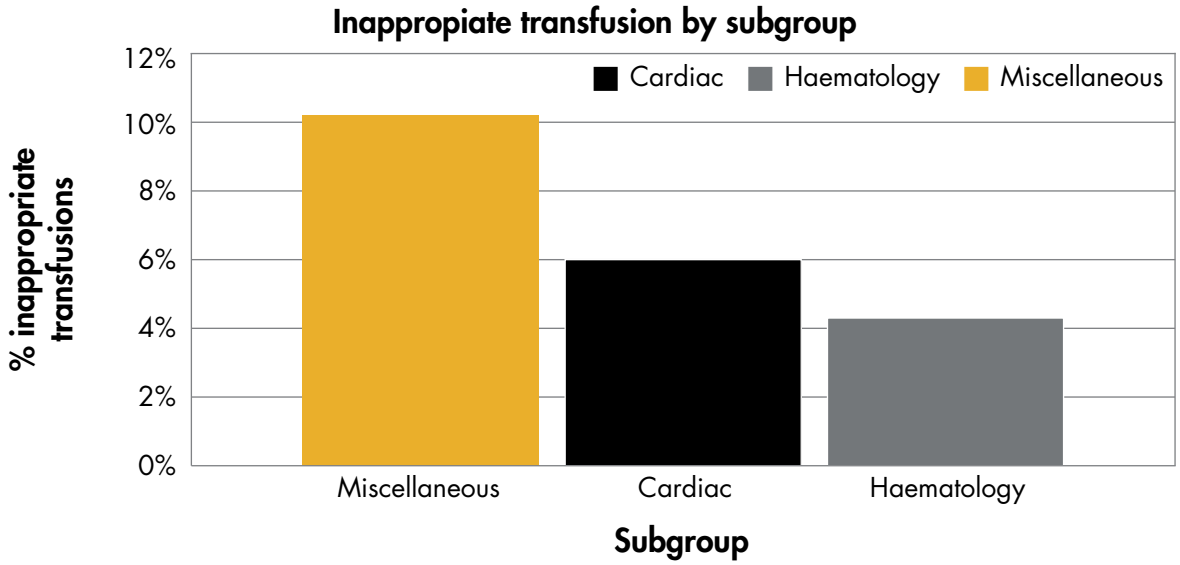


Recommendation 2
The clinical indication for platelet transfusion and the clinical response achieved should be documented in the patient's clinical notes.

INAPPROPRIATE TRANSFUSION

The overall rate of inappropriate transfusion was 7.3% across the entire audit sample. This varied in the subgroups from 10% in the Miscellaneous subgroup to 4.3% in the Haematology category.

Figure 13



Example:
A 67-year-old man was admitted under a surgical team for investigation of melaena. He was not on any antiplatelet medication. Initial blood tests showed haemoglobin 158 g/L and platelet count 91 x 10^9 / L. Two days later the haemoglobin was 144 g/L, platelet count 66 x 10^9 / L, PT 16.2 seconds, APTT 27.5 seconds and fibrinogen 0.8 g / L.

Haematology was contacted and advised that platelets were not required but the surgical team still gave 1 pack of platelets and 1 unit of FFP. The patient was diagnosed with lung cancer and liver metastasis. He had no additional transfusions and died 5 days later.

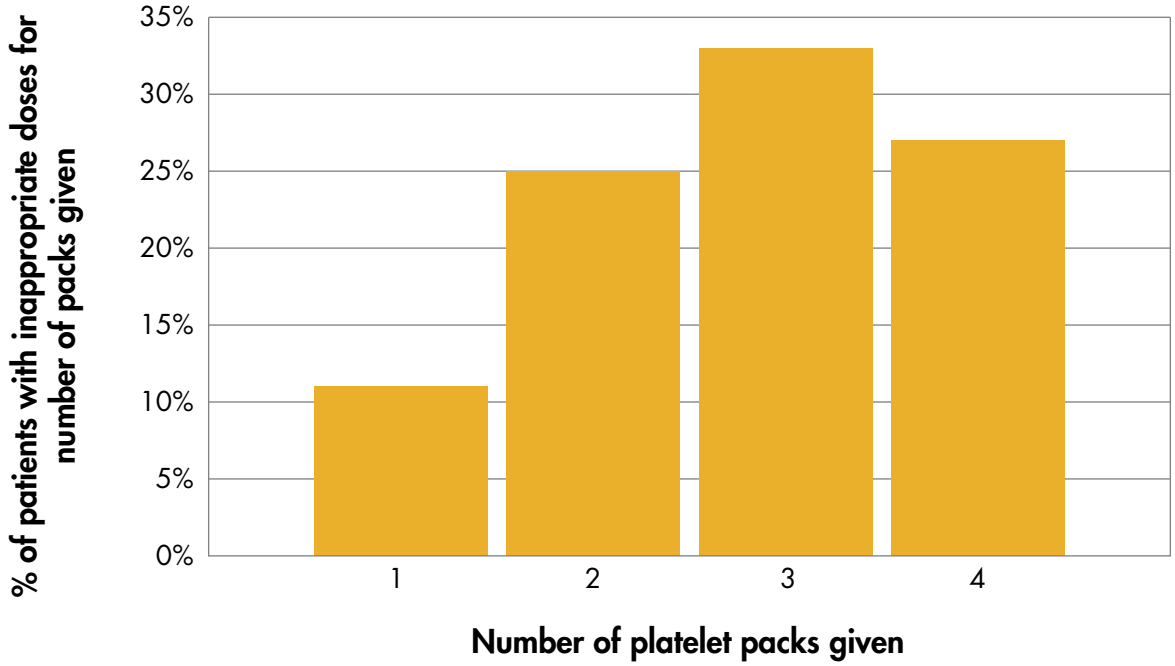
Recommendation 3
Hospitals should have guidelines for the use of platelet transfusions. Platelets should only be transfused for an appropriate indication agreed in local guidelines.

