24 Haemoglobin Disorders n=57

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Abbreviations used in this chapter

ADU	Avoidable, delayed and under/overtransfusion	**IBCT**	Incorrect blood component transfused
AHTR	Acute haemolytic transfusion reaction	**IT**	Information technology
APPG	All-party parliamentary group	**IVIg**	Intravenous immunoglobulin
BSH	British Society for Haematology	**NHS**	National Health Service
DAT	Direct antiglobulin test	**NHSBT**	NHS Blood & Transplant
DHTR	Delayed haemolytic transfusion reaction	**SCD**	Sickle cell disease
FAHR	Febrile, allergic and hypotensive reaction	**Sp-ICE**	Specialist Services electronic reporting using Sunquest's Integrated Clinical Environment
Hb	Haemoglobin		
HCC	Haemoglobinopathy Coordinating Centre	**SRNM**	Specific requirements not met
HSCT	Haemopoietic stem cell transplant	**UK**	United Kingdom
HTR	Haemolytic transfusion reaction	**WCT**	Wrong component transfused

Key SHOT messages

- Alloimmunisation and HTR are a significant risk of transfusion in SCD and may not be appreciated by medical teams
- This year saw the highest number of reports of HTR in SCD accounting for 22/49 (44.9%) of all HTR reported
- Hyperhaemolysis is a unique and potentially fatal complication of transfusion and contributed to major morbidity in 7 patients. All were in patients with SCD

Recommendations

- Haematology teams must be involved in the care of haemoglobinopathy patients presenting to secondary care and provide advice regarding transfusion. Specialist haematology advice should be taken regarding transfusion decisions
- For ad-hoc transfusion decisions it is important to seek transfusion history from the patient, transfusion laboratory and the national database (Sp-ICE or equivalent)
- All haemoglobinopathy patients should have a baseline extended red cell phenotype or genotype prior to transfusion (BSH Trompeter et al. 2020)

Action: Hospital transfusion teams, clinical teams looking after patients with haemoglobin disorders, laboratory management

Introduction

Transfusion in an important aspect of care in both SCD and thalassaemia. The intended benefits of transfusion must be balanced against the potential risks of serious transfusion reactions and adverse events. HTR is a particular problem in SCD; in the last 10 years, 125/454 (27.5%) of all HTR reported to SHOT occurred in patients with SCD (Figure 24.2).

NHS England haemoglobinopathy services support the provision of both specialist and non-specialist haemoglobinopathy services, enabling access to expert advice and management of complex patients (NHS England 2019). This service supports patients within England and the devolved nations each have their own arrangements for care provision. Updated standards and recommendations for clinical care of SCD in children and adults are available which help ensure that every individual with SCD has the best possible healthcare wherever they live in the UK (Sickle Cell Society 2018 and 2019).

There were a total of 57 reports in patients with a haemoglobinopathy diagnosis in 2022 and Figure 24.1 shows cumulative data for adverse transfusion events in patients with haemoglobin disorders from 2010, when SHOT started collating these reports, to 2022.

