Under or Overtransfusion n=20

12c

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Definition:

A dose inappropriate for the patient's needs, excluding those cases which result in TACO and usually resulting in a haemoglobin or platelet level significantly outside the intended target range. Infusion pump errors leading to under or overtransfusion with clinical consequences (if no clinical consequences, then it is reportable as a handling and storage error).

Key SHOT message

- As in previous years, more than half the cases of overtransfusion were in children (8/14)

Recommendations

- Paediatric transfusion protocols should be readily accessible to all clinical staff
- Hospitals should have clear guidelines for patients being transferred between hospitals to reduce the risk of adverse outcomes

Action: Hospital transfusion teams

Introduction

The number of reports (20) is similar to last year (18). In 2023, there were 14 reports of overtransfusion and 6 of undertransfusion. The majority were clinical incidents (19/20).

Many cases were reported in children, 9/20. Eight of these were overtransfused and 1 was undertransfused.

Deaths related to transfusion n=1

Case 12c.1: A patient died following surgery where overtransfusion was justified

Shortly after an uneventful elective surgery (exchange of ureteric stents), the patient developed hypotension and tachycardia and was only minimally responsive to intervention (including intravenous fluids and vasopressors). The abdomen appeared distended, and the patient began complaining of back pain. The patient was thought to have major haemorrhage and was transfused three units of red blood cells and two units of FFP (emergency MHP). CT showed no evidence of bleeding, but there was evidence of pulmonary oedema. The patient was transferred to critical care and remained extremely unstable. TACO was considered but not supported by bedside echocardiography. Sadly, the patient died. Subsequently blood cultures from the patient grew E. coli. This death was referred to the coroner who concluded multi-organ failure, E Coli urosepsis with chronic ureteric obstruction caused the patient's death. The blood transfusion could have contributed to the patient's deterioration, but the relationship to the patient's outcome was not certain.

Initial investigation by hospital transfusion team felt this was unlikely to be TACO/TRALI or anaphylaxis to blood components. However, in the absence of an identifiable source of bleeding and rise in Hb from

114 to 184g/L, it was concluded that this was a clinically justified overtransfusion where the anaesthetist had substantial grounds to believe the patient was experiencing major haemorrhage.

Major morbidity n=2

A child received a full adult unit of red cells (300mL) when the correct volume would have been 150mL. The post-transfusion Hb was 190g/L. As a result, the child was admitted to ICU overnight and required venesection.

An adult with a platelet count of $27x10^9$/L who presented with haematuria received four platelet pools inappropriately prescribed by a junior doctor without adequate knowledge; only one was indicated. There was misunderstanding following discussion between the doctor and haematologist. The patient, already with pulmonary oedema, developed shortness of breath and required admission to ICU for 3 days. The patient later died but this was unrelated to the transfusion.

Overtransfusion n=14

More than half of the reported cases (8/14) were in paediatric patients. These are discussed in more detail in Chapter 24, Paediatric Cases.

Six adults received excess transfusion, 1 caused by a WBIT.

Case 12c.2: WBIT in FBC sample impacts two patients

A patient was transfused based on a wrong FBC result involving incorrectly labelled blood samples. Labels for Patient 1 were printed, but the phlebotomist was unable to get a sample from the patient. At the same time, there was a request for bloods to be taken from Patient 2 but the IT system defaulted to the Patient 1's record following an incorrect hospital number data entry. This resulted in labels belonging to Patient 1 being printed. PPID was not undertaken correctly at the time of phlebotomy, and the incorrect labels were attached to the FBC sample which contained Patient 2's blood.

The FBC results were issued against Patient 1. The laboratory staff noticed the discrepant Hb result in relation to the previous results from this patient but attributed this to surgery because the request had originated from a surgical ward. The junior medical and nursing staff had also discussed the discrepancy of both Hb and mean cell volume but the possibility of WBIT was not considered. Patient 1 was unnecessarily transfused a unit of red cells resulting in a post-transfusion Hb of 151g/L with no adverse symptoms. Patient 2, whose Hb had been 91g/L fell to 71 then 69g/L resulting in a delay before they were transfused. A mismatch between workload, staff provision, an ineffective IT system and communication factors were noted to be contributory factors in this incident.