INAPPROPRIATE DOSE OF PLATELETS

The number of packs of platelets (dose) transfused should be appropriate for the clinical condition. Transfusing an excessive dose of platelets exposes a patient to additional transfusion risk without any clinical benefit and is wasteful of a scarce resource. There was evidence in 17.5% of all cases audited that an inappropriate dose was transfused. The number of packs of platelets administered was considered to be excessive in 15.9% of cases and inadequate in 1.6% of cases.

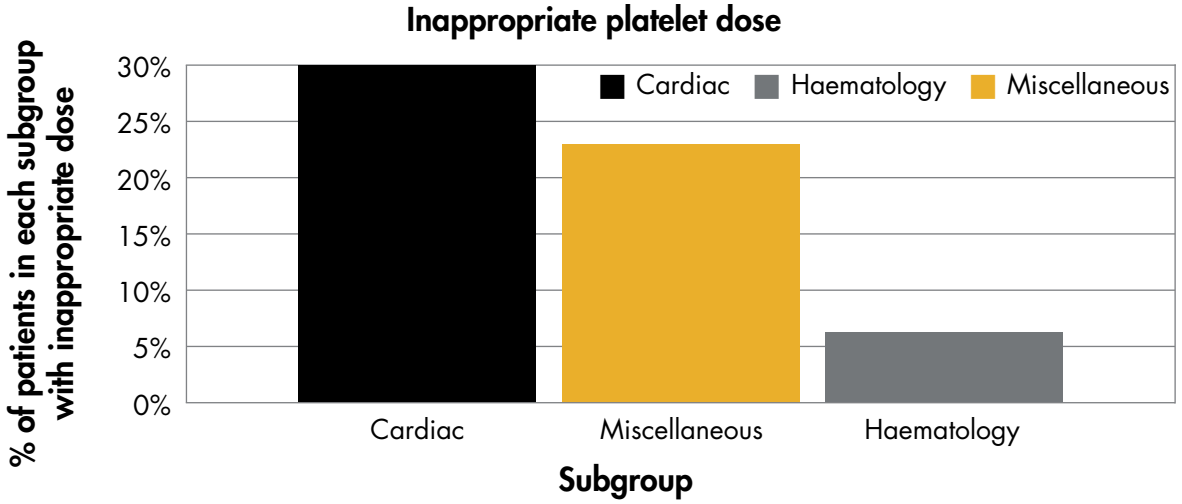
Figure 14

Inappropriate and excessive platelet transfusions by number of packs given



The Cardiac and Miscellaneous subgroups had the highest incidence of excessive dosing.

Figure 15



Example:
A 77-year-old patient underwent coronary artery bypass grafting. Preoperative daily medication included clopidogrel 75mg (stopped 7 days preoperatively) and aspirin 75mg. Postoperative blood loss in chest drains was 1.2 litres and haemoglobin was 86 g / L, platelet count 115 x 10^9 / L, INR 1.93 and APTT 43.5 seconds before transfusion. A total of 3 packs of platelets, 2 units of red cells and 2 units of FFP were transfused during the audited episode and there was no necessity to return to theatre.

The next day haemoglobin was 95 g / L, platelet count 210 x 10^9 / L, INR 1.36, APTT 36.5 seconds , fibrinogen 3.39 g / L and the patient required no further transfusion.