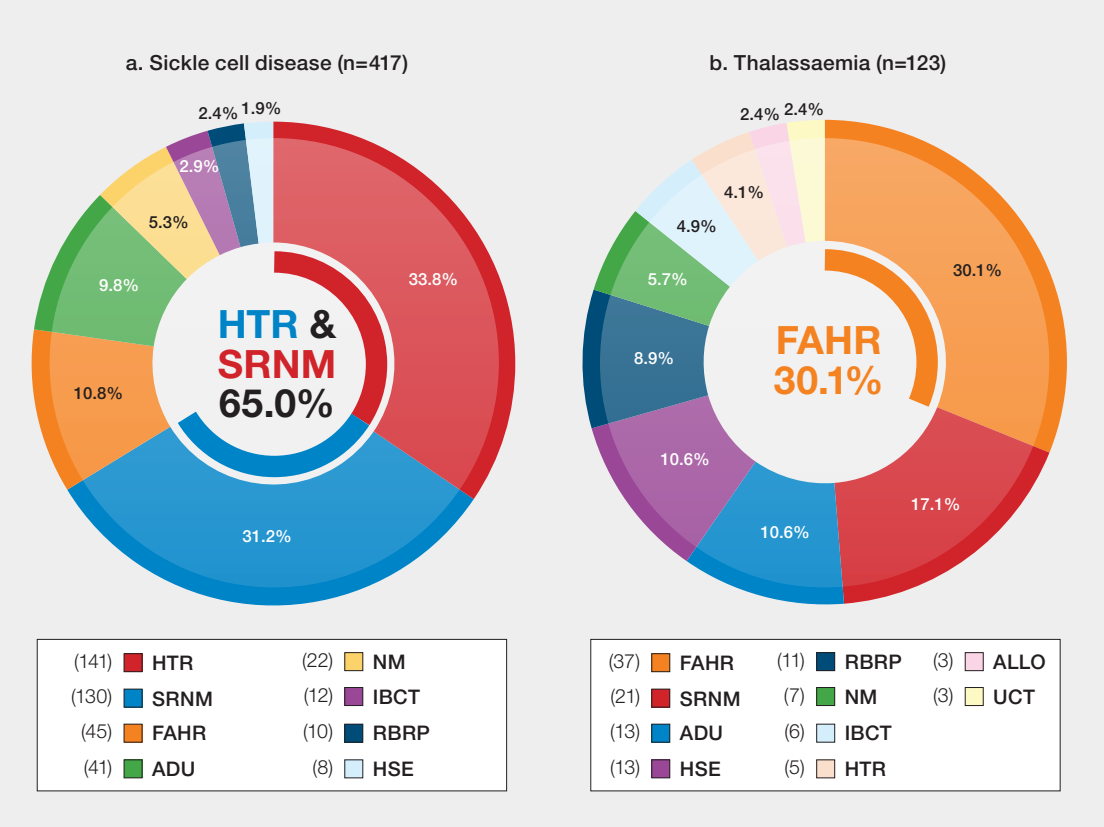


Figure 24.1: Cumulative data for adverse transfusion events in patients with haemoglobin disorders 2010 to 2022

FAHR=febrile, allergic or hypotensive reactions; ADU=avoidable, delayed or under or overtransfusion; IBCT=incorrect blood component transfused; SRNM=specific requirements not met; TACO=transfusion-associated circulatory overload; TAD=transfusion-associated dyspnoea; HTR=haemolytic transfusion reactions; TTI=transfusion-transmitted infection

Categories with 2 or fewer reports are not included in the figures

Deaths related to transfusion n=1

There was 1 death (imputability 2, probable) reported in a female in her 20s with SCD who presented with hyperhaemolysis 1 week following transfusion and developed acute respiratory complications.

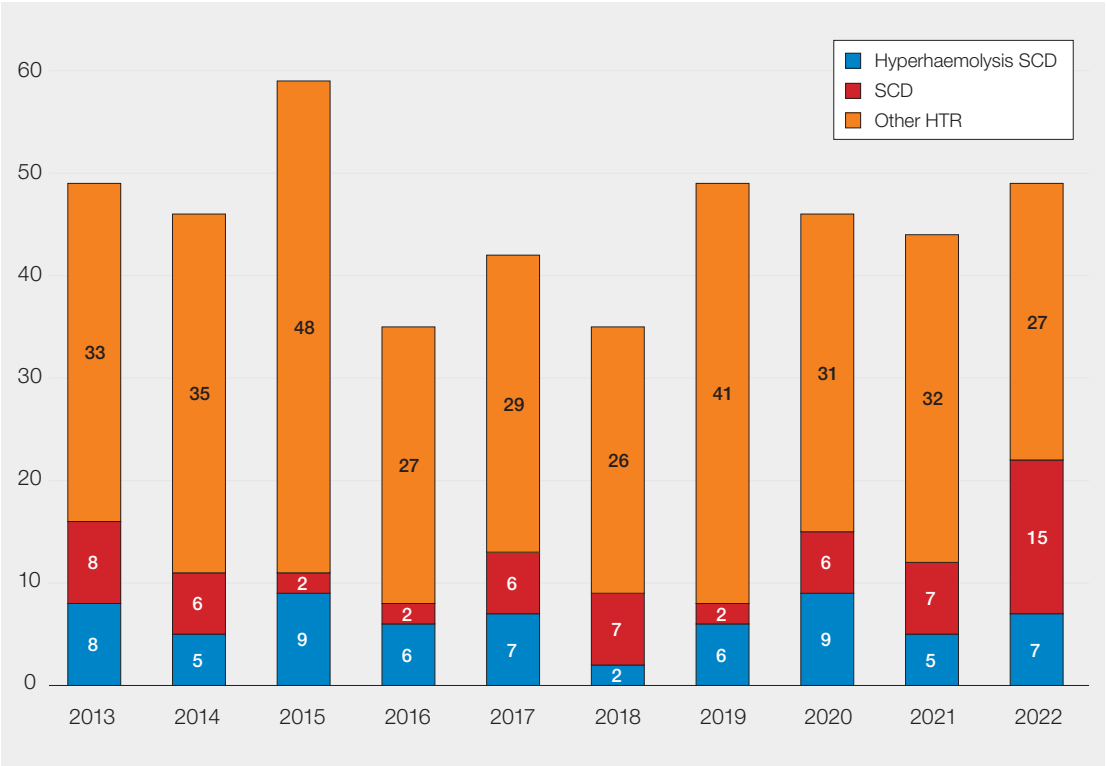
Major morbidity n=14

There were 14 reports associated with major morbidity including 10 HTR, 2 delayed transfusions, 1 FAHR and 1 IBCT-WCT.

