Errors Related to Information Technology (IT) 15

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Definition:

This chapter includes transfusion adverse events that relate to laboratory information management systems (LIMS) as well as other information technology (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 also includes cases where IT systems could have prevented errors but were not used. Where the corrective and preventive action suggested in response to errors included IT solutions, these have been included.

Key SHOT messages

- At a local level it remains vital that information technology (IT) systems are configured correctly, regularly validated and robust processes are in place for accurate and timely manual input of specific requirements. The deployment and operation of IT systems within transfusion practice should be aligned with National Health Service (NHS) digital and NHSX digital, data and technology framework (NHS Digital 2016, DHSC 2018, Scottish Government 2018)

Abbreviations used in this chapter

ADU	Avoidable, delayed and under/overtransfusion	**NHS**	National Health Service
BSH	British Society for Haematology	**NM-IT**	Near miss information technology
DOB	Date of birth	**PDA**	Personal digital assistant
GP	General practitioner	**RBC**	Red blood cell
HSE	Handling and storage errors	**RBRP**	Right blood right patient
IBCT	Incorrect blood component transfused	**SD-FFP**	Solvent-detergent fresh frozen plasma
ID	Identification	**SRNM**	Specific requirements not met
IT	Information technology	**UKTLC**	United Kingdom Transfusion Laboratory Collaborative
IUT	Intrauterine transfusion	**WCT**	Wrong component transfused
LIMS	Laboratory information management systems		

Recommendations

- Clinical and laboratory transfusion practice must be aligned within the hospital and with National Health Service (NHS) digital strategies
- SHOT's wealth of data relating to information technology (IT) issues should be used to inform future digital solutions

Action: SHOT, United Kingdom Transfusion Laboratory Collaborative (UKTLC), transfusion/pathology IT leads within Trusts and Health Boards

Background

It is now 38 years since the introduction of the first LIMS. Keeping focus on the primary aims of IT systems in healthcare is vital to ensure they are deployed in a manner that fully exploits their capability to improve healthcare delivery (Murphy et al. 2019).

There are two primary aims for IT systems. Firstly, improving the ergonomics of clinical tasks by allowing automation within defined parameters with the aim of driving a reduction in human error and improvement in speed and efficiency. Secondly, allowing the collection and storage of large volumes of detailed and accurate information in a manner that allows for easy manipulation and scrutiny with the purpose of generating both clinical and managerial insights. These two aims are intrinsically linked; a failure to improve ergonomics and automation will lead to 'workarounds' and manual steps that degrade the safety of IT systems and hence the quality and reliability of the information gathered. To fully realise these two aims, systems need to be interoperable with data from one clinical system being readily transferrable and usable in others.

SHOT has repeatedly demonstrated the persistent adverse safety consequences of the failure to achieve interoperability. An absence of interoperability creates the requirement for manual data entry which SHOT has demonstrated is a source of error. The interoperability of systems both within NHS hospitals and between NHS institutions remains limited and is held back by a lack of standardisation of data formatting and data exchange.

Clinical information standardisation is a key part of the NHS digital, data and technology framework (NHS Digital 2016) reflecting the fact that it underpins system interoperability with wide reaching benefits to the healthcare system as a whole. The specific challenges for improving the safety of IT in transfusion are well aligned with this framework.

Introduction

In 2019 there were 283 (270 excluding anti-D immunoglobulin (Ig) administration errors) reports included in this chapter drawn from the primary reporting categories as shown in Table 15.1 and these are categorised in Table 15.3 (available on the SHOT website) according to the errors and the reason for the error based on the reporter's classification and the author's interpretation.

For the first time the IT errors in the near miss reporting category (NM-IT) have been analysed and are included in this chapter. For all other IT errors and associated learning points and recommendations, please see the supplementary information on the SHOT website (https://www.shotuk.org/shot-reports/report-summary-and-supplement-2019/) for the relevant chapters given in Table 15.1.

Errors related to flags, alerts and warnings remain the commonest source of error and are summarised below for all reporting categories.

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

Primary reporting category	Number of cases 2019
Incorrect blood component transfused-wrong component transfused (IBCT-WCT)	25
IBCT-specific requirements not met (IBCT-SRNM)	102
Right blood right patient (RBRP)	42
Avoidable, delayed and under/overtransfusion (ADU)	25
Handling and storage errors (HSE)	76
Total	**270**
Anti-D Ig	13
Total including anti-D Ig	**283**

IT flags, alerts and warnings n=122

Warning flag in place but not heeded n=40

There were 18 reports where a unit had expired or was out of temperature control and the warning was not heeded. There were 7 reports of WCT and 14 of SRNM. One warning related to the requirement for a blood warmer.

Warning flag not updated or removed in error n=29

This category is where information on the LIMS should have been updated and wasn't or where a flag was removed in error. In 4 cases wrong blood was transfused, 21 reports related to SRNM and 4 units were expired or out of temperature control.

Failure to use flags and/or logic rules n=53

These incidents would have been prevented if the LIMS or other system had the warning flags activated or logic rules put in place.

Further details of the IT-related reports can be found in the supplementary information on the SHOT website (https://www.shotuk.org/shot-reports/report-summary-and-supplement-2019/).

Near miss IT events n=155

The numbers of NM-IT events reported for the 2019 reporting year compared to the previous three years (2016, 2017 and 2018) are shown in Table 15.2. The number of cases reported shows variation for all categories from 2016 to 2019. The cases described below are for 2019 only.