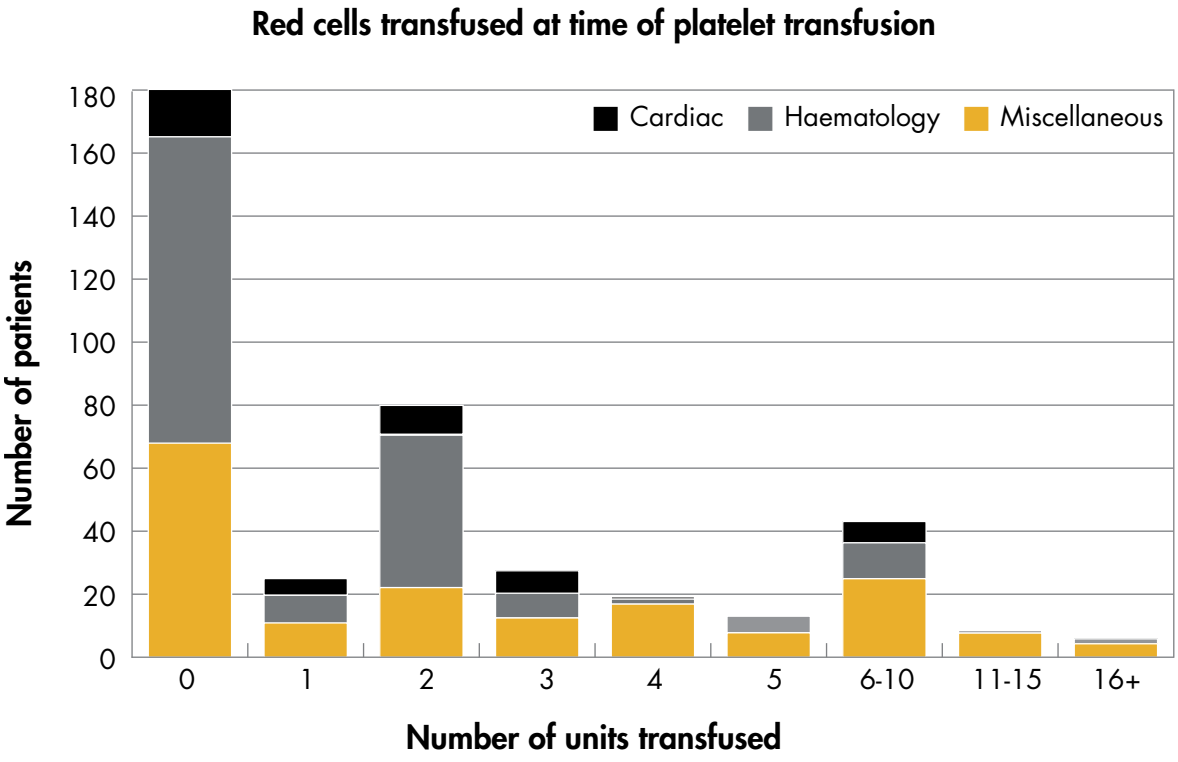
It is questionable whether this patient required any platelets at all. Certainly three adult therapeutic doses was excessive.

Recommendation 4
The dose of platelets transfused should be appropriate for the clinical condition and the underlying defect in haemostasis. In bleeding patients, the response to each transfused pack of platelets should be clinically assessed prior to further transfusion. In non-bleeding patients where further doses of platelets are being considered, e.g. before an invasive procedure, the platelet count should be re-measured.

THE USE OF TRANEXAMIC ACID TO REDUCE BLOOD LOSS

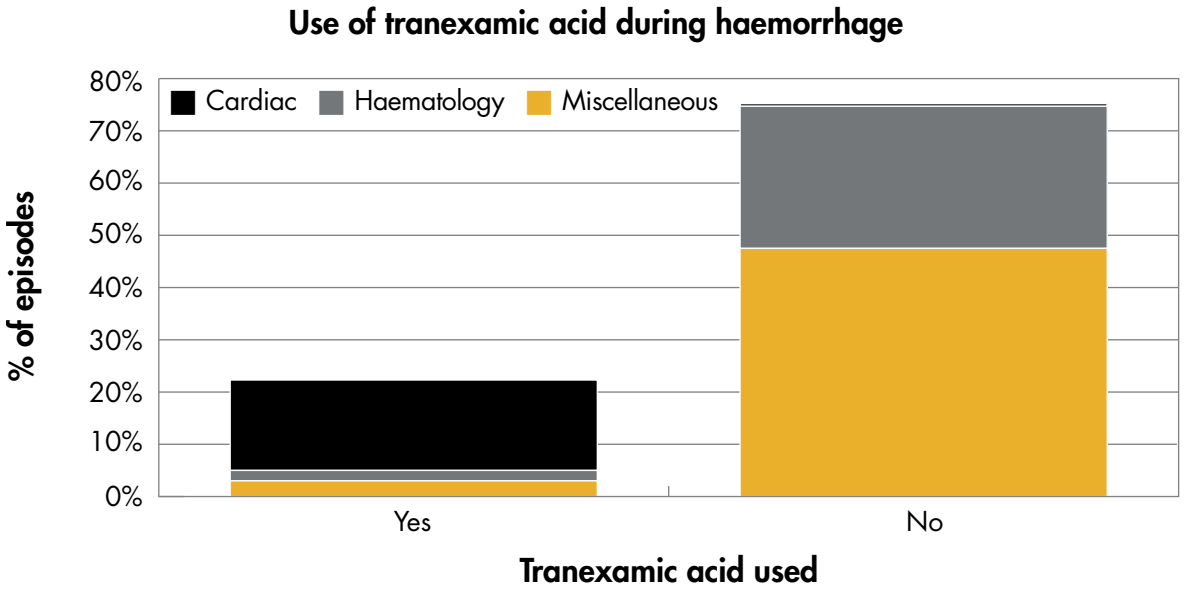
For a significant proportion of all patients audited, i.e.197 (49%) patients, platelets were transfused during treatment of a documented haemorrhage, which also required transfusion of at least two units of red cells.

