Transfusion Errors in Transplant Cases n=56

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Abbreviations used in this chapter

CMV	Cytomegalovirus	**LIMS**	Laboratory information management system
HLA	Human leukocyte antigen	**NM**	Near miss
HSCT	Haemopoietic stem cell transplant	**SRNM**	Specific requirements not met
IBCT	Incorrect blood component transfused	**WCT**	Wrong component transfused

HSCT and solid organ transplant introduce complexities into the transfusion process, both in the clinical and laboratory setting. In 2021, 56 cases have been analysed, 45 involving HSCT and 11 involving solid organ transplant. IBCT-WCT accounted for 26/56 (46.4%) of cases, with 16/56 (28.6%) NM events and 14/56 (25.0%) IBCT-SRNM (Figure 24.1).

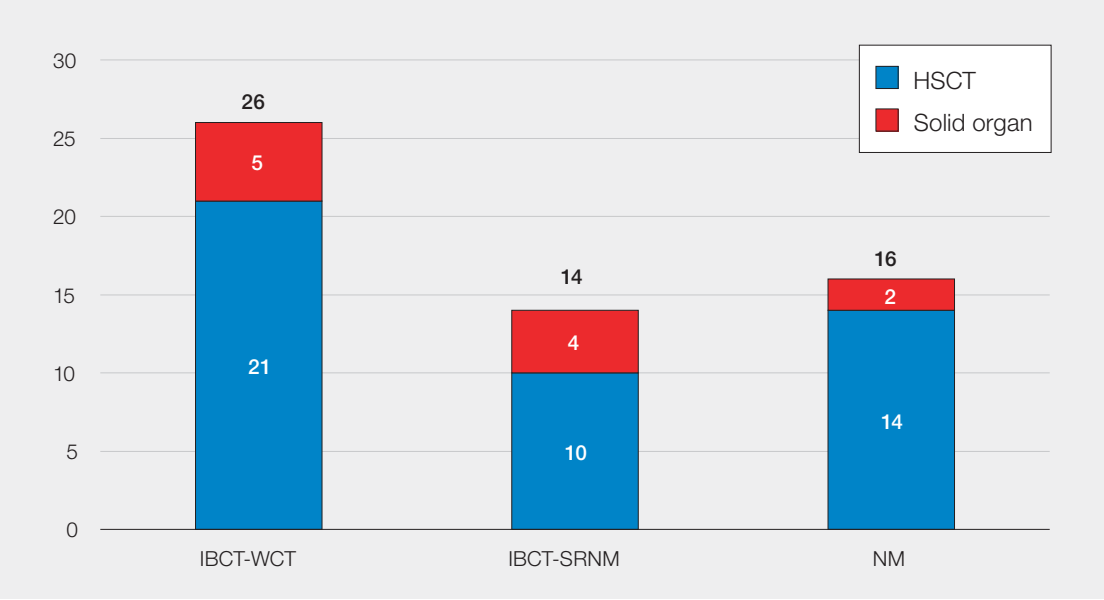

Figure 24.1: Transplant cases by reporting category and type of transplant in 2021 (n=56)

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

The success of an HSCT is dependent on HLA-match between donor and recipient rather than ABO blood group compatibility. Hence 40-50% of HSCT are ABO-mismatched (Worel 2016), with D-mismatches also being commonplace. ABO-mismatches with solid organ transplantation is also possible and may be performed where limited number of donor organs are available (Alhamad 2019). When transfusing a transplant patient, it is important that red cells and plasma components are compatible with both the donor and the recipient ABO/D type, and this may not align with standard blood grouping compatibility. Provision of components of the appropriate ABO/D-type is reliant on effective communication of the donor and recipient blood groups to the transfusion laboratory, and effective measures within the laboratory processes for component selection.

Errors within the laboratory including failures to add or heed flags, and unclear flags, within the LIMS accounted for 32/56 (57.1%) cases. Failures in communication accounted for 20/56 (35.7%) cases.

Within the IBCT-WCT cases, 21/26 (80.8%) were related to HSCT and 5/26 (19.2%) for solid organ transplant. Of these, 21/26 (80.8%) involved selection of components with the wrong ABO/D group.

Failure to transfuse components meeting the patient specific requirements (IBCT-SRNM) was noted in 14 cases, 10 HSCT and 4 solid organ transplants. Failure to provide irradiated components accounted for 7/14 cases, failure to provide CMV-negative components occurred in 3/14 cases, inappropriate electronic issue of red cells occurred in 2 cases and failure to provide HLA-matched platelets in 2 cases. Failure to communicate the specific requirements to the laboratory accounted for 8/14 errors, failure to add or heed the flag in the LIMS accounted for 2 cases, in 2 cases the LIMS had no algorithm to control appropriate component selection and in 1 case incorrect advice was given by the Blood Service.

Near miss events (n=16) mainly occurred in HSCT patients (14/16). IBCT-SRNM was implicated in 10/16 events and IBCT-WCT in 6/16 cases. NM events occurred mainly in the laboratory area (14/16), with failures in the LIMS accounting for 12/14 cases.

