Errors Related to Information Technology (IT) n=376

15

Authors: Jennifer Davies and Megan Rowley

Definition:

This chapter includes transfusion adverse events that relate to LIMS as well as other IT systems and related equipment used in the delivery of hospital transfusion services.

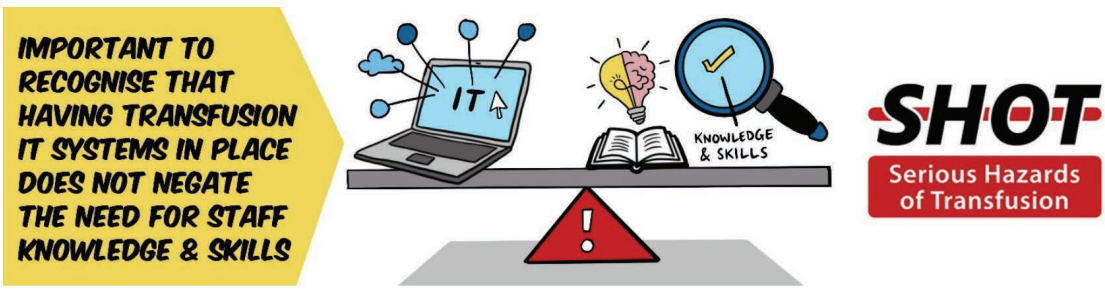
Cases selected include events where IT systems may have caused or contributed to the errors reported, where IT systems have been used incorrectly and includes cases where IT systems could have prevented errors but were not used.

Abbreviations used in this chapter

ADU	Avoidable, delayed and under or overtransfusion	**Ig**	Immunoglobulin
BMS	Biomedical scientist	**IT**	Information technology
BSH	British Society for Haematology	**LIMS**	Laboratory information management system
CMV	Cytomegalovirus	**NHS**	National Health Service
EBMS	Electronic blood management system	**RBRP**	Right blood right patient
ED	Emergency department	**SCRIPT**	SHOT Collaborative Reviewing and reforming IT Processes in Transfusion
EI	Electronic issue		
IBCT	Incorrect blood component transfused	**SRNM**	Specific requirements not met
ICU	Intensive care unit	**UK**	United Kingdom
ID	Identification	**WCT**	Wrong component transfused

Key SHOT messages

- Electronic systems and technology make transfusions safer, but they must be designed with consideration of human factors and ergonomics. Staff must be trained for their correct use. If systems are used as designed and as intended, without workarounds or short cuts, the safety features and benefits of use will be realised
- Staff responsible for implementing or upgrading systems must understand the functionality and interoperability of the system to ensure adequate validation is completed and avoid unexpected consequences. This process should be supported by the supplier, as the subject matter experts, and local IT departments



Recommendations

- Staff must use LIMS and EBMS as intended and avoid workarounds
- Staff must fully understand the nature and scope of the electronic system or technology being used and the purpose of the manual system it supports or replaces
- Healthcare leaders should ensure there are sufficient numbers of staff trained to use electronic systems and technology when they are introduced to provide confidence in benefits for workflow and for patient safety
- Only trained and competent staff should have access to IT systems that support transfusion. Sharing of access cards or computer logins must not be permitted under any circumstance
- Equipment, including communication devices, should be regularly tested, maintained and on a replacement program to ensure that it is available and functions correctly when required

Actions: Healthcare leaders and all staff involved in transfusions

Background

SHOT Collaborative Reviewing and reforming IT Processes in Transfusion (SCRIPT)

The SHOT SCRIPT group was formed in 2019. The main driver was to improve transfusion safety through improved IT systems and practices. SCRIPT aimed to identify gaps in practices, barriers for IT, recognise areas for improvement and begin a constructive dialogue between transfusion stakeholders and IT providers. Further goals included identifying training needs, promoting subject matter experts, and supporting and maintaining a community of practice within transfusion IT. Since 2019 SCRIPT have completed two surveys: an understanding of the status of IT in transfusion with users and an insight into LIMS functionality with LIMS suppliers. The survey results are available via the SCRIPT page on the SHOT website. The user survey results have been shared with NHS England Pathology Transformation Team to highlight the challenges facing hospitals transfusion laboratories with a view to inform decision making around funding bids for IT upgrades within Pathology networks in England.

SCRIPT have added other resources to the web page including how IT can be used to support safe practice with anti-D Ig management in pregnancy, and a variety of IT specification and validation documents shared by reporters. New resources will be added to the website when they become available. SCRIPT would welcome ideas for future resources and invite contributions from all. If you are interested in contributing your own documents or templates, or if you are interested in sharing your experience for the benefit of others in our transfusion community, please email shot@nhsbt.nhs.uk.

