23 Summary of Incidents Related to Transplant Cases n=93

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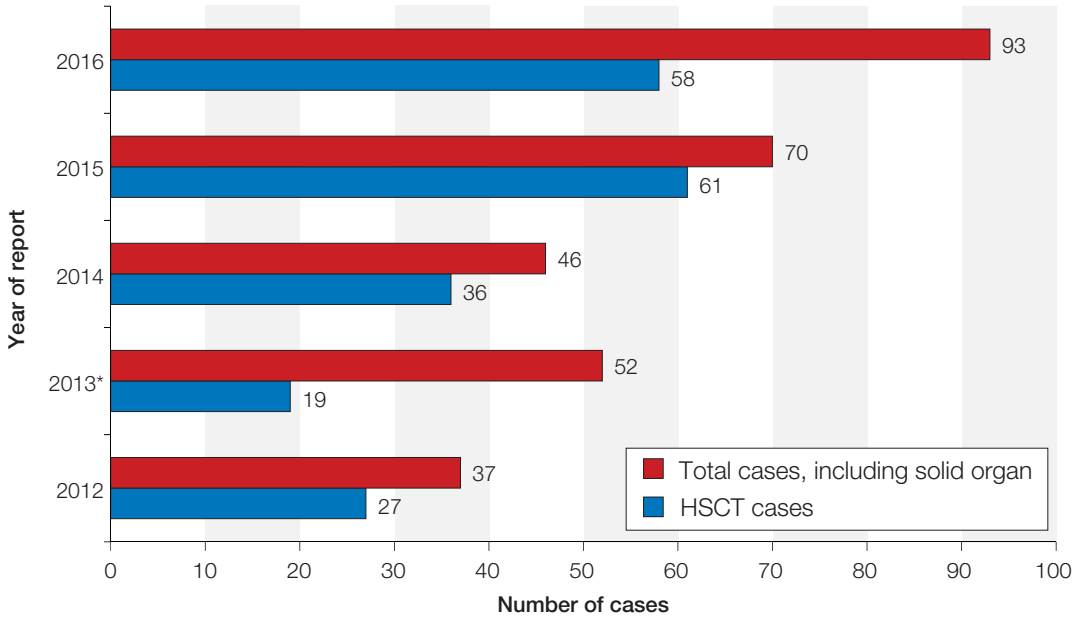
Key SHOT messages

- It is essential to give irradiated components to haemopoietic stem cell transplant (HSCT) patients prior to stem cell harvest
- Procedures should be robust when institutions use remote access electronic issue of compatible red cells in order to ensure a current valid sample is not replaced in the system while a transfusion is in progress
- Excellent communication between clinical transplantation staff and transfusion laboratory staff is imperative to ensure transplant patients receive appropriate components
- National guidelines are needed that are suitable for both transplantation and transfusion professionals that cover the procedures necessary for managing transfusions to transplant patients

Since 2012 incidents related to transplant patients have been summarised to highlight the particular problems associated with transfusion in both HSCT and solid organ transplants. There are several difficulties with the specific requirements associated with transfusing transplant patients and there are particular complexities when the transplant is ABO-incompatible or mismatched for the D antigen.

The number of reports related to transplant cases increased again in 2016 to n=93 (n=70 in 2015).

Figure 23.1: Transplant transfusion errors 2012-2016 n=298



**1 patient had both HSCT and solid organ transplants*

Figure 23.1 shows that the increase in 2016 results from errors related to solid organ transplants, in particular a general increase in reports where specific requirements were not met (SRNM). For comparison solid organ transplant SRNM in 2016 was n=30 and in 2015 n=5; HSCT SRNM in 2016 n=38, 2015 n=26. These increases mainly result from failures to request or supply hepatitis E virus (HEV)-screened components, n=39 in 2016. The Advisory Committee on the Safety of Blood, Tissues and Organs (SaBTO)/British Society of Blood and Marrow Transplantation (BSBMT) recommendations (SaBTO 2016) for the requirement for HEV-screened components for transplant patients became applicable in March 2016, when the Blood Services were able to supply screened components.