Figure 16



There is now strong evidence that the administration of tranexamic acid will reduce blood loss in major haemorrhage. Reduction in blood loss should result in decreased platelet loss and therefore lower requirement for platelet transfusion. Tranexamic acid was administered to only 23% of cases where platelets were transfused during treatment of haemorrhage requiring at least two units of red cells. Administration of this drug was almost universal when bleeding occurred during cardiac surgery but it was almost never used in the Miscellaneous and Haematology subgroups – see Figure 17 below.

Figure 17



Example:
A 54-year-old man who presented to hospital with major rectal bleeding underwent emergency surgery. He received a total of 13 units of red cells, 4 units of fresh frozen plasma and 3 packs of platelets but did not receive any tranexamic acid. Bleeding was documented as "on going" the following day despite a normal coagulation screen.

Recommendation 5
Tranexamic acid should be administered to all cases of major haemorrhage to reduce blood loss and potentially reduce platelet requirements, unless it is specifically contraindicated.

PERIOPERATIVE ADMINISTRATION OF DRUGS THAT AFFECT PLATELET FUNCTION

Aspirin, Non Steroidal Anti Inflammatory Drugs (NSAIDs) and other "antiplatelet" drugs can significantly interfere with platelet activity in the perioperative period and result in prolonged bleeding which may require a platelet transfusion. When there is a significant risk of perioperative bleeding, which is not outweighed by an increased risk of a thrombotic event, temporary discontinuation of such medication should be considered, usually for *5 - 7* days before surgery.

The table below summarises the use and discontinuation of antiplatelet drugs in the 50 Cardiac Surgery patients.

Table 2

	Elective surgery 58% of total (*29 patients*)		**Emergency surgery 42% of total (*21 patients*)**	
Antiplatelet drug	% Patients taking drug	Discontinuation (5 days +)	% Patients taking drug	Discontinuation (5 days +)
Aspirin	62% (*18*)	83% (*15*)	86% (*18*)	5.6% (*1*)
Clopidogrel	24% (*14*)	100% (*14*)	42.9% (*9*)	33% (*3*)

117/188 (62%) of the Miscellaneous subgroup also had surgical procedures and the table below summarises the use and discontinuation of antiplatelet drugs in this group.

Table 3

	Elective surgery 23% of total (*27 patients*)		**Emergency surgery 77% of total (*90 patients*)**	
Antiplatelet drug	% Patients taking drug	Discontinuation (5 days +)	% Patients taking drug	Discontinuation (5 days +)
Aspirin	14.8% (*4*)	50% (*2*)	21% (*19*)	0% (*0*)
Clopidogrel	3.7% (*1*)	100% (*1*)	6.7% (*6*)	0% (*0*)

Only a minority (6.6%) of the Haematology subgroup patients were taking Aspirin or another antiplatelet drug and none required surgery.

The audit identified that in 86.5% (32/37) of patients that normally took antiplatelet therapy and subsequently required platelets during elective surgery, the antiplatelet medication had been discontinued for an appropriate time in advance. The audit could not determine if the other 13.5% of elective surgery patients could have had their antiplatelet therapy stopped as the risks of stopping may have outweighed potential benefits.

This high discontinuation rate contrasted with those patients on antiplatelet therapy who required platelets during emergency surgery; only 7.7% (4/52) of these patients had their medication discontinued for an adequate period in advance.

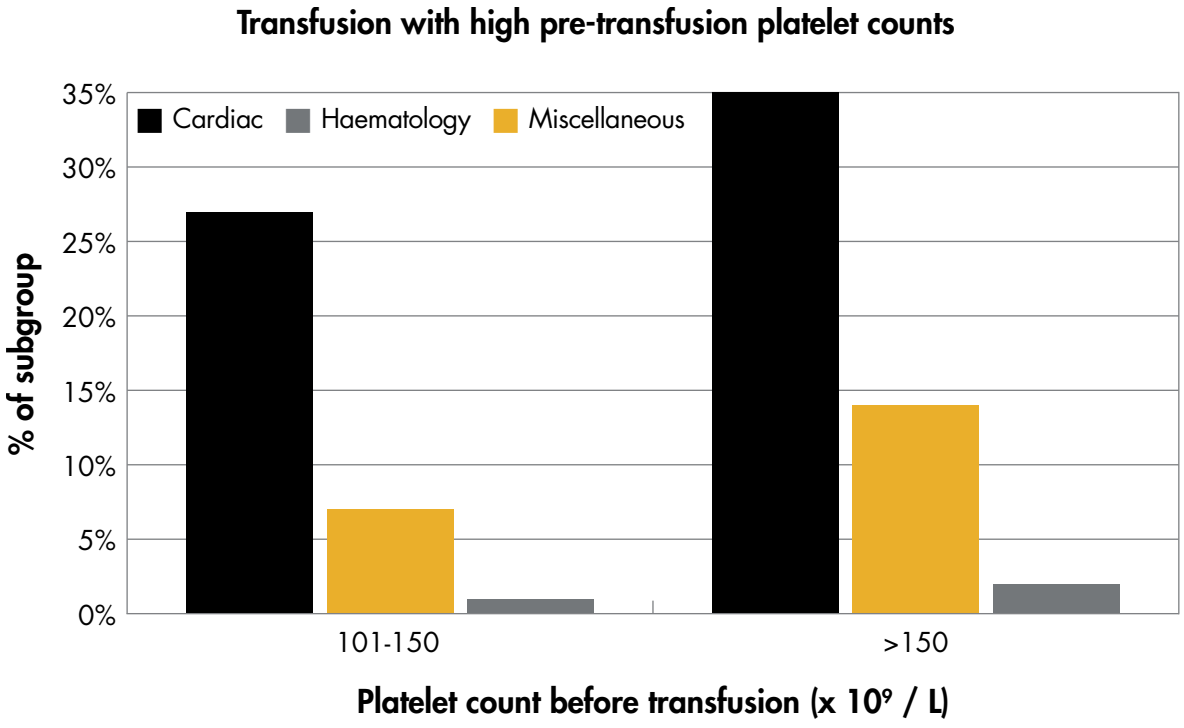
The degree of urgency for surgery was clearly the main factor in determining whether such medications were discontinued ahead of surgery.

