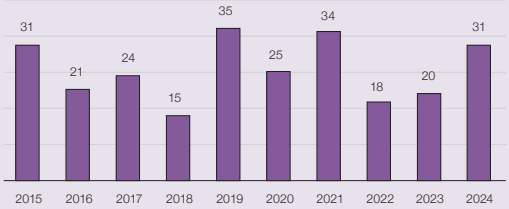
Under or Overtransfusion n=31

Authors: Paula Bolton-Maggs, Catherine Booth and Vera Rosa

Headline data 2024

Number of reports n=31
Deaths n=1
Major morbidity n=3

Under or overtransfusion reports by year



Demographic data

Male n=19
Female n=12
Adults n=11
Paediatric n=20

Blood component data

Red cells n=27
Platelets n=2
Plasma n=0
Cryoprecipitate n=2
Multiple components n=0

Key findings:

- An increase in numbers reported compared with previous 2 years
- Paediatric cases predominate (64.5%)
- Several haemoglobinopathy patients over or undertransfused

Gaps identified:

- Calculation and infusion rates for transfusion
- Communication issues and knowledge gaps

Good practice:

- Local investigations were carried out and relevant improvement actions were undertaken
- Vigilant laboratory staff querying appropriateness of requests for transfusion

Next steps:

- Patients with haemoglobinopathies should be managed under discussion with specialists and following national guidelines
- Practitioners who authorise transfusions for paediatric patients should be adequately trained to ensure calculations of volume are correct, and the correct infusion equipment is used

For all abbreviations and references used, please see the **Glossary** and **Reference list** at the end of the full Annual SHOT Report. Please see the supplementary information on the SHOT website (https://www.shotuk.org/shot-reports/annual-shot-report-2024/).

Definition:

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

Introduction

There has been an increased number of reports received in this category in 2024, 31, compared to 20 in 2023. Most, 20/31 (64.5%), were paediatric cases. The majority were caused by wrong calculations or wrong infusion rates. Overtransfusion was reported in 13 cases, and 11 of these were paediatric patients. Undertransfusion occurred in 18 cases, and 9 of these were paediatric patients.

Eight cases occurred in patients with haemoglobinopathies, 3 with thalassaemia (all paediatric) and 5 with sickle cell disease (2 paediatric).

Most (27/31) related to red cells; 2 related to cryoprecipitate (a baby received too much and an adult with major haemorrhage was underdosed). A child received an excess of platelets due to an administration error, and an adult was undertransfused platelets due to an error with the infusion pump.

Deaths related to transfusion n=1

Case 13.1: Death from severe drug-induced haemolysis and ineffective transfusion (imputability 1 – possible)

An elderly person died from probable severe drug-induced haemolysis with haemoglobinuria and ineffective transfusion. The patient had an infected joint prosthesis and was receiving rifampicin. Over a 4-day period, red cell transfusions were provided using best-matched concessionary release red cells together with steroids and intravenous immunoglobulin. However, there was insufficient response in the haemoglobin (Hb) due to the rampant haemolysis.

Rifampicin-induced haemolysis is recognised, often severe, but rare and deaths have been reported despite best available treatment (as in this case) (Ahrens, et al., 2002; Covic, et al., 1998; Sveroni, et al., 2018). Limited details were available regarding this case and from the information provided, rampant haemolysis resulted in patient death whilst transfusion was being administered.

Major morbidity n=3

Case 13.2: Extravasation of transfusion and inadequate monitoring

An elderly patient presenting with rectal bleeding received a transfusion of red cells which extravasated extensively with bruising of his arm. The patient received no benefit from the transfusion which was also not adequately monitored. They were very unwell with fluid overload and renal dysfunction and died but unrelated to the transfusion.

Case 13.3: Undertransfusion during exchange transfusion: use of wrong giving set

A neonate underwent exchange transfusion for haemolytic disease of the fetus and newborn but was significantly undertransfused. The wrong giving set was used resulting in a lower volume transfusion than planned. The hospital's supplier produced two paediatric giving sets that looked very alike, one for transfusion and one for fluids. Exchange transfusion was very infrequently performed in this hospital. The infant developed hypovolaemic shock with cardiac arrest and required ventilation. The child recovered when appropriately transfused.

This case is also described in Chapter 25, Paediatric Cases, Case 25.7.

