11b Avoidable Transfusions n=116

Authors: Paula Bolton-Maggs, Catherine Booth and Simon Carter-Graham

Definition:

Where the intended transfusion is carried out, and the blood component itself is suitable for transfusion and compatible with the patient, but where the decision leading to the transfusion is flawed.

Key SHOT messages

- For a patient with anaemia, unless there is haemodynamic instability, pause and investigate before transfusing. The definitive treatment will be correcting the underlying cause
- If a patient's results are unexpected or outwith expected trends, consider whether they fit the clinical picture. If not an emergency, repeat before acting on them
- Unless the patient is critically unstable due to bleeding, speak to the transfusion laboratory before accessing emergency group O red cells (or at least before removing multiple emergency units)
- Caution must be exercised when acting on Hb results from point-of-care machines. Ideally the result must be confirmed with a venous sample if time allows

Recommendations

- Avoidable transfusion in patients with haematinic deficiency puts them at risk of TACO. Clinical staff should be familiar with full blood count results that suggest deficiencies of iron (microcytosis), or B12 or folate (macrocytosis)
- Local transfusion training should include the indications for group O emergency red cells and how to check if group-specific or crossmatched units are available
- Laboratories should have a mechanism for alerting other pathology departments to erroneous results – a diluted sample withdrawn by biochemistry should trigger review of haematology samples taken at the same time

Action: Hospital transfusion teams, UK medical schools, transfusion laboratory managers

Introduction

There were 116 reports of avoidable transfusion compared to 110 in 2020.

Deaths related to transfusion n=0

There were no deaths reported related to avoidable transfusions.

Major morbidity n=0

There were no cases of major morbidity related to the transfusion.

Haematinic deficiency n=6

Six people were transfused for haematinic deficiency: 1 had B12 deficiency, the others had iron deficiency (4 female, 2 male). Two were found to be iron deficient preoperatively and this was not corrected resulting in the need for perioperative transfusion.

Case 11b.1: Avoidable transfusion for B12 deficiency

Two units of red cells were given to a patient with B12 and folate deficiency. His Hb was 39g/L with macrocytosis. He was referred by his GP with pancytopenia. He had symptomatic anaemia and a single unit transfusion would have been reasonable, but the administration of the second unit could have been avoided.

Pancytopenia is a characteristic feature of B12 or folate deficiency.

Case 11b.2: Avoidable transfusion for iron deficiency

A woman with symptomatic iron deficiency had a Hb of 27g/L. She was transfused three red cell units, and her post-transfusion Hb was 56g/L. She was stable with no overt bleeding or cardiovascular compromise, but she went on to receive two more red cell units. Iron replacement was not considered. The locum haematology consultant did not review the patient's latest Hb or iron results before authorising the extra two units.

Case 11b.3: Avoidable transfusion of group O D-negative emergency blood in an iron deficient patient

A man admitted to the ED with gastrointestinal bleeding was found to have a Hb of 49g/L, with a ferritin of 2micrograms/L. Four units of red cells were requested with no clinical details and urgency was also not indicated. The laboratory staff liaised with the haematology registrar who approved issue of one unit of red cells following discussions with the gastroenterologist. It was agreed that transfusion was appropriate to stabilise prior to endoscopy. In the meantime, the treating team had transfused emergency O D-negative red cells, but the laboratory staff were not updated. After two units the Hb was 68g/L. The first unit of group O blood was justifiable, but as a male, he could have received O D-positive red cells.

Learning points

- Haematinic deficiencies can be detected before severe anaemia develops and transfusions are indicated only in patients with haemodynamic instability
- All relevant clinical information must be provided to the transfusion laboratory to enable issue of appropriate blood components. The urgency of the transfusion must be stated clearly
- Hospitals need to review policies for use of emergency group O D-positive rather than D-negative for appropriate patients

The recently published NCA on medical use of blood found that 20% of patients receiving transfusion were found to have iron deficiency once investigation was complete (NCA 2022). This indicates that cases with avoidable transfusions for haematinic deficiency are significantly under-reported to SHOT contrary to published guidance (NICE 2015, Royal College of Pathologists 2019).