Recommendation 6
Clinicians should continue to assess whether Aspirin, NSAIDs and other antiplatelet medication should be discontinued prior to elective surgery, by careful risk benefit analysis of requirement for optimal haemostasis versus prophylaxis of arterial thrombotic events.

PLATELET TRANSFUSION WITH HIGH PRE-TRANSFUSION PLATELET COUNTS

In 63% of Cardiac surgery cases and 21% of the Miscellaneous subgroup the platelet count last measured prior to platelet transfusion was in excess of 100 x 10^9 / L. The documented indication for transfusion in some of these cases was treatment of platelet dysfunction secondary to drug therapy or other interventions, such as prolonged cardiac bypass.

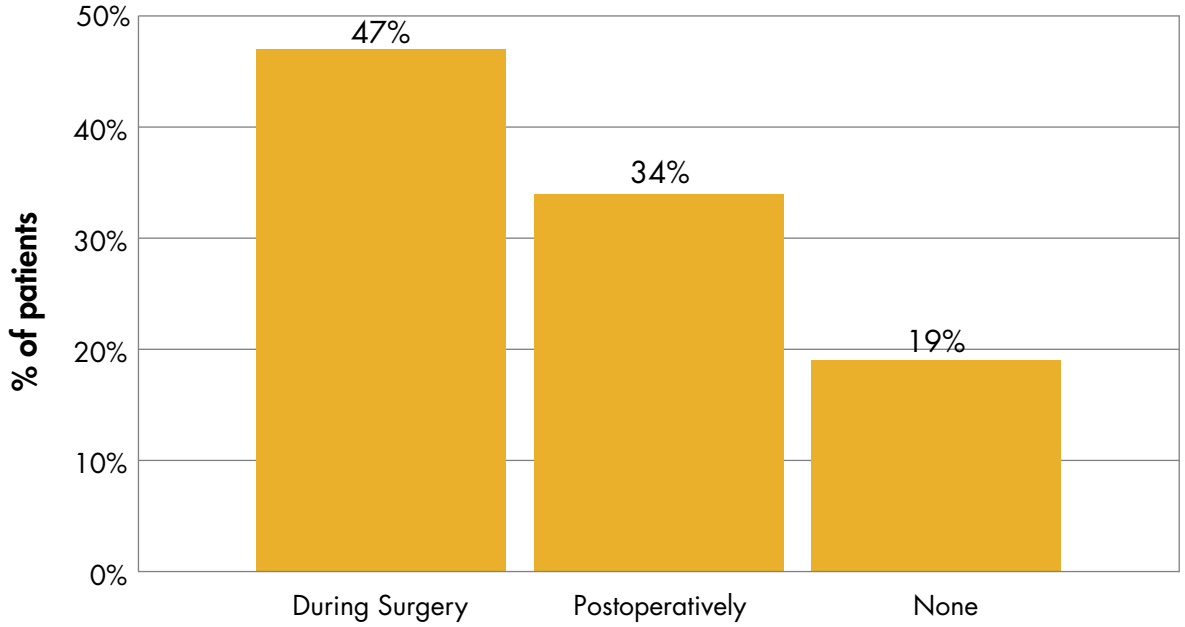
Figure 18



Platelet function during surgery can be monitored by the use of thromboelastography to guide the decision making process. The status of use was recorded in 32 patients during cardiac surgery and there was evidence that thromboelastography was used in 81% of these cases.

Figure 19

Use of thromboelastography in cardiac surgery



In two thirds of cases where it was not employed to assess platelet function, the pretransfusion platelet count was in excess of 100 x 10^9 / L.