The 3rd case involved overtransfusion of red cells due to a calculation error in a child who was also severely thrombocytopenic.

Errors in haemoglobinopathy patients n=8

Five of 8 cases occurred in paediatric patients. A young child only received a quarter of the intended volume (101 rather than 404mL) due to a miscalculation resulting in a lower than desired Hb at the next visit. Two other patients were transfused based on a wrong calculation and 2 based on an incorrect prescription. An adult with sickle cell disease received an inadequate number of red cell units for exchange transfusions due to difficulty sourcing compatible group O D-positive units. The patient had multiple antibodies and there was a national shortage of group O.

Case 13.4: Overtransfusion of a child with thalassaemia

An infant with known beta thalassemia was prescribed 80mL red cells but was transfused 210mL in error. There were additional concerns: there were significant delays in providing the blood components due to mislabelled samples, conflicting information regarding whether irradiated units were required, how fresh the blood should be, and what component type i.e., large volume unit vs paediatric packs. The child was not harmed.

The management of this case suggests staff were not familiar with the process. Transfusion of patients with haemoglobinopathies is specialised and should follow national guidelines including standards for clinical care in thalassaemia (UK Thalassaemia Society, 2023; Trompeter, et al., 2020a; Trompeter, et al., 2020b).

Case 13.5: A patient with sickle cell disease could not complete their exchange transfusion

A young person was receiving an exchange transfusion via an implanted central venous line which stopped functioning during the procedure. Two red cell units were returned to the refrigerator but as they had been out of temperature control for 31 minutes, they were not subsequently released to finish the transfusion. The patient was not harmed.

The local review considered that concessionary release of these red cell units could have been appropriate to complete the exchange.

Learning point

- Wherever possible, patients with haemoglobin disorders should be managed by specialists with appropriate transfusion protocols

Near miss n=3

An incorrect Hb result was reported for a patient who was bleeding and in need of surgery.

This was at the time of a laboratory information technology cyber-attack which increased the laboratory workload and necessitated manual transcription of results with some delay. The surgical staff did not question why the reported Hb of 130g/L was so different to the previous day (Hb 84g/L). During surgery, repeat Hb measurement on the blood gas machine confirmed significant anaemia (Hb 59g/L) and the patient received a single unit of red cells which was all that was available. The corrected result for the original Hb was 74g/L. The patient came to no harm and was not undertransfused.

There were 2 other cases of near miss, both related to overtransfusion, which were identified when laboratory staff queried the transfusion request.

Conclusion

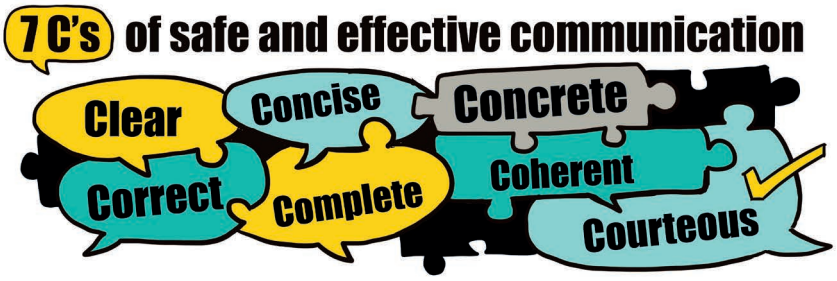
Cases of under or overtransfusion occur most commonly in paediatric patients (see additional comments in Chapter 25, Paediatric Cases). Patients with haemoglobin disorders should be managed under specialist guidance. In cases of catastrophic haemolysis, it may not be possible to keep up with the fall in Hb by transfusion.

Recommended resources

Avoidable, Delay and Under or Overtransfusion (ADU) Cumulative Data
https://www.shotuk.org/resources/avoidable-delay-and-under-or-overtransfusion-adu-cumulative-data/

Avoidable, Delayed or Under/ Overtransfusion webinar (ADU)
https://www.shotuk.org/resources/avoidable-delayed-or-under-overtransfusion-webinar-adu/

SHOT Bite No.4: Lessons in Paediatrics (including neonates)
https://www.shotuk.org/resources/shot-bite-no-4-lessons-in-paediatrics-including-neonates/



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Serious Hazards of Transfusion