Transfusion Errors in Transplant Cases n=58

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Abbreviations used in this chapter

ABOi	ABO-incompatible	**LIMS**	Laboratory information management system
BMS	Biomedical scientist	**NBTC**	National Blood Transfusion Committee
BSBMTCT	British Society of Blood and Marrow Transplantation and Cellular Therapy	**RCPath**	Royal College of Pathologists
BSH	British Society for Haematology	**SaBTO**	Advisory Committee on the Safety of Blood, Tissues and Organs
CMV	Cytomegalovirus	**SCRIPT**	SHOT Collaborative Reviewing and reforming IT Processes in Transfusion
FY1	Foundation year 1	**SOT**	Solid organ transplant
HEV	Hepatitis E virus	**SRNM**	Specific requirements not met
HSCT	Haemopoietic stem cell transplant	**TA-GvHD**	Transfusion-associated graft-versus-host disease
IBCT	Incorrect blood component transfused	**WCT**	Wrong component transfused
IT	Information technology		
JPAC	Joint UKBTS Professional Advisory Committee		

Key SHOT messages

- Timely, effective, and reliable communication with easy access to transplant protocols is vital to ensure safe transfusions in transplant recipients
- Preventable errors due to lack of staff knowledge and poor awareness of transfusion requirements in these patients continue to be reported

Recommendations

- Clinical teams should ensure the transfusion laboratory in both the transplant centre and any other organisations with whom the patient care is shared, either short-term or long-term, are fully informed about the transplant timetable, need for specific transfusion requirements, and ABO/D groups of the patient and donor
- National guidelines are needed that are suitable for both transplantation and transfusion professionals that cover the processes necessary for managing transfusions to transplant patients
- Patient involvement in all decision-making is encouraged and should include information about their specific transfusion requirements
- Laboratory staff should ensure the LIMS is updated in a timely manner, and that all laboratory steps are properly checked to detect errors before they result in wrong transfusions

Action: All clinical and laboratory transfusion staff

Introduction

This chapter covers HSCT- and SOT-related transfusion errors reported to SHOT in 2022.

Patients receiving such transplants present unique challenges in provision of blood component support, especially when donor and recipient are ABO or D non-identical.

For HSCT recipients, decisions on which ABO/D group of components for transfusion have to take into account the ABO and D mismatches and the transition period until the stem cells have engrafted and the patient converts fully to their new group. Approximately 40-50% of HSCT are ABOi (Worel 2008). Incompatibility may be major, where antibodies in the recipient's plasma have the potential to react with donor red cells (e.g., recipient group O and donor group A), or minor, where antibodies in the donor plasma react with recipient red cells (e.g., recipient group A, donor group O). Bidirectional incompatibility includes both major and minor mismatches. Antibodies in both the recipient and donor plasma can react with donor and recipient red cells respectively, e.g., recipient group B and donor group A.

Major and minor incompatibility each occur in approximately 20-25% of transplants, and bidirectional incompatibility in 5% (Worel 2008). The ABO and D group transfusion requirements of these patients change over time with the clinical course of the transplant. Poor communication between clinicians and the laboratory, with gaps in staff knowledge may result in serious transfusion errors.

The BSH has published guidance on the irradiation requirements for cellular components in patients at risk of developing TA-GvHD. This includes patients undergoing allogeneic and autologous transplant (and donors to avoid transfusion of viable leucocytes) (Foukaneli et al. 2020). In 2016 SaBTO recommended that transplant patients receive HEV-screened cellular blood components (SaBTO 2016) and universal screening was implemented in April 2017 in the UK (Harvala et al. 2019).

The 'Safe transfusions in haemopoietic stem cell transplant recipients' document has been developed by SHOT in collaboration with RCPath, NBTC and BSBMTCT. This supports safe transfusion decisions in HSCT recipients (see 'Recommended resources'). A national guidance document for transfusions in solid organ transplant recipients is lacking.

Summary of cases from 2022

A total of 58 cases were reported in 2022 which involved HSCT (n=50) or SOT (n=8) recipients. Figure 25.1 shows the distribution of all the cases reported. There were no deaths related to transfusion errors.

