10 Handling and Storage Errors (HSE) n=244

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Definition:

All reported episodes in which a patient was transfused with a blood component or plasma product intended for the patient, but in which, during the transfusion process, the handling and storage may have rendered the component less safe for transfusion.

Abbreviations used in this chapter

HSE	Handling and storage error	**MOH**	Massive obstetric haemorrhage
LIMS	Laboratory information management system	**NM**	Near miss

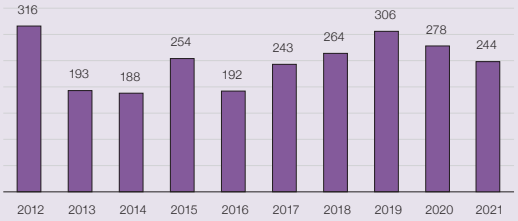
Key SHOT messages

- A detailed and robust process must be in place and followed for the use of infusion pumps, to ensure that the correct rate and time is set as prescribed for the transfusion. The process should include a second check of the pump set up before the transfusion is commenced
- Errors have been reported with staff choosing the wrong blood giving sets. These should be easily identifiable from other solution giving sets with distinct packaging to avoid incorrect selection
- Patient monitoring during transfusions is essential to prevent excessive time to transfuse errors and to avoid potential patient harm. Effective handovers between shifts will help ensure timely completion of transfusions. Blood transfusion training and competency-assessments of clinical staff should include awareness of potential impact of these errors

Headline data 2021

Number of reports n=244
Deaths n=0
Major morbidity n=0

HSE reports by year



Demographic data

Male n=108
Female n=119
Unknown n=17

Adults n=201
Paediatric n=15
Unknown n=28

Blood component data

Red cells n=204
Platelets n=21
Plasma n=10
Multiple components n=6
Other n=3
Unknown n=0

Introduction

There were 244 cases reported in 2021. HSE errors accounted for 278/3214 (8.6%) errors in 2020 (Narayan et al. 2021) and for 244/3161 (7.7%) in 2021. The reduction in the total number of HSE is multifactorial and could reflect a reduction in the number of transfusions during the COVID-19 pandemic during 2021 or under-reporting due to staff pressures. This could be also due to the decision to stop duplicating reports where multiple patients were affected. Clinical errors accounted for 190/244 (77.9%) and laboratory errors for 54/244 (22.1%). The distribution between clinical and laboratory errors are illustrated in Figure 10.1.

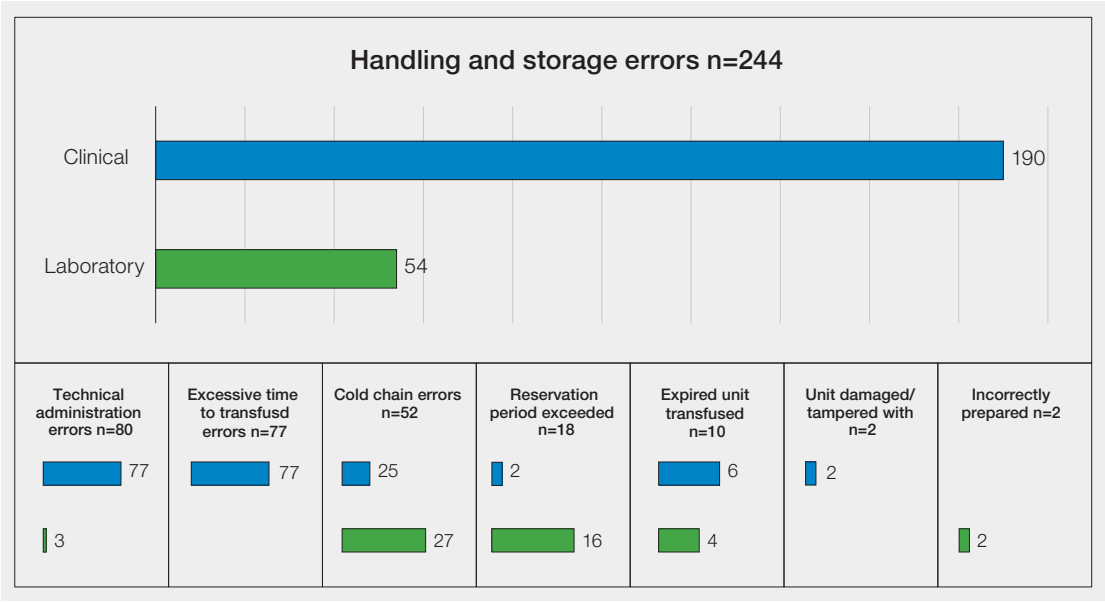


Figure 10.1: Breakdown of 2021 handling and storage error (HSE) reports (n=244)

3 cases were categorised as 'miscellaneous' (1 clinical error, 2 laboratory errors)

Deaths related to transfusion n=0

There were no deaths reported that related to errors associated with HSE in 2021.