Type of transplant	ABO/D errors	SRNM	Other**	Total
HSCT	19	38	1	58
Solid organ	4	30	1	35
Total	**23**	**68**	**2**	**93**

Table 23.1: Summary of errors made in transplant cases n=93

***Other=summary of 2 cases in Table 23.2*

The cases analysed here are included in the data discussed in other chapters:

- Incorrect blood component transfused (IBCT)
  - – wrong component transfused (WCT) n=15
  - – specific requirements not met (SRNM) n=53
- Near miss WCT and SRNM n=23
- Avoidable, delayed or undertransfusion (ADU) n=2

SHOT category	Description of error	Outcome
ADU Avoidable	A child, aged 11, requiring irradiated components for stem cell harvest was transfused with red blood cells (RBC) that were not irradiated (Case 11b.2 in Chapter 11b, Avoidable Transfusions)	The stem cell collection had to be discarded and the patient needed additional G-CSF* to re-mobilise marrow for repeat collections
ADU Delay	A liver transplant was started with 18 units of RBC allocated to the patient and available from the remote issue refrigerator in theatre. After transfusion of 1 unit, there were no longer any RBC allocated for this patient, because a new sample had been booked in, invalidating the previous test results	Access to group specific RBC by remote issue suddenly became unavailable and RBC units could not be released until the new sample had valid results

Table 23.2: Non-ABO/D or SRNM transplant errors n=2

**G-CSF=granulocyte-colony stimulating factor*

Learning points

- It is essential to give irradiated components to haemopoietic stem cell transplant (HSCT) patients prior to stem cell harvest
- Procedures should be robust when institutions use remote access electronic issue of compatible red cells to ensure a current valid sample is not replaced in the system while a transfusion is in progress, because this can lead to confusion and delays

ABO and D errors n=23

SHOT category	ABO* error	D error	Total
IBCT	13	2	15
Near miss	6	2	8
Total	**19**	**4**	**23**

Table 23.3: ABO and D errors in transplant cases n=23

**1 case was mismatched for both ABO and D*

The unintentional transfusion of ABO-incompatible blood components is a never event in England (NHS England 2015) and is similarly reportable in the devolved countries, e.g. as 'red incidents' in Scotland. However, it is not known if these errors are being reported, possibly because in five years of analysing transplant-transfusion incidents there has only been 1 case of ABO-incompatible transfusion that resulted in an adverse outcome for the patient (Bolton-Maggs, 2013). Table 23.4 summarises cases that could be classifiable as never events (in England).

Table 23.4: Details of ABO-incompatible red cell transfusions to allograft HSCT patients n=6

ABO/D	Gender	Patient group	Donor group	Group transfused	Error
IBCT as a result of clinical error					
ABO	Female	A	B	A	protocol or communication
ABO	Female	A	B	A	protocol or communication
IBCT as a result of laboratory error					
ABO	Female	A	O	A	LIMS* flags not heeded or updated
ABO/D	Male	A	O+/O-**	A	LIMS flags not heeded or updated
ABO	Male	A	O	A	LIMS flags not heeded or updated
ABO	Male	A	O	A	LIMS flags not heeded or updated

*LIMS=laboratory information management system, ** O+/O-=double cord groups O D-positive and O D-negative*

Specific requirements not met n=68

Table 23.5: Failure to provide components with correct specific requirements for transplant patients n=68

SHOT category	Irradiated	HEV	Irradiated and HEV	Other*	Total
Errors related to HSCT					
SRNM clinical error	12	5	4	1 HLA	22
SRNM laboratory error	3	2	0	1 EI	6
Near miss clinical error	1	3	0	0	4
Near miss laboratory error	5	1	0	0	6
Subtotal errors HSCT	**21**	**11**	**4**	**2**	**38**
Errors related to solid organ transplants					
SRNM clinical error	2	21	0	0	23
SRNM laboratory error	0	0	0	2 MB	2
Near miss clinical error	2	3	0	0	5
Near miss laboratory error	0	0	0	0	0
Subtotal errors solid organ	**4**	**24**	**0**	**2**	**30**
Total	**25**	**35**	**4**	**4**	**68**

HLA=human leucocyte antigen-matched, EI=electronic issue, MB=methylene blue-treated component

Transplant patients have complicated specific transfusion requirements, which became more complex in 2016 with the additional requirement to provide HEV-screened blood components for patients receiving solid organ transplants or allograft HSCT (SaBTO 2016a). In autumn 2016 SaBTO reviewed their guidance on the introduction of HEV-screened components and concluded that universal screening of all donations would be a more effective strategy (SaBTO 2016b). 100% HEV-screened red cells were available in England from 1st May 2017, from 3rd April 2017 in Wales, and in Scotland from 5th April 2017. Replacement of frozen components followed as stocks were used up.

In the 2015 Annual SHOT Report (Bolton-Maggs et al. 2016) it was highlighted that the need for irradiated components for some patients receiving solid organ transplants has been challenged (Hui et al. 2016) and that the guidelines are being revised by the Transfusion Task Force of the British Society for Haematology (BSH), but until then the current guidance remains in place (BSH Treleaven et al. 2011). It is essential to consider the importance of irradiated components for HSCT patients. There were two cases reported in 2016 of children who received non-irradiated components in the week before a planned stem cell harvest. Case 11b.2 is described in Chapter 11b, Avoidable Transfusions, and noted in Table 23.2.