The largest category of cases, 28/58 (48.27%) were IBCT-SRNM. The majority of these (22/28) were failure to provide irradiated components (1 of which was also a failure to provide CMV-negative), and inappropriate use of electronic issue accounted for the remaining 6/28 cases.

Of the 22 cases of IBCT-WCT, 14 cases involved transfusion of components with the wrong ABO group to the recipient and 6 cases were instances where D-positive components were transfused rather than D-negative.

In the NM category, the pre-transfusion checklist identified the error in 6/8 cases highlighting the importance of safety checks to ensure safe transfusions.

Information about incident investigation was available in 54/58 cases and in 44 cases, a formal incident investigation to evaluate the causal and contributory factors was reported to have been carried out.

Reporters who recorded the single thing that could be changed that would make the incident less likely to recur (n=30) within all categories, mainly indicated improvements to electronic systems (12/30) and communication pathways for shared care patients (10/30).

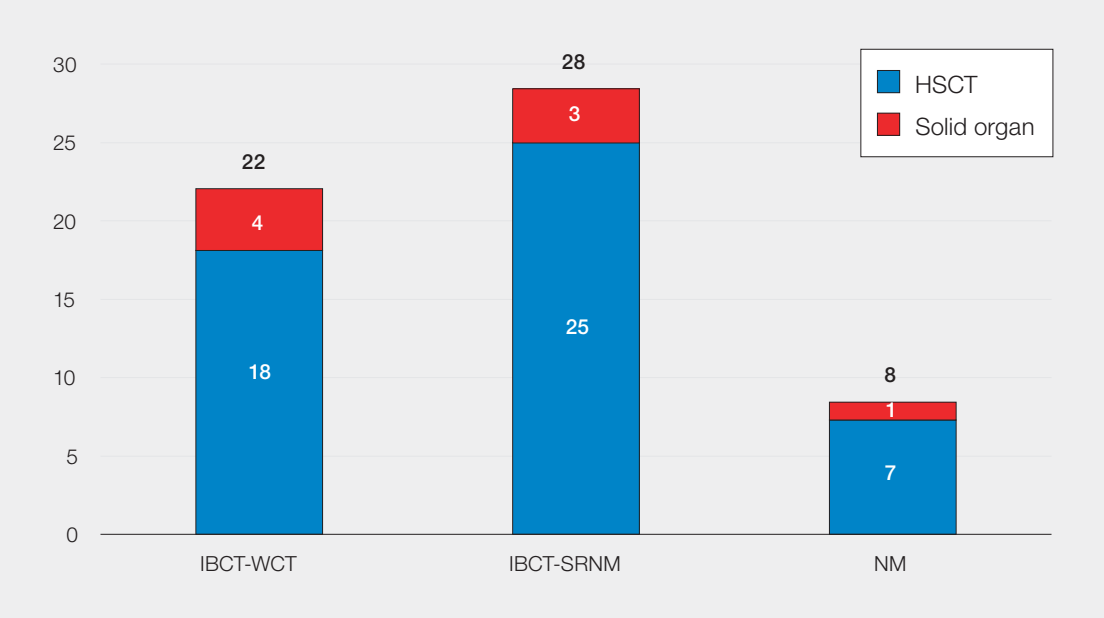

Figure 25.1: Total cases of IBCT-WCT, IBCT-SRNM and NM transfusion errors in transplant recipients reported to SHOT in 2022 (n=58)

HSCT=haemopoietic stem cell transplant; IBCT-WCT=incorrect blood component transfused-wrong component transfused; IBCT-SRNM=IBCT-specific requirements not met; NM=near miss

It is interesting to note that in 52/58 cases (89.65%), transfusion IT was implicated. Figure 25.3 shows the distribution of the IT issues in these cases. There was no information on the LIMS in 28 cases. The transfusion laboratory was not aware of the transfusion requirements in 14 of these cases and the LIMS was not updated appropriately even after the laboratory was notified in the other 14 cases.