Major morbidity n=0

There were no HSE cases reported in 2021 that resulted in major morbidity.

Clinical errors n=190

The number of clinical errors has seen a slight rise (2.7%) from the previous year (185 in 2020) and there has been an increase (16.7%) in technical administration errors (77/190 in 2021 from 66/185 in 2020) and also a slight decrease (4.9%) in excessive time to transfuse errors (77/190 and 81/185 in 2020). Technical administration errors have been further categorised below in Table 10.1.

Technical administration error	Number of cases
Administration pump error	42
Giving set error	26
Inappropriate rate	4
Same venous access used	1
Drug added	1
Miscellaneous	3
Total	**77**

Table 10.1: Clinical technical administration errors n=77

Of the 42 administration pump errors, 36 reported that the prescription was correct, but the pump had been set incorrectly.

Of the 26 giving set errors 23 were due to a blood giving set not being used. Inappropriate giving sets were reported to have been used and in 1 case, the set used was stated as having no filter.

Excessive time to transfuse errors mostly occurred during routine hours (08:00-20:00) 48/77 (62.3%) which is a slight decrease from last year. The majority of these were routine requests (34/48), however there were 7/48 incidents of urgent or emergency requests. Routine hours would normally see higher staff levels which should ensure increased patient monitoring, however staffing levels in the hospitals generally have been reduced across the board in 2021 due to COVID-19 sickness and self-isolation requirements. Yet again it has been reported that 34/77 cases (44.2%) had no incident investigation performed, with the most common reason given being that the error was not deemed serious enough to warrant an incident investigation. This lack of full investigation may explain why the problem is persisting and increasing. In 24/77 (31.2%) excessive time to transfuse incidents, cases were identified retrospectively during the traceability process or during routine audits and a further 18/77 (23.4%) were identified by laboratory staff. Only 31/77 (40.3%) of these incidents were reported by the clinical staff, which demonstrates a potential lack of awareness of the importance of not exceeding the permitted time to transfuse and the possible harm to patients among clinical staff.

There has been a slight decrease in incidents of expired units being transfused, but there were still 6 clinical incidents reported. It is imperative that clinical staff check the expiry date and time to make sure that the blood component can be completely transfused before expiry. Transfusion laboratories must make sure that the post-thaw expiry date and time for plasma components is clearly visible for clinical staff so that this can be adhered to.

Case 10.1: Cryoprecipitate transfused after the permitted 4 hours post-thaw expiry time

A request for two adult pools of cryoprecipitate was received in the laboratory at 10:35. The units were thawed and issued at 11:10 and were ready for collection with a post-thaw expiry time of 15:10. The first unit was collected at 15:01 and transfused at 15:25. The second unit was then attempted to be collected but was no longer available as it had expired and was subsequently wasted by the laboratory. On investigation the electronic blood-tracking system was active and permitted the removal of the unit as it had not expired at the time of collection, but staff involved failed to check the expiry time on the unit prior to commencing the transfusion.

Laboratory errors n=54

There has been a 40.0% decrease in the number of laboratory errors from the 2020 Annual SHOT Report, 54 errors in 2021 compared to 90 in 2020. There were 4 cases reported where the laboratory had issued blood components for transfusion that had expired and 3 of these involved the LIMS allowing the issuing of expired units or a unit with no expiry.

Case 10.2: Expired unit of emergency group O issued and transfused

A unit of red cells was requested by maternity theatres due to a MOH at 01:24. The porter came to the laboratory to collect a unit of red cells and the laboratory staff member on-call selected the first O D-negative unit from the stock refrigerator not noticing that the unit had expired at 23:59 the previous day.

On investigation, the laboratory had a relatively new LIMS and the on-call laboratory staff member was unfamiliar with issuing un-crossmatched units in an emergency. The incorrect procedure was performed and the expired red cell unit was issued. The incident investigation identified that the LIMS did not block the user from changing an expired unit's location to 'Flying Squad'.

Half of the laboratory HSE reports were related to cold chain errors, 27/54 (50.0%) reports in 2021. This has decreased considerably from 68/90 (75.6%) in 2020. The largest cause of cold chain errors identified was refrigerator/equipment failure 12/27 (44.4%) of which 9 involved temperature monitoring systems, followed by inappropriate return to stock 6/27 (22.2%), transport and delivery 5/27 (18.5%), inappropriate storage 3/27 (11.1%) and finally 1 incident of incomplete cold chain.