Errors in the clinical setting accounted for 16 cases, 13/16 due to failures in communication to the laboratory, 1/16 resulting from order of the wrong component, 1/16 where the component was administered to the wrong patient and 1/16 failure to prescribe a CMV-negative component. Laboratory errors occurred in 40 cases, 21/40 failures to heed alert in LIMS or request form, 8/40 failures to add flag to LIMS, 1/40 unclear flag in LIMS, 3/40 no algorithms in LIMS to support good practice.

HSCT reports n=45

Reports of errors involving HSCT patients accounted for 45/56 cases, with IBCT-WCT seen in 21/45 cases, NM events in 14/45 cases and IBCT-SRNM in 10/45 cases (Figure 24.1). Most IBCT-WCT cases involved transfusion of an inappropriate ABO group components (14/21), inappropriate D-type components were transfused in 6/21 cases and in 1 case the component was transfused to the wrong patient. Most IBCT-SRNM cases involved failure to transfuse irradiated components (6/10), failures in provision of CMV-negative components accounted for 2/10 cases, failure to transfuse HLA-matched platelets accounted for 1 case and inappropriate electronic issue was implicated in 1 case. NM cases included failures in provision of irradiated components (7/14), inappropriate ABO groups (5/14), failure to select high-titre negative platelets (1/14), and inappropriate use of electronic issue (1/14).

Case 24.1: Communication failure and flag fatigue leads to D-mismatch platelet transfusion

A HSCT patient transferred from another hospital was transfused with B D-positive platelets when they should have received D-negative platelets. No communication was given to the laboratory that the patient was a post-HSCT patient. No shared-care document from the transplanting hospital was received. The transfusion sample showed anomalous results, the laboratory staff contacted the ward and obtained patient history that the patient had received an HSCT (donor O D-positive, recipient B D-negative). This was recorded in the LIMS notepad, but the specific requirement flags were not updated on the LIMS. A platelet component of the incorrect D-type was issued to the patient The BMS overrode the warning flags, as the LIMS functionality was limited on management of blood component requirements of HSCT patients, and showed many alerts, leading to alert fatigue.

Case 24.2: Inadequate remote issue algorithm resulted in transfusion of non-irradiated red cells

The transfusion laboratory informed the ward that the patient's red cells were ready for collection in the 'smart' blood refrigerator. A nurse used remote issue to release a unit of red cells for the patient. Early on in the transfusion the nurse realised blood issued should have been irradiated. Red cells for patients who require irradiated components cannot be remotely issued by the smart refrigerator as algorithms are not configured to select irradiated blood. There was a sign on the smart refrigerator to advise staff to contact the transfusion laboratory if the patient required irradiated red cells. In this incident the ward contacted the transfusion laboratory who advised in error that the patient was suitable for remote issue.

Solid organ transplant reports n=11

Errors involving patients with solid organ transplants accounted for 11/56 cases, IBCT-WCT (5/11), IBCT-SRNM (4/11) and NM (2/11) (Figure 24.1). IBCT-WCT events all involved transfusion of inappropriate ABO groups, 4/5 were red cells and 1/5 related to plasma components. Failure to provide CMV-negative components accounted for 1 IBCT-SRNM case and 1 NM case, other IBCT-SRNM cases included failure to transfuse HLA-matched platelets, inappropriate use of electronic issue and failure to transfuse irradiated components. Failures in provision of antigen-negative red cells was implicated in 1 NM case.

Conclusion

Patients receiving HSCT or solid organ transplants are often under the shared care of multiple hospitals. Transfusions may not be performed in the transplant centre and so it is imperative that all relevant organisations are made aware of the transplant and, in particular the ABO/D group and specific requirements of components for transfusion. Transplant centres and referring organisations should ensure that robust processes are in place for transfer of information across sites, including to the transfusion laboratories. Communication of transplant information to the laboratory could include email communication to a generic email account that is regularly monitored. Transplant protocols must include clear information relating to the appropriate ABO/D group of components for transfusion post transplantation.

Processes must be in place in laboratories to ensure that flags are added to the LIMS in a timely fashion. The LIMS should support good practice within the laboratory setting, flags and alerts should be relevant and appropriate to reduce risk of alert fatigue. Flag overrides should include a requirement for justification that can be audited. LIMS should include algorithms that support component release that is appropriate for ABO/D mis-matched transplant patients rather than relying on comments or notes attached to the patient record. Where smart refrigerators are employed for remote issue of red cells the algorithms supporting this process must include controls for component and patient 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 Transfusion Checklist
https://www.shotuk.org/resources/current-resources/

References

Worel N. ABO-Mismatched Allogeneic Hematopoietic Stem Cell Transplantation. *Transfus Med Hemother*. 2016;**43(1)**:3-12. doi:10.1159/000441507.

Alhamad T, Axelrod D, Lentine KL, The Epidemiology, Outcomes, and Costs of Contemporary Kidney Transplantation. Chronic Kidney Disease, Dialysis, and Transplantation (Fourth Edition), Elsevier. 2019:539-554.e5. ISBN 9780323529785. https://doi.org/10.1016/B978-0-323-52978-5.00034-3. [accessed 21 June 2022].