Case 12c.3: Hypotension attributed to GI bleeding results in overtransfusion

An elderly woman with pre-existing cardiac failure and poor renal function suffered a major GI bleed requiring a red cell transfusion and endoscopy which confirmed arterial bleeding from a duodenal ulcer. She was stabilised but the following morning had hypotension. No formal laboratory sample was taken between the first transfusion and the second the day after. An urgent Hb was recorded mistakenly as 49g/L but on the venous gas was 119g/L. Based on the erroneous result, she received six units of red cells; her Hb rose to 198g/L and she required venesection. CT angiogram showed no evidence of bleeding. She was admitted to ICU following IR treatment with gastroduodenal artery coil. Four days later she returned to the ward, Hb 152g/L. Although she subsequently died this was not related to the overtransfusion.

Learning point

- Hypotension can have different causes and is not always due to bleeding. Thorough evaluation of the patient is crucial for guiding appropriate management. This will ensure the patient receives the care they need promptly and effectively

Haematinic deficiency n=1

A child with a Hb of 35g/L due to iron deficiency was intentionally transfused to Hb 96g/L and at a rate (6.13mL/kg/hr) greater than recommended (3-5mL/kg/hr). Iron deficiency is very well tolerated in young children. A smaller volume at a slower rate would have been more appropriate, but not every child, even with such a low Hb, requires transfusion as they are often very chronically anaemic.

There were a further 16 avoidable transfusions in patients with haematinic deficiencies, see Chapter 12b, Avoidable Transfusions.

Undertransfusion n=6

Of the 6 reports of undertransfusion, 2 involved FFP. In 1 case, two bags were given instead of three and in the other case one bag with 250mL of FFP was issued by the laboratory instead of the 1L requested resulting in delay of a planned procedure.

There were 3 reports of red cell undertransfusion, 1 in a child. A sample was run as a neonatal one, but the child was over a year of age and a paedipack was issued instead of a full unit. Another was in a patient whose target Hb was >100g/L because of radiotherapy. The patient received only one of five units of red cells resulting in failure to achieve the target. The 3rd case is described in Case 12c.4.

A patient with leukaemia failed to receive granulocytes as they had not been prescribed and were therefore wasted. There was no harm to the patient.

Case 12c.4: Splenic rupture with major haemorrhage requiring interhospital transfer

An elderly man on oral anticoagulants developed abdominal pain found to be caused by splenic rupture. He required emergency transfer to another hospital site for IR. Transfusion of red cells was started and planned to continue throughout the transfer. He also received PCC and tranexamic acid. There was no nurse available to accompany the patient, and the paramedics did not know how to manage the infusion pump when it stopped working and the transfusion was not completed. The transfusion laboratory at the transferring hospital had not been informed of the transfer, so the available crossmatched red cell units and patient sample were not sent with him. During the IR procedure he was peri-arrest and received emergency group O D-negative units and FFP. The splenic embolisation was successful and he was transferred to a ward.

The report noted that there was a lack of clarity on inter-site transfer for patients who require intervention. There were multiple handovers and unclear information among teams. Such transfers are known to be associated with risks of adverse events (Haji-Michael, 2005). The laboratory protocol for transfer of red cell units with patients was not followed. Guidelines are available for interhospital transfer noting the importance of appropriate equipment and personnel (AAGBI, 2006; Ahmed & Majeed, 2008; Warren, et al., 2004).

Learning points

- Transfer of seriously ill patients between sites carries additional risks; ideally patients should be accompanied by medical or nursing staff
- Handovers concerning seriously ill patients are essential and should be concise and accurate

Near miss n=1

A child avoided an excessive transfusion because an error in the prescription was detected by the staff member undertaking the pre-administration check.

Conclusions

Errors in paediatric transfusion continue to be a cause for concern. Transfusion training should ensure that clinicians authorising transfusions understand the use of all blood components including indications, monitoring, recognising, and managing adverse reactions.

Ensuring safety when transferring patients between hospitals involves careful coordination and communication between clinical teams, verifying patient information, transport with appropriate staff accompanying to monitor and manage patients during transfer. Clear protocols for communication and continuity of care are essential to minimise risks and ensure a smooth transition for the patient.

Finally, all transfusion decisions must be made after carefully assessing the risks and benefits of transfusion therapy. Clinical and laboratory staff must work collaboratively and in a co-ordinated fashion to be able to deliver individualised, holistic, patient-centred care.

Recommended resources

SHOT Bite No.4: Paediatrics
https://www.shotuk.org/resources/current-resources/shot-bites/

BSH guidelines for paediatric transfusion
https://b-s-h.org.uk/guidelines/guidelines/transfusion-for-fetuses-neonates-and-older-children

Guidance on: Transfer of the critically ill adult
https://ics.ac.uk/resource/transfer-critically-adult.html

References

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