Haemolytic transfusion reactions (HTR) n=22

There were 22 reports of HTR, all in patients with a diagnosis of SCD. This included 13 reports of DHTR, 7 hyperhaemolysis and 2 AHTR.

Figure 24.2: A summary of HTR occurring in SCD 2013-2022 out of a total of 454 HTR reports



HTR=haemolytic transfusion reactions; SCD=sickle cell disease

Case 24.1: Hyperhaemolysis treated with eculizumab

A man in his 20s with SCD presented with widespread pain and was generally unwell. This was following an admission at another hospital where he was treated for a sickle cell crisis and COVID-19 infection and received several red cell transfusions. Blood tests demonstrated haemolysis with a Hb nadir of 36g/L. There was an associated fall in reticulocyte count and raised ferritin of >15000ng/mL. Antibody screen and DAT were negative. He was treated for hyperhaemolysis with steroid, IVIg and eculizumab.

Case 24.2: Hyperhaemolysis following elective transfusion for surgery preparation

A middle-aged man with SCD underwent an elective red cell exchange transfusion in preparation for hip surgery. Due to a history of previous DHTR, he received steroids and IVIg prior to transfusion. Despite prophylactic measures, he developed further haemolysis and was treated with steroid, IVIg and eculizumab. No new antibody was reported.

Case 24.3: HTR following transfusion not matched for extended Rh group

A middle-aged female with SCD presented with flu-like symptoms and a Hb of 55g/L. A decision was made for top-up red cell transfusion. The red cell unit selected was not matched for extended Rh phenotype and the patient received C-positive units. The patient developed acute intravascular haemolysis and required intensive care admission. Limitations of IT with incomplete details in the transfusion request combined with potential gaps in staff knowledge contributed to this error.

Febrile, allergic and hypotensive reactions (FAHR) n=5

There were 5 reports of FAHR. Three reports were in patients with thalassaemia and 2 in SCD.

Case 24.4: Post HSCT thalassaemia patient experienced allergic reaction to platelet transfusion

A male patient in his 20s with thalassaemia was admitted to the haematology ward post HSCT and experiencing haematuria. The patient developed bronchospasm and urticaria 15 minutes into a transfusion of irradiated platelets. The transfusion was immediately stopped, and the patient was given antihistamines and hydrocortisone. His symptoms subsided within a few hours, and he fully recovered.

IBCT-specific requirements not met (IBCT-SRNM) n=12

There were 12 cases of IBCT-SRNM.

Case 24.5: An SCD patient with known antibodies presented at a new hospital

A teenage male with SCD and multiple red cell antibodies including anti-U and anti-f presented to a different hospital to which he normally attended, and a decision was made for transfusion. The laboratory failed to register a diagnosis of SCD from the request form. The haematology team also failed to provide the laboratory with a transfusion history. No antibodies were detected in the local laboratory and therefore the patient did not receive the specific requirements for red cell transfusion. There were no reported immediate clinical consequences.

Learning points

- The use of extended phenotype matched units has reduced the risk of alloimmunisation and HTR (BSH Davis et al. 2016)
- Education of clinical and laboratory staff regarding transfusion requirements for this group of patients is essential
- To enhance safety, IT alerts about specific transfusion requirements should be reliable, not easily overridden, displayed correctly and prompt timely actions
- For patients with multiple antibodies or a genotype which puts them at greater risk of developing rare antibodies, it is important that transfusion decisions are carefully considered. These decisions should be discussed with the patient due to the potential clinical consequences including difficulties in obtaining appropriate red cells
- It is important that unnecessary transfusions are avoided, each year the Annual SHOT Report highlights cases of avoidable transfusions. Healthcare professionals prescribing blood transfusion may not always appreciate the potential consequences including the impact on future provision of blood components in this group of patients

IBCT-wrong component transfused (IBCT-WCT) n=2

There was 1 case of ABO-incompatible transfusion in an SCD patient that resulted in major morbidity. This is described in Chapter 9, Incorrect Blood Component Transfused (IBCT) (Case 9.3), and can be found in the supplementary information for this chapter on the SHOT website (https://www.shotuk.org/report-summary-and-supplement-2022/).

Case 24.6: Wrong blood component given to a patient with thalassaemia

A man in his 20s with thalassaemia attended for routine transfusion. Whilst the first red cell unit was being transfused it was realised that the blood component being administered was intended for another patient on the unit. The patient was group A and received group O blood. The patient also had a history of red cell alloimmunisation and therefore was at risk of developing subsequent antibodies. No clinical consequences were reported.