Errors due to verbal handover n=13

Four unnecessary transfusions were given as a result of incorrect verbal handover of treatment plans and in 3 of these there was no prescription for the transfused components. In another 5 patients a decision to transfuse was made based on incorrect results given verbally. Four patients were transfused based on handover of previous treatment plans, when subsequent medical reviews had identified that transfusion was no longer necessary.

Handover is a safety critical point in the working day. It is essential that accurate and timely information is communicated between members of staff to ensure continuity of care. This information should be documented in a standardised format where possible to ensure clarity and limit any interpretation errors. Structured, standardised communication methods overcome barriers and foster a safety culture. Change in shifts is a particularly risky time for such errors if staff taking over do not independently check the plan or relevant results.

Avoidable transfusion of group O D-negative units in patients with major haemorrhage n=17

Sixteen were due to clinical errors and 1 to laboratory error. In 15 cases the MHP was activated but in 2 it was not.

Crossmatched units were available for 8, and group-specific red cells could have been provided for another 2.

Communication issues were reported for 5/17 cases and in another none of the traceability paperwork was completed for any of the emergency blood including the prescription.

Case 11b.4: Confusion caused by duplicate hospital numbers

A woman in her 30s was admitted for elective surgery. The surgical team requested that blood be available but when they needed it, it was not ready because the BMS expected a second group sample (which was not necessary as she had a group record with another hospital number). The woman was bleeding heavily so the MHP was called and emergency group O D-negative was used. She was transfused three units of blood, four units of FFP and two pools of cryoprecipitate.

The reporting organisation had three sites; two sites use the same hospital number. This caused confusion for this patient who had more than one hospital number which was not noticed by the BMS.

The outcome from this case was to change the LIMS so that it linked patients by NHS number in the background so patients with two hospital numbers could be easily identified and blood issued.

Case 11b.5: Errors in procedure

An elderly man with neutropenic sepsis (myelodysplasia) was transferred from a ward to the coronary care unit. He developed hypotension and an initial Hb check done was 58g/L. The MHP was activated and although a repeat Hb was 73g/L he received two units of group O D-negative red cells based on the erroneous Hb result. O D-negative red cells were used despite the fact that crossmatched red cells were available. There were several errors noted in this case such as prescription errors, incomplete information on the traceability records with no patient ID information and acting on erroneous Hb results. The first Hb result may have been from a diluted sample.

Use of O D-positive units would have been appropriate n=13

Eight of these were male and 5 were females over 50 years of age who could have received group O D-positive units.

Avoidable transfusion of platelets n=17

These included 6 cases where the platelet count was above the threshold for platelet transfusion, 2 cases with spurious low counts due to clumping, another with a clot in the sample and 3 patients with immune thrombocytopenia. Others included platelets ordered for the wrong patient, platelets given the night before an invasive procedure by mistake, wrong blood in tube and cancelled surgery after platelets were transfused.

Learning points

- Thrombocytopenia is infrequently associated with bleeding and platelets should only be transfused according to guidelines (BSH Estcourt et al. 2017)
- Platelet transfusions are not indicated for ITP except in serious bleeding
- Clinical staff should be aware of platelet thresholds above which transfusion of platelets is not appropriate
- Unexpected low platelet counts should be repeated, and a blood film reviewed

Case 11b.6: Did the platelet transfusion contribute to thrombosis?

A patient with COVID-19 VITT and post thrombolysis intracranial haemorrhage with mass effect required an EVD. Platelet count originally was 16x10^9/L and increased to 46 after 2 ATD of platelets. Haematology advice to the ICU consultant and neurosurgeon was to proceed with EVD because

- *Platelet count of >80x10^9/L was not achievable*
- *The patient was unlikely to bleed given that he had VITT and was prothrombotic (i.e., thrombocytopenia would not translate into a higher risk of bleeding)*
- *There was a reasonable possibility that a platelet transfusion might cause thrombosis*

The neurosurgical registrar insisted on an additional ATD of platelets before surgery but was unwilling to wait for a check of the platelet count prior to theatre. The FBC was checked at 18:15 immediately after return to ICU from theatre. The platelet count was 33x10^9/L, with no increment following the third unit. The patient did not bleed. Subsequent postoperative head CT/CT venogram at 22:40 showed no worsening of bleed but there was a new CVST (not present on 01:34 scan), that subsequently progressed despite adequate anticoagulation. The patient recovered slowly and was discharged to another hospital.