The BSH IT guidelines have been updated and should be published in 2023. This will provide a valuable resource for those looking to implement, upgrade or change IT systems.

Digital healthcare is a core strategy for all governments across the devolved nations in the UK. Following the merger of NHS Digital and NHS England on 1 February 2023, NHS England is responsible for designing and operating national data infrastructure and digital systems (NHS England, 2023). Scotland have refreshed their digital health and care strategy (Scottish Government, 2021). Northern Ireland's

digital strategy describes how the country will rise to the challenge of delivering the digital transformation needed to improve health and care outcomes (HSC Northern Ireland, 2022). Health Technology Wales (2023) have published evidence supporting the adoption of electronic blood management systems with associated safety and cost saving benefits.

As the UK moves forward with digital healthcare transformation, transfusion services should strive to ensure that appropriate and effective IT systems are implemented. This should include reliable interoperability with other clinical systems to support transfusion safety.

Implementing new and upgrading existing IT systems

The implementation and upgrade of IT systems are complex multidisciplinary projects involving subject matter experts and IT specialists as well as staff with operational and project management skills. Involvement of quality managers as well as staff with expertise in testing, validation and training is key to successful implementation.

IT systems that support blood transfusions may be single system or networked across several sites and sometimes regional or national. Alternatively, the whole-hospital system covering all aspects of patient care including electronic patient record, patient administration, diagnostics and reporting could be managed by a single system.

The errors reported to SHOT that have an IT or technology element are those where there has been an unexpected or unpredicted consequence *after* implementation. Problems and potential for errors are usually identified during the planning, testing and validation stages – before the systems are used in clinical or laboratory practice. These are not SHOT-reportable, but the SCRIPT group would be very interested to hear of your experience with LIMS or EBMS implementation to help share learning from experiences.

- **What did you learn from this project that would help others?**
- **And if you knew then, what you know now, what would you do differently?**

Below are some examples of cases reported to SHOT in 2022 and, in Table 15.1, the categories where IT errors are derived. Additional case studies can be found in the supplementary information on the SHOT website (https://www.shotuk.org/shot-reports/report-summary-and-supplement-2022/).

Primary reporting category	Number of cases 2022
Incorrect blood component transfused-wrong component transfused (IBCT-WCT)	32
IBCT-specific requirements not met laboratory (IBCT-SRNM)	118
Right blood right patient (RBRP)	71
Avoidable, delayed and under or overtransfusion (ADU)	54
Handling and storage errors (HSE)	101
Total	**376**
Anti-D Ig administration errors	54
Total including anti-D Ig errors	**430**

Table 15.1: Source of cases containing errors related to information technology

Electronic blood management systems

These vein-to-vein IT systems include blood-tracking systems in the clinical areas linked to the LIMS. Most commonly these include tracked blood refrigerators and remote electronic issue refrigerators and increasingly bedside electronic ID systems for sampling and administration of blood components. There are some examples to be aware of where these systems can contribute to adverse events.

Case 15.1: Remote electronic issue on samples with an edited group (IBCT-SRNM)

During correspondence with the LIMS provider, it was mentioned that another site had found a problem with the LIMS/blood-tracking interface which meant samples where the group had been manually edited were still available for remote electronic issue. The IT search identified three samples which had a 'result manually edited' flag but remote electronic issue was still enabled, and blood had been collected for transfusion.

Case 15.2: Multiple errors and misuse of the EBMS (RBRP)

Emergency group O red cells assigned to a specific patient were collected from the laboratory by emergency department staff without a pick-up slip as it was an emergency. The laboratory received an alert to say that there was an incompatibility between the patient ID band and the blood component. The transfusion was stopped immediately, and the component was returned part-transfused. The staff member who administered the transfusion came to the laboratory with two patients' ID bands in their hand stating they had scanned the wrong one and that it was not attached to the patient at the time. Furthermore, the person who started the transfusion was not the same person whose ID badge was used in that process. The ID band printers were not working in the ED, so staff had to go elsewhere to get ID bands printed and multiple wristbands were held in nurse's pockets.

Case 15.3: Equipment and communication failure leading to delay in collection (ADU)

A patient required a blood transfusion for intraoperative bleeding. The EBMS handheld device in theatre was not responding or working after several attempts. Maternity's handheld device was missing. The ICU's handheld device would not print a barcode for use on the collection slip. The clinical team tried to bleep the laboratory several times, but there was no answer. The bleep number was confirmed with the switch board but again no answer. Two colleagues went to pathology and banged on the door until someone answered to gain access to the blood refrigerator for this patient's blood which was needed urgently.