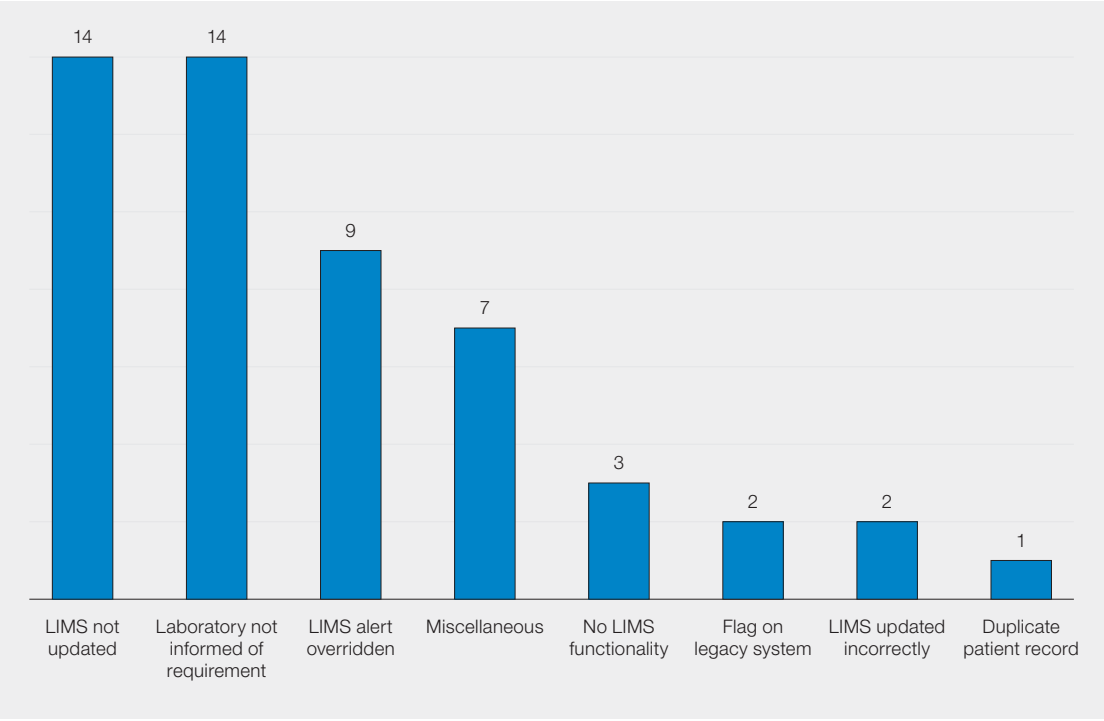

Figure 25.2: Distribution of IT issues in transplant errors (n=52)

LIMS=laboratory information management system

The miscellaneous category included issues with staff using a combined LIMS and missing a flag, complex mechanisms for adding flags, LIMS configurations that remove flags in certain scenarios and a BMS using a support staff log-in that did not display the flag.

Errors in the clinical setting accounted for 32/58 (55.2%) and laboratory errors for 26/58 (44.8%). In the IBCT-SRNM category errors occurred mostly in the clinical setting, 19/28 (67.9%), mainly failure to communicate requirements to the laboratory, compared to 9/28 (32.1%) in the laboratory. In contrast, most errors in the IBCT-WCT category occurred in the laboratory, 19/22 (86.4%), mainly errors with selection of inappropriate components, compared to 3/22 (13.6%) in the clinical setting.

Case 25.1: Incorrect ABO group transfused after incorrect advice

A shared-care patient received a HSCT at hospital 1. A letter confirming the transplant was uploaded to the clinical computer system at hospital 2. Blood components were requested for the patient post transplant approximately 3 weeks later and on two separate occasions. In both instances the request form stated, 'post transplant' and the BMS on duty sought advice from the supervisory BMS regarding component selection. The supervisory BMS did not investigate the type of transplant the patient had received and gave the incorrect advice to the BMS. The patient received blood components which was the same group as his pre-transplant group (B D-positive). They should have received group O D-positive blood components.

Selection of appropriate components for transplant patients is complex and advice is often required from staff working at supervisory level. Staff should ensure that they fully investigate cases where the patient has been noted to have received an HSCT before offering advice and they should access the transplant protocol and available guidance document to inform advice given.

Shared care

Gaps in communication between hospitals are a recurring theme in several reports submitted to SHOT. For example, when a patient is transplanted at a transplant centre, the information about the transplant, changing ABO/D group and specific requirements may not be communicated to the local hospital or its transfusion laboratory. The transplant may have taken place several months or years before, but patients will continue to need specific transfusion requirements.