When platelet dysfunction is suspected in the presence of moderate to normal platelet counts, thromboelastography or an alternative test of platelet function should be employed whenever available, to guide therapy.

Recommendation 7
Thromboelastography, or an alternative test of platelet function should be employed whenever available, to guide platelet therapy, if platelet dysfunction is suspected in the presence of moderate to normal platelet counts.

LIMITATIONS OF THE AUDIT

1. This audit did not take account of adult therapeutic doses requested but not transfused or the number of platelets wasted.

2. The number of patients in the Haematology category was capped at 40% of all cases audited and the Cardiac sample was pre-set to 50 cases, so the overall sample audited is not fully representative of the use of platelets by speciality in Northern Ireland.

3. Only one 24-hour episode per patient was audited, which meant that transfusion in Haematology was under represented, the specialty in which the most platelets are transfused in NI and with the greatest proportion of patients who have multiple episodes of platelet transfusions.

4. Unavailability of patient clinical notes impeded auditing of consecutively transfused patients in some hospitals.

5. Smaller Healthcare Trusts where only 6% of platelets are transfused were overrepresented in the audit by each providing 12.5% of the total sample.

6. The expert reviewers considered a composite set of clinical variables for each patient, rather than relying on a single definitive threshold in their assessment of appropriateness of indication and dose of platelet transfusion. This renders direct comparison with some other national platelet audits invalid.

7. The audit included a subset of patients who had recently been taking antiplatelet medication and required platelet transfusion for perioperative bleeding. The expert reviewers considered whether this medication influenced the requirement for platelet transfusion and whether it should have been discontinued preoperatively. The decision to stop any antiplatelet medication involves a careful risk benefit analysis on an individual patient basis. The audit did not take into account the large number of patients who continued to take aspirin or other antiplatelet medication in the perioperative period and did not require platelet transfusion.

DISCUSSION

Despite the limitations documented on the previous page, this audit identified some important findings, with scope for further improvement in the transfusion of platelets in Northern Ireland.

In 10% of cases pre-transfusion platelet count checks were not performed within 24 hours of transfusion for inpatients or within 48 hours for outpatients. Documentation of both indication for transfusion and subsequent clinical effect could be greatly improved upon.

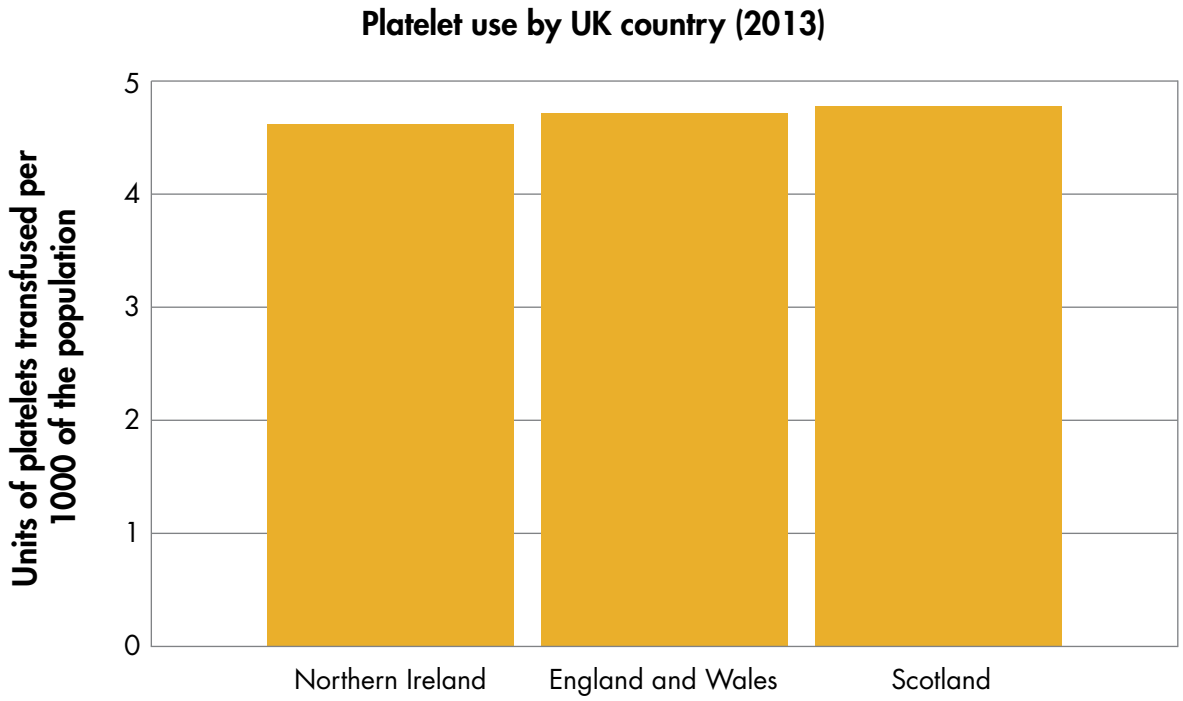
Overall some 92.7% of platelet transfusions were administered for an appropriate indication given the clinical circumstances. However an excessive dose of platelets was transfused in almost 16% of cases and there appeared to be a correlation between this finding and increasing number of packs transfused.