Primary reporting category	No. of reports 2016	No. of reports 2017	No. of reports 2018	No. of reports 2019
ADU	0	3	1	1
Cell salvage	0	0	0	1
Anti-D Ig	4	16	5	13
HSE	1	8	15	20
SRNM	44	52	36	35
WCT	37	66	65	42
RBRP	23	36	28	43
Total	**109**	**181**	**150**	**155**

Table 15.2: Source of NM-IT cases 2016-2019

RBRP NM-IT n=43, and WCT NM-IT n=42

Discrepancies in patient details were noted due to errors of manual entry in electronic systems, data mismatches within unlinked systems, transcription errors and transposition of compatibility labels on components. Electronic tracking systems proved invaluable in preventing errors at collection and administration, as noted in the cases below. In 23 of the WCT and 6 of the RBRP events the error was prevented by an electronic tracking system, however, it is notable that the tracking system appears to be used as the primary patient check, rather than a confirmation step.

Case 15.1: Incorrect replacement identification (ID) band used to scan components prior to administration

Administration checks for solvent-detergent fresh frozen plasma (SD-FFP) were performed by two nurses at the bedside. The ID band on the patient had eye-readable patient details however the barcode was worn and could not be scanned by the BloodTrack® system. A new ID band was printed, however the nurse had not realised there were previous ID bands in a queue. They selected the incorrect patient's ID band to scan away from the bedside using the personal digital assistant (PDA) linked to BloodTrack®, however the system alerted to prevent transfusion of an incorrect unit to the wrong patient. The correct patient subsequently received an SD-FFP transfusion as indicated.

Case 15.2: Patient details mismatched on two unlinked IT systems

A request for red blood cell (RBC) transfusion was received in the laboratory, however the date of birth on the request form and blood sample received from the general practitioner (GP) did not match the LIMS. It did match the information on the GP patient ID system (summary care record (SCR)) and the LIMS was updated by laboratory staff. When attempting to issue the unit, it was scanned into Blood360® which held information from the patient's previous transfusion, and the unit was automatically quarantined due to a mismatched date of birth (DOB). The details on Blood360® are updated manually, and this step had not been completed. The ward was contacted to ascertain the correct DOB, and the patient confirmed the DOB on Blood360® was correct, but incorrect on the patient ID system and pathology LIMS system. A new sample was requested from the ward to provide blood for the patient and the GP practice contacted to inform them of the error.

SRNM NM-IT cases n=35

The majority of SRNM NM-IT cases related to the issue of non-irradiated components, most of these due to the laboratory not being informed of the specific requirement. Despite this, IT systems assisted in prevention of error at collection (Case 15.3) and by provision of checklists at administration. The importance of correct application of IT flags is demonstrated in Case 15.4 where non-irradiated blood was issued via a blood refrigerator.

Case 15.3: Irradiated red cells not issued for a baby with previous intrauterine transfusion (IUT)

A woman with history of IUT at a different hospital in the Trust presented for a planned caesarian section. A unit of neonatal emergency red cells, which had not been irradiated, was removed from a satellite refrigerator in advance of the procedure to be given to the infant immediately following birth. Even though the woman had been admitted 12 hours prior to the procedure, the transfusion laboratory had not been informed of admission, or delivery plan. The laboratory team were alerted to the removal of neonatal emergency cells by an alarm on BloodTrack® and contacted the clinical area to assist in the emergency haemorrhage. They were subsequently able to access the woman's transfusion records, prevent this incorrect unit being transfused and provide a component with the correct specification for the infant.

Case 15.4: Failure to complete all steps required to attach a flag to the LIMS

The specific requirements section on the request form stated that the patient required irradiated blood. An irradiated warning flag was put onto the patient's laboratory record on WinPath® by the transfusion laboratory staff. However, within this LIMS a second step is necessary - the specific requirement section on the 'product issue page' must also be populated for each sample during the booking-in process. On this occasion this step was omitted in error and therefore there was no message to the HaemoBank80® remote issue refrigerator to prevent the issue of non-irradiated blood.

HSE NM-IT cases n=20

HSE NM-IT events included failure to act on alerts, failures in temperature monitoring systems and storage of blood components in non-designated refrigerators. IT systems, in some cases were able to identify and prevent errors.

Case 15.5: Incorrect storage of red cells identified by electronic tracking system

A unit of blood was correctly collected from the transfusion laboratory issue refrigerator and put into the ward satellite refrigerator using an electronic tracking system. During collection from the satellite refrigerator it was noted that the unit was not present. The blood was then found in a chemotherapy storage refrigerator next to the satellite blood refrigerator. The unit was initially quarantined pending investigation and then discarded.

Learning points

- Electronic blood-tracking systems identify errors in transfusion practice and should be implemented for storage, collection and administration of blood components. Staff appear to be becoming more reliant on these systems to perform the primary patient identification, particularly at administration, and should be reminded that bedside information technology (IT) systems acts as the *confirmatory* step
- IT systems are increasingly used within hospital practice to support patient safety (Davies et al. 2018). For them to perform this role they must be configured correctly, used appropriately by staff and interfaced
- Flags within the laboratory information management system (LIMS) should not be easily overridden by laboratory staff and their application should not be complex or multifaceted
- There should be robust processes in place for communication of specific requirements to the laboratory to allow timely application of flags to the LIMS

Conclusion

NHS Digital and NHSX are in the process of developing digital strategies and solutions to address the myriad of standalone systems and inherent failures or barriers. SHOT and the wider transfusion community have an opportunity to work with these teams, use the knowledge and data that we have and develop a fully functioning IT solution to enhance transfusion practice.

References

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