Access cards

The purpose of controlling access to IT systems is to ensure that staff are appropriately trained and competent and to provide an audit trail. The following example demonstrates the risks of sharing access cards or a computer log-in that gives the wrong level of access. Information required to access systems should be secure but not overly complicated such that it could be forgotten when used infrequently.

Case 15.4: Someone else's access card used to get emergency blood (RBRP)

The transfusion laboratory rejected two pre-transfusion samples, so theatre needed to use emergency blood from the remote blood refrigerator. The theatre nurse did not have access to Haemobank because their personal barcode was not working. The hospital transfusion laboratory advised them to seek another staff member with access. This was misinterpreted as being told to use someone else's barcode. O D-negative red cells were removed, and the component transfused in theatre.

Downtime procedures – when equipment doesn't function as intended

There have been several examples this year, repeating the previous experiences, of errors that occur because systems are down and the contingency processes in place are not robust enough – or staff have not been trained in down-time procedures. Equipment failures may introduce unsafe practices which may make sense to the staff at the time but are demonstrated to introduce errors, partly due to over-reliance on the electronic systems or technology and partly due to lack of knowledge about why systems are needed. An illustrative example is given below.

Case 15.5: New LIMS (RBRP)

The department went live with a new LIMS which included a new label printer. As the labels printed, they came out successively, with the first printed label on the bottom when they are removed from the printer. The BMS was unfamiliar with the new design of the labels and, although they checked the patient details, they omitted the bag number check and transposed the bag labels, which were both for the same patient. Immediate action was taken to ask all staff to only print one label at a time and complete that labelling before printing labels for further units. Additionally, quotes were sourced for software which could mandate a 'bag and tag' scan prior to release to prevent such an incident re-occurring.

Functionality, alerts and warnings – LIMS and EBMS

There has been little change from previous years in the problems with flags, alerts and warnings. The problems arise from the configuration of systems so that the warnings are not seen at the time where they are needed or in a format that does not convey the appropriate action to take.

The most common category, particularly for patients needing irradiated or CMV-negative components, is the failure to communicate the need for a specific transfusion requirement so that a flag is not set at all or updated in a timely manner.

Miscommunication and lack of availability or interoperability of systems contribute to errors with selection of phenotyped red cells either to prevent sensitisation or to match a patient with red cell antibodies. Interoperability issues could be with the legacy systems or unlinked records within and between hospital sites.

Case 15.6: Wrong platelets transfused despite multiple alerts (IBCT-WCT)

Platelet components were issued to two patients on the same ward with exactly the same surname, and very similar hospital numbers. The nurse collecting received an audible alert on the blood-tracking system stating, 'stop contact blood bank for advice' and the screen stated that the unit was assigned to a different patient and to return the component to storage. The nurse sought advice from the laboratory and was told to continue with collection. The patient developed a fever and returning the platelets to the agitator resulted in another alert that the platelets were 'already in storage'. The system therefore 'quarantined' the unit. Later, on scanning the platelet component out a second time the blood-tracking system gave an audible alert 'stop contact blood bank for advice and the screen stated that the unit was 'unsuitable for use'. The BMS again advised to continue with collection. The two-person independent pre-administration check did not prevent transfusion to the wrong patient.

Case 15.7: Failure to use a legacy system to look for red cell antibodies (IBCT-SRNM)

Two units of red cells were provided by electronic issue, but legacy system checks were omitted. The patient met all EI criteria according to testing on current LIMS which had been in place since August 2021. The historical anti-K and anti-C were recorded on the legacy system but were not discovered until 'end of testing' form check was performed. These checks should be performed daily because data migration from the legacy system may have been planned but had not yet taken place. There were ongoing staffing capacity issues that could have contributed to the incident.

Learning point

- IT supports safe practice, but only if it is configured, designed, maintained and used correctly

Recommended resources

SHOT SCRIPT resources
https://www.shotuk.org/resources/current-resources/script/

SHOT Laboratory and IT webinar 2020
https://www.shotuk.org/resources/current-resources/webinars/

SHOT Bite No. 13: Information Technology and Transfusion (2020)
https://www.shotuk.org/resources/current-resources/shot-bites/

References

Health Technology Wales. Reports and Guidance – Electronic blood management systems (2023). https://healthtechnology.wales/reports-guidance/electronic-blood-management-systems/ [accessed 28 April 2023].

HSC Northern Ireland. Digital Strategy 2022-2030 (2022). https://www.health-ni.gov.uk/digitalstrategy [accessed 28 April 2023].

NHS England. Digital Transformation (2023). https://www.england.nhs.uk/digitaltechnology/ [accessed 28 April 2023].

Scottish Government. Digital health and care strategy (2021). https://www.gov.scot/publications/scotlands-digital-health-care-strategy/ [accessed 28 April 2023].