Another major finding was that tranexamic acid was infrequently administered to non-cardiac surgery patients when multiple blood components, in addition to platelets, were required for treatment of major haemorrhage, despite strong evidence that it reduces blood loss in such situations.

Finally it is reassuring to report that transfusion of platelets for bleeding secondary to antiplatelet drug therapy was only required when patients presented for emergency surgery, when it was not possible to discontinue this medication prior to intervention. There was no evidence that platelets were transfused to correct bleeding as a result of platelet dysfunction when clinicians had the opportunity to hold such therapy pre-operatively.

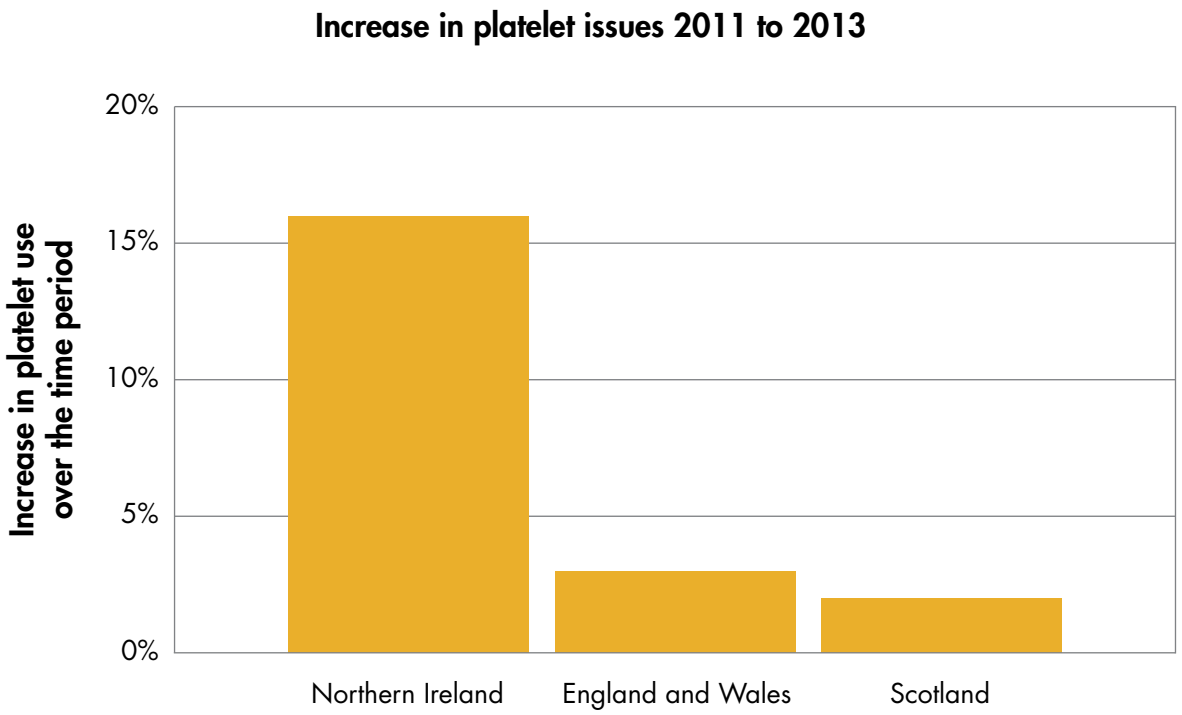
When benchmarked – the use of platelets per head of the population is broadly similar across the 4 UK countries.

Figure 20



However data on platelet issues from the annual Serious Hazards of Transfusion (SHOT) reports show that the rate of increase in platelet use in Northern Ireland is faster than anywhere else in the UK.

Figure 21



This audit demonstrates that there is potential to make improvement in the appropriate transfusion of platelets in Northern Ireland. An action plan on how this could be taken forward by key individuals, groups, committees and Healthcare Trusts is outlined on the following page.

ACTION PLAN

- The results of this audit should be widely distributed to all Healthcare Trusts and Healthcare Professionals
  Action: GAIN, NI Transfusion Committee and NITC Audit and Implementation Lead

- An educational presentation of this audit should be made available to all Hospital Transfusion Committees and Haemovigilance Practitioners
  Action: NI Transfusion Committee and NITC Audit and Implementation Lead

- A regional education study day on platelet use should be organised to highlight the issues in this audit
  Action: NI Transfusion Committee

- All Healthcare Trusts should have local policies and guidelines for the use of platelets in all relevant clinical specialities
  Action: Hospital Transfusion Committees

- Healthcare Trusts should regularly audit platelet use and encourage appropriate use and correct dosing.
  Action: Trusts, Hospital Transfusion Committees and Haemovigilance Practitioners

- The administration of tranexamic acid should be recommended in transfusion policies and protocols and its use promoted in all cases of major haemorrhage when not contra-indicated.
  Action: Trusts, Hospital Transfusion Committees and Haemovigilance Practitioners

Copies of the audit tools (data collection forms and instruction manual) for this audit will be available on the GAIN website.