Learning points

- The LIMS must ensure that expired blood components are prevented from being issued
- When blood components expire whilst issued to a patient, the LIMS or electronic blood-tracking system should alert the laboratory staff so that they take appropriate actions. These include returning the units from the storage location and setting the expired components for wastage
- Laboratory temperature monitoring systems must have a detailed and robust process for alerting the appropriate staff, and staff acknowledging and actioning any alerts/alarms. Staff should respond to the issues with adequate corrective and preventative actions as necessary to ensure safe storage of blood components

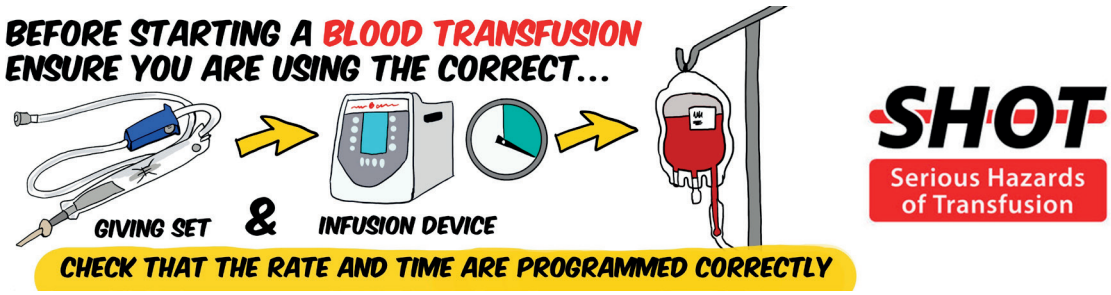
Near miss (NM) HSE cases n=140

There were 140 NM HSE cases which is an 8.5% increase in the number of cases reported in 2020 (n=129), 107/140 (76.4%) originated in the clinical area and 33/140 (23.6%) in the laboratory. The NM HSE cases primarily involved cold chain errors 101/140 (72.1%), which is an increase from 59/129 (45.7%) in 2020, followed by 17/140 (12.1%) cases of reservation period exceeded and 13/140 (9.3%) cases where expired units were almost transfused to patients. There is a much larger number of NM incorrect storage errors, 75/140 (53.6%) than actual errors, 10/244 (4.1%). As seen in 2020 this shows that there is a need for increased awareness among staff about correct component storage and actions to be taken if appropriate conditions are not met. Staff should be vigilant and return blood components to the transfusion laboratory when they are found outside of recommended conditions.

Conclusion

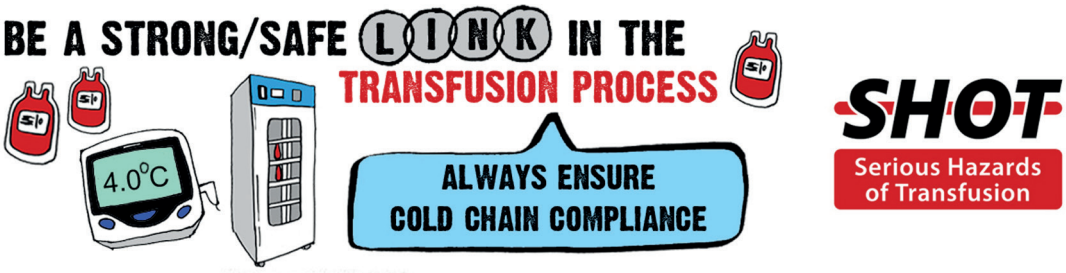
Collaboration and good communication between clinical and laboratory staff will ensure the safety of all the blood components that are transfused to patients. Laboratories can further ensure this by meticulous blood stock control ensuring that suitable components are supplied in a timely manner. Blood components which are no longer, or may soon be no longer appropriate for transfusion, are not available for clinical use. The need for further transfusion education around the appropriate rate and duration of transfusion is highlighted by this year's Annual SHOT Report. These errors are probably also due to reduced levels of staffing in the clinical area and potential impact on adequate patient monitoring.

The overall findings remain consistent with previous Annual SHOT Reports. SHOT reiterates that all staff who participate in the handling and storage of blood components throughout the transfusion process should be aware of and adhere to the correct procedures that are outlined in guidelines and their local transfusion policy. Transfusion policies should be easy to access and contain useful information based on the most current published guidance available (BSH Robinson et al. 2018). By embedding these policies in working practice, safer patient care overall can be achieved.



Recommended resource

Patient Blood Management - Blood assist app provides information on appropriate giving sets, safe rates and duration of transfusion.
Apple (https://apps.apple.com/gb/app/blood-assist/id1550911130)
Google play (https://play.google.com/store/apps/details?id=uk.nhsbt.bloodassist)
Web based (https://www.bloodassist.co.uk/)



References

BSH Robinson S, Harris A, Atkinson S, et al. The administration of blood components: a British Society for Haematology Guideline. *Transfus Med* 2018;**28(1)**:3-21. http://onlinelibrary.wiley.com/doi/10.1111/tme.12481/full [accessed 05 May 2022].

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