This was an avoidable transfusion to an 11-year-old transplant patient who then needed a repeat stem cell harvest, including further stimulation with granulocyte-colony stimulating factor. Another incident is included in the SRNM data, a 4-year-old child with neuroblastoma received non-irradiated platelets three days prior to stem cell harvest. These cases show the importance of continuing to ensure HSCT patients receive irradiated components.

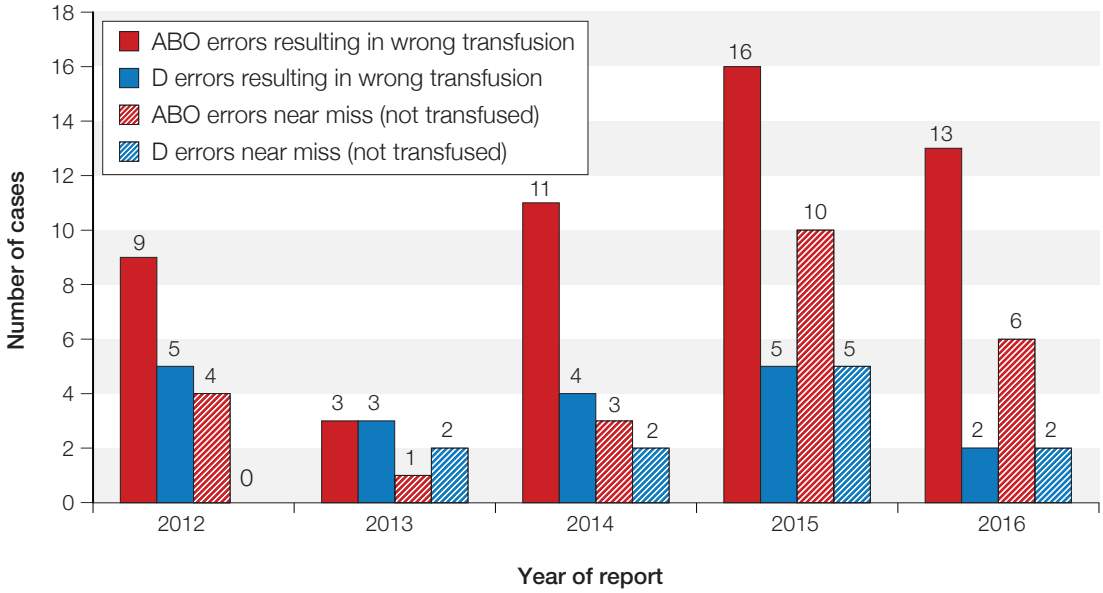


Figure 23.2: Transplant ABO and D errors 2012-2016, n=106

Causes of error

Error made	ABO/D error	SRNM	Other	Total
Errors related to HSCT				
Clinical error - protocol or communication	4	22	1	27
Clinical decision making	0	3	0	3
Laboratory error - LIMS flags not heeded or updated	12	10	0	22
Laboratory error - communication	0	1	0	1
Lack of understanding in laboratory	3	1	0	4
Non-availability of HEV screened	0	1	0	1
Subtotal errors HSCT	**19**	**38**	**1**	**58**
Errors related to solid organ transplants				
Clinical error - protocol or communication	0	24	0	24
Clinical decision making	0	4	0	4
Laboratory error - LIMS flags not heeded or updated	3	2	0	5
Laboratory error - communication	0	0	1	1
Lack of understanding in laboratory	1	0	0	1
Subtotal errors solid organ	**4**	**30**	**1**	**35**
Total	**23**	**68**	**2**	**93**

Table 23.6: Causes of all transplant errors, including near misses n=93

Commentary

In this fifth year of analysing SHOT transplant data, similar lessons have emerged, particularly the need to manage the complications associated with ABO-incompatible transplants. This has been echoed in a recent American update (Staley 2016) on ABO-incompatible (ABOi) haematopoietic progenitor cell (HPC) transplantation (HSCT) which concluded: 'ABOi HPC transplantation poses a unique challenge to the clinical transplantation unit, the HPC processing lab, and the transfusion medicine service. Thus, it is essential that these services communicate closely with each other to ensure patient safety. Additionally, it is critical for the transfusion service to have processes in place to ensure components of the correct ABO type are given to the patients, as well as for when and how to convert the recipient's ABO type to donor's ABO type.'

A recommendation was made in the 2012 Annual SHOT Report (Bolton-Maggs et al. 2013) that 'guidelines should be developed that cover the procedures, particularly communication protocols, necessary for managing transplant patients, especially where ABO/D mismatched transplants have been given.' It could be seen as a missed opportunity that the British Transplant Society Guidelines for Antibody Incompatible Transplant Third Edition (BTS 2016) 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.

Specific national guidelines are still needed for both transplantation and transfusion professionals that cover the procedures necessary for managing transfusions to transplant patients.

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