Avoidable transfusion, delayed or under/overtransfusion (ADU) n=7

Case 24.7: Delay in top-up transfusion in SCD resulted in clinical deterioration and the need for red cell exchange

A patient in his 20s with SCD was admitted with fever and chest pain. A diagnosis of acute chest syndrome was made and a plan for two units of red cells. The medical on call team later reviewed the patient due to ongoing hypoxia and discussed with the on call haematologist. The following morning the patient had become more unwell at which point it became apparent that the patient had not yet received the transfusion as planned from the previous day. Due to a deterioration in his condition an urgent red cell exchange was arranged.

Learning points

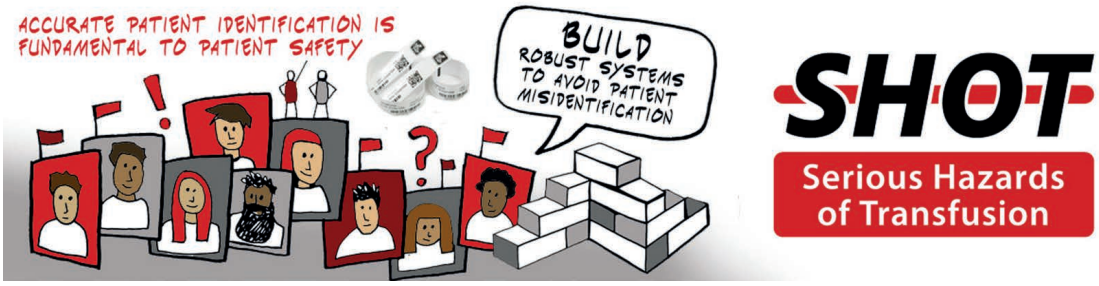
- Acute chest syndrome in SCD can be life-threatening and requires early recognition and close monitoring
- Early intervention with simple or 'top-up' red cell transfusion/s may prevent deterioration and senior decision makers should be involved (BSH Howard et al. 2015)
- Healthcare professionals may not appreciate when a transfusion is urgent and therefore it is vital that this is communicated to the relevant staff to prevent clinical deterioration

Near miss n=2

There were 2 cases of NM.

Case 24.8: Pre-administration transfusion checks prevented a wrong component transfused

Two patients with the same first name and a diagnosis of thalassaemia were sat next to each other in the day unit awaiting routine transfusion. A unit of red cells was taken from the refrigerator for one of the patients and during the pre-administration check, it was realised it was for the other patient and was therefore returned to the refrigerator.



Conclusion

Alloimmunisation and HTR are a significant risk for haemoglobinopathy patients, in particular those with SCD. To minimise this risk, it is important that each transfusion decision is carefully considered, balancing intended benefits with potential risks. A transfusion history should be obtained for all haemoglobinopathy patients requiring transfusion including any prior alloimmunisation and transfusion reactions. Clear communication between clinical and laboratory staff is essential to ensure specific transfusion requirements are provided.

Specialist haemoglobinopathy teams should be involved in the management and advise on transfusion.

The APPG report has highlighted inadequacies in healthcare for sickle cell patients (Sickle Cell Society 2021). SHOT supports the recommendations set out in the report. Education and training for all healthcare professionals is essential to ensure safe transfusion practice, reducing the risk of morbidity and mortality. To support safe transfusion in haemoglobinopathy patients, several new online resources have been developed by NHSBT and SHOT (listed below). These resources are intended for use within HCC and specialist hospital teams to support the development of training programmes for their haemoglobinopathy networks.

A key finding from a recent investigation by the Healthcare Safety Investigation Branch highlighted the lack of a minimum training requirement or nationally agreed content to improve staff knowledge about sickle cell disease or sickle cell crisis. The report recommends that NHS England reviews the existing training and competence requirements within sickle cell care provision and specifies the minimum training requirements and content for staff so that the content can then be delivered by HCC to increase knowledge about sickle cell disease and how to treat patients in sickle cell crisis (HSIB 2023).

Recommended resources

SHOT Bite No. 14: Haemoglobinopathies
SHOT Bite No. 15: Hyperhaemolysis
https://www.shotuk.org/resources/current-resources/shot-bites/

SHOT Video: Haemolytic Transfusion Reactions in patients with Haemoglobinopathies
https://www.shotuk.org/resources/current-resources/videos/

Patient Blood Management England Video: Setting up and Performing a Manual Exchange Red Cell Exchange in Sickle Cell Disease (Under 40kg)
https://youtu.be/e2itKcfXQAE

Patient Blood Management England Video: Setting up and Performing a Manual Exchange Red Cell Exchange in Sickle Cell Disease (Over 40kg)
https://youtu.be/5QFiLziDxbc

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Serious Hazards of Transfusion