Case 25.2: SRNM due to poor communication between hospitals

A unit of non-irradiated red cells was issued to a patient who required irradiated components. The error was detected when the clinical area returned the second unit, after noticing that it was not irradiated. The patient had two hospital numbers. The requirement for irradiated components was added to record 1, at which time there was only one hospital number. The laboratory received the first sample with the number for record 2. There was no mention of the irradiated requirement on the request form. The BMS failed to check for duplicate hospital numbers in deviation from local policy. The clinical area failed to notice that the requirements were not met prior to transfusion of the first unit.

Duplicate patient records on the LIMS can result in critical information being missed. Laboratories should have processes for identification and merging of duplicate records.

Commentary

Most transfusion-related errors in transplant patients are either transfusion of ABO-mismatched blood components, or failure to administer irradiated components putting the patient at risk of TA-GvHD. Poor

communication of vital information between teams involved in the patient's care (clinical and laboratory) and failure to heed/update the LIMS in the laboratory are the most common errors noted. These are the same errors noted in many other areas of transfusion practice and need to be addressed effectively. Errors in clinical communication are further compounded by the shared care of patients between transplant centres and the patient's local hospital, which necessitates the need for effective transfer of information between centres.

Embedded in many transplant protocols is the requirement to inform the laboratory staff of the patient's impending transplant and associated change in transfusion requirements particularly ABO and D group changes. However, it is apparent that the transfusion laboratory is not always being informed or following updated information, there are failures to adequately update the LIMS. More robust procedures are required to ensure this information is appropriately communicated to the laboratory and updated in the patient's electronic history. This is echoed by JPAC, which advises a clear post-transplant transfusion policy should be developed for all transplant patients and circulated to clinical and laboratory teams involved in their care. JPAC acknowledges previous Annual SHOT Reports which show component selection errors are common for patients who have changed blood group following HSCT (JPAC 2020). A checklist to ensure clear communication between clinical and laboratory teams in transplant patients can be found in the 2019 Annual SHOT Report (Narayan et al. 2020).

There is also confusion in some areas about transfusion in ABO-mismatched HSCT. This is likely potentiated by the complex transfusion schedule that exists for ABO-mismatched transplants in relation to changes in the ABO and D group (Schrezenmeier et al. 2019). SHOT data show that transfusion of the wrong ABO or D group in ABO-mismatched transplants continues to be a problem. Lack of support in LIMS for appropriate selection of components has been highlighted by Annual SHOT Reports and a survey by the SHOT SCRIPT group (see 'Recommended resources'). Users are often dependent on alerts or notes in the LIMS to make decisions about component selection rather than functionality in the LIMS that confirms the correct selection. LIMS functionality in terms of assigning blood groups to patients where testing results are indeterminate has also been implicated in flawed decision-making. Although improved functionality in the LIMS could reduce the risk of error, this does not negate the need for staff knowledge and skills. Training, educational activities and competency-assessments should include transfusion in transplant patients, for both clinical and laboratory staff. Decision making aids, such as the SHOT resource 'Safe transfusions in haemopoietic stem cell transplant recipients' (see 'Recommended resources') should be easily accessible and incorporated into procedures and guidance. There is paucity of guidance to support safe transfusions in solid organ transplants recipients and a BSH guideline is in the pipeline to address this. The British Transplant Society Guidelines for Antibody Incompatible Transplant (BTS 2016, reviewed 2020) does not include guidance on transfusion for ABO-incompatible solid organ recipients in the immediate post-transplant period, nor advice about communication protocols, which should include informing the transfusion laboratory of the recipient's specific requirements.

Recommended resources

SHOT Bite No. 18: Transplant Patients
SHOT Bite No. 20: IBCT-SRNM
https://www.shotuk.org/resources/current-resources/shot-bites/

SHOT Video: Transfusion errors in haemopoietic stem cell transplant recipients
https://www.shotuk.org/resources/current-resources/videos/

Safe transfusions in haemopoietic stem cell transplant recipients
Safe Transfusion Checklist
https://www.shotuk.org/resources/current-resources/

SHOT UK Collaborative Reviewing and reforming IT Processes in Transfusion (SCRIPT) surveys and resources can be accessed at this link: https://www.shotuk.org/resources/current-resources/script/

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