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APPENDIX 1

Recommendations for Platelet Transfusion referred to in this audit - see Reference section above for evidence base

Patients with chronic thrombocytopenia (e.g. due to chemotherapy, bone marrow transplantation, aplasia, myelodysplasia):

- The threshold platelet count for platelet transfusion in the absence of other risk factors for bleeding is 10 X 10^9 / L. **(Grade A, level 1b)**
- In the presence of one or more risk factors for severe bleeding (sepsis, concurrent use of antibiotics, other haemostatic abnormalities, recent bleeding in last 5 days, chronic renal disease (eGFR < 60), bone marrow transplantation in last 100 days, the threshold platelet count for platelet transfusion is 20 X 10^9 / L. (Grade A, level 1b)
- Patients with chronic stable thrombocytopenia should be managed on an individual basis. A strategy of therapeutic rather than prophylactic platelet transfusion should be adopted to minimise the risk of infection and alloimmunization.

Thrombotic thrombocytopenic purpura, Immune thrombocytopenic purpura, Haemolytic uraemic syndrome

- Platelet transfusions should be reserved for life threatening bleeding secondary to severe thrombocytopenia **(Grade C, level IV)**

Heparin induced thrombocytopenia (HIT)

- Platelet transfusion is contraindicated

Critically ill patients

The thresholds for platelet transfusion are:

- 10 x 10^9 / L in the absence of bleeding
- 50 X 10^9 / L prior to an invasive procedure
- 100 X 10^9 / L if central nervous system injury, multisystem trauma or an intrathecal catheter is required
- Platelet count less than 100 x 10^9 / L, with a congenital or acquired cause of platelet dysfunction, e.g. uraemia, cardiopulmonary bypass, antiplatelet therapy (e.g. clopidogrel)

Disseminated intravascular coagulation (DIC):

- In the presence of DIC and bleeding the threshold for platelet transfusion is 50 X 10^9 / L. **(Grade C, level IV)**
- In the presence of DIC and a high risk of bleeding (due to undergo surgery or other invasive procedure or postoperative patients) the threshold for platelet transfusion is 50 x 10^9 / L. **(Grade C, level IV)**
- Prophylactic platelet transfusion is only indicated for treatment of DIC in the absence of bleeding if platelet count is less than 20 x 10^9 / L or if there is a high risk of bleeding. **(Grade C, level IV)**

Patients with thrombocytopenia scheduled for planned or urgent surgery or other invasive procedures:

- The requirement for platelet transfusion should be minimised by the following measures when appropriate:
  - Preoperative discontinuation of medication with antiplatelet activity
  - Perioperative administration of tranexamic acid

- The thresholds for platelet transfusion are:
  a. 50 x 10^9 / L prior to surgical procedures, including spinal surgery, except those listed in c. below

b. 50 x 10^9 / L prior to insertion of central venous access or dialysis catheters, IVC filter placement, thoracentesis, paracentesis, trans abdominal liver biopsy, insertion of gastrostomy tube, lumbar puncture **(Grade B, level III)**
c. 75 x 10^9 / L prior to spinal or epidural needle insertion in obstetric patients. Caution in women who have a rapidly declining platelet count, e.g. HELLP syndrome.
d. 100 x 10^9 / L prior to invasive procedures in critical sites, e.g. brain or eye. **(Grade C, level IV)**

- Following platelet transfusion the platelet count should be measured preoperatively to ensure that a satisfactory preoperative count has been achieved.
- Prophylactic platelet transfusion is not indicated prior to bone marrow biopsy or prior to cardiopulmonary bypass **(Grade C, level IV**)
- In the event of postoperative surgical bleeding the patient should be returned to theatre without delay

During active bleeding or massive blood loss

- Platelet count and coagulation screen should be monitored.
- A platelet count of 75 x 10^9 / L should trigger platelet transfusion and platelet count must be maintained above 50 x 10^9 / L **(Grade C. level IV)**
- In patients with multiple high velocity trauma or central nervous system injury the platelet count must be maintained above 100 x 10^9 / L **(Grade C, level IV)**
- Response to therapeutic platelet transfusion should be monitored by assessing the effect on bleeding and by measuring the increase in platelet count
- Coexistent anaemia and coagulopathy should be corrected
- Perioperative antifibrinolytic agents (tranexamic acid) should be administered.

Dose of platelets

- For prophylaxis – one adult therapeutic dose (apheresis or whole blood derived) should increase platelet count by 30 - 80 X 10^9 / L.
- The dose of platelets administered should be appropriate for the clinical condition. An excessive dose should not be administrated and if more than one adult therapeutic pack of platelets is administered – the post transfusion platelet count should not exceed the recommended threshold for the particular clinical condition by more than 40 x 10^9 / L.
- Treatment of active bleeding – more than one adult therapeutic dose may be required, depending on the duration of haemorrhage and total blood loss. Monitor platelet count and transfuse if platelet count is less than 75 X 10^9 / L.

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