The reporter wrote 'given the mechanism of VITT, there is a high probability that the platelet transfusion(s) directly contributed to the new CVST'.

Later review noted that:

- This is a new disease process and correct treatment remains unclear
- Current guidelines suggest platelet count >100x10^9/L is needed for neurosurgery (although this is contentious)
- It cannot be said with certainty that the additional platelet transfusion was the sole cause for sinus thrombosis in this patient

As a result, the incident has been downgraded from moderate harm. In addition, the ICU consultant noted that the right sided venous thrombosis is on the same side as the infarct and hydrocephalus with mass effect had occurred. It is reasonable to suggest that raised pressure probably affected venous flow and increased the risk of thrombosis from mechanical means (and prior to platelet transfusion) (i.e., thrombosis is multifactorial).

The patient was discharged to another hospital 3 weeks later and continued to suffer extensive and progressive arterial and venous thrombosis despite therapeutic anticoagulation with argatroban.

Commentary: VITT was first reported in 2021 (Greinacher et al. 2021, Pavord et al. 2021, Perry et al. 2021, Schultz et al. 2021). This case occurred in May 2021. This is a new condition and the guidance for management is evolving over time. Intravenous immunoglobulin and non-heparin anticoagulants are recommended (Scully et al. 2021). An expert haematology panel (EHP) was convened on 22 March 2021 meeting several times a week (Chevassut et al. 2021), collecting information from reported cases (Pavord et al. 2021) and giving advice on management. The EHP has a 'live' guidance document found here https://b-s-h.org.uk/media/20499/guidance-version-22-20210903.pdf. This notes that it is not

clear whether platelet transfusions should be given or not, and that they may be indicated to cover neurosurgery. There is also guidance from the intensive care society found here: https://www.ics.ac.uk/Society/COVID-19/PDFs/Management_VITT_Guidance.

This guidance is also unclear about platelet transfusion but states this: 'Platelets only for surgery or major bleed'. They suggest caution: 'There are theoretical reasons to try and avoid platelet transfusions in case they could exacerbate the pathological disease process, analogous to thrombotic thrombocytopenic purpura, however there is no evidence that giving platelets does actually cause any harm at this stage.' This is their conclusion: 'Note: It is unclear whether platelet transfusions will exacerbate the condition, the risk/benefit in supporting platelets <50x10^9/L on anticoagulation who a secondary cerebral bleed and not requiring procedure is unknown and therefore clear advice cannot be offered at the time of writing'.

All cases of suspected VITT should continue to be reported centrally so that more can be learned from study of as many cases as possible.

Case 11b.7: Inappropriate transfusion for immune thrombocytopenia

An elderly man with ITP on a background of chronic lymphocytic leukaemia received 50mL of platelets before transfusion was stopped as his platelet count was 1258x10^9/L. His previous count 2 weeks before was 13x10^9/L but he had been treated with eltrombopag. The plan was to review the count before proceeding with platelet transfusion but that was overruled by a doctor.

ITP is not treated with platelet transfusions unless there is serious bleeding (which is rare). Treatment guidelines recommend immune suppression and use of thrombopoietic mimetic agents such as eltrombopag (Thachil et al. 2018, Provan et al. 2019). This patient showed a very good response.

In 1 case, the patient received a platelet transfusion in error following a wrong blood in tube incident. This was investigated thoroughly and appropriate corrective and preventative actions were taken. This case has been described in the supplementary information on the SHOT website (https://www.shotuk.org/shot-reports/report-summary-and-supplement-2021/) as well as in Chapter 5, Acknowledging Continuing Excellence in Transfusion (ACE) acknowledging the thorough and effective incident investigation.

Learning points

- When a patient has thrombocytopenia, it is important to find out the cause before requesting a platelet transfusion, particularly to exclude a spurious result
- Some causes of thrombocytopenia are associated with thrombosis rather than bleeding, including VITT and thrombotic thrombocytopenic purpura (similar mechanisms)

Avoidable transfusion of plasma components n=8

In 4 cases, patients received plasma components although coagulation tests were normal with no bleeding. Two cases related to errors involving COVID-19 convalescent plasma (1 patient received CCP instead of FFP, and the other received CCP after recovery from COVID-19. This patient had initially been randomised to receive CCP which was delayed due to sample errors but was given CCP prior to discharge which was deemed unnecessary). One patient received cryoprecipitate after an erroneous low fibrinogen was recorded due to interference in the test by dabigatran (Kanda et al. 2021). In the final case the respiratory team wanted INR <1.5 to perform a pleural tap. The FFP was transfused after the procedure had taken place.

As with transfusions in iron deficiency, these cases will most likely represent the tip of the iceberg in relation to unnecessary plasma transfusions. In the recently published NCA of use of FFP in neonates and children, more than 75% of FFP transfusions given to neonates were to correct abnormal coagulation results, in the absence of bleeding or surgery (NCA 2021). This is contrary to BSH guidelines (BSH New et al. 2016).

Learning points

- Use of FFP in non-bleeding patients with normal coagulation tests must be avoided
- There is no evidence to support prophylactic use of FFP in non-bleeding patients with pre-procedural abnormal standard coagulation tests (BSH Green et al. 2018)

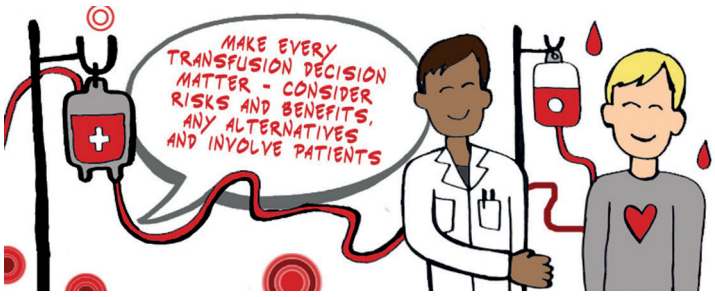
Near miss cases n=4

The 4 near miss cases are detailed in the supplementary information on the SHOT website (https://www.shotuk.org/shot-reports/report-summary-and-supplement-2021/).

Conclusion

Unnecessary or excessive transfusion continues to be reported in patients with haematinic deficiencies, suggesting a reactive response in transfusing to correct anaemia rather than investigating and treating the cause (BSH Fletcher et al. 2022). Errors continue to occur due to decisions based on inaccurate results from clotted or diluted samples, platelet clumping, wrong blood in tube or point-of-care machines. Unexpected results should be confirmed on a repeat sample unless the patient is unstable due to bleeding. Shift changeover is a particularly dangerous time for communication errors. Transfusions should not be prescribed or administered based on verbal handover alone without confirmation in the patient's notes and after review of any relevant results. Staffing pressures, working in unfamiliar areas or on call and multiple competing priorities contribute to this.

Group O units can be lifesaving in an emergency, but O D-negative should be preserved for women of childbearing potential and robust systems are needed to ensure a switch to group specific or crossmatched units as soon as these are available.



SHOT
Serious Hazards of Transfusion

Recommended resources

New e-learning resources:

Anaemia
Includes modules 'Anaemia - the only introduction you need', 'Anaemia in primary care patients' and 'Anaemia in hospital patients'
https://hospital.blood.co.uk/training/clinical-courses/

Blood component use in major haemorrhage
https://www.e-lfh.org.uk/programmes/blood-component-use-in-major-haemorrhage/

The NHSBT O D-negative toolkit
https://hospital.blood.co.uk/patient-services/patient-blood-management/o-d-negative-red-cell-toolkit/

Royal College of Pathologists - Choosing Wisely
https://www.rcpath.org/profession/patient-safety-and-quality-improvement/patient-safety-resources/choosing-wisely/recommendations-for-transfusion-medicine.html

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