Laboratory Errors n=639 (439 errors and 200 near miss)

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Thank you

The SHOT laboratory working expert group would like to extend our huge appreciation to all staff working within laboratories for their commendable effort during this very difficult year. Many staff have faced numerous challenges supporting an already extremely stretched workforce and have supported each other through harrowing personal challenges. This laboratory chapter hopes to highlight areas where transfusion laboratory practice can be further improved and how we can support our patients and hospital community. We would also like to thank our reporters for continuing to report to SHOT during this challenging time and maintaining a strong collaborative reporting culture.

Key SHOT messages

- K-negative units should be provided to K-negative individuals of childbearing potential. Failure to do so puts future pregnancies at risk. Laboratory information management systems (LIMS) rules, which cannot be easily overridden, should be implemented to aid this process
- If in doubt, ask the right person for the right advice. SOP should include sufficient information and escalation procedures; however, it is in the interest of patient safety to check details of procedures with senior colleagues rather than assume

Abbreviations used in this chapter

ABID	Antibody identification
ABOi	ABO-incompatible
BMS	Biomedical scientist
CCP	COVID-19 convalescent plasma
DAT	Direct antiglobulin test
ED	Emergency department
EQA	External quality assessment
FFP	Fresh frozen plasma
HDFN	Haemolytic disease of the fetus and newborn
HSE	Handling and storage errors
HT	High-titre
IBCT	Incorrect blood component transfused
IBGRL	International Blood Group Reference Laboratory
IFU	Instructions for use
IQC	Internal quality control
IT	Information technology
LIMS	Laboratory information management system
MHRA	Medicines and Healthcare products Regulatory Agency
NM	Near miss
QC	Quality control
RCA	Root cause analysis
SOP	Standard operating procedure(s)
Sp-ICE	Specialist Services electronic reporting using Sunquest's Integrated Clinical Environment
SRNM	Specific requirements not met
SRR	Sample receipt and registration
UKNEQAS	UK National External Quality Assessment Scheme
UKTLC	UK Transfusion Laboratory Collaborative

Recommendations

- Trust/Health Board governance should review staffing levels in transfusion laboratories and ensure the skill mix is in compliance with UK Transfusion Laboratory Collaborative (UKTLC) standards and that there are sufficient numbers of staff in line with capacity plan (UKTLC 2014)

Action: Transfusion laboratory managers, clinical governance departments and chief executives

- Transfusion laboratories should have clear procedures for component selection to avoid ABO-incompatible transfusion. Complex situations should be discussed with a haematologist or UK Blood Transfusion Service (UKBTS) consultant for concessionary issue where time allows

Action: Transfusion laboratory managers, transfusion training leads and haematologists

- Handover is a safety critical point in the working day. Transfusion laboratories should implement a written handover log to support clear communication

Action: Transfusion laboratory managers, transfusion quality leads

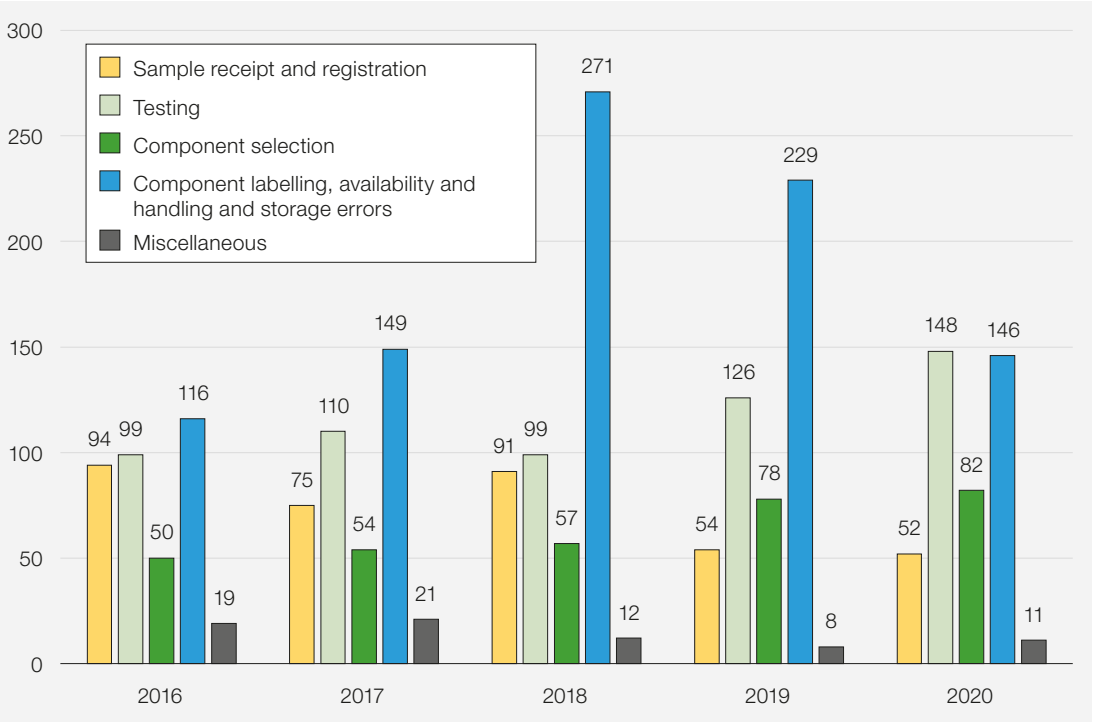
Introduction

The number of events reported in the laboratory has reduced by 19.7% to 639 from 796 in 2019. In 2019, 796/3397 (23.4%) SHOT reports were laboratory errors, in 2020 this is 639/3214 (19.9%). This is possibly due to improvements in practice, or due to the unprecedented pressures faced in the healthcare community this year due to the COVID-19 pandemic, leading to reduced reporting.

In challenging circumstances, it is vital to have robust emergency preparedness procedures. In 2021, SHOT issued a safety notice highlighting the key role of planning for such situations in the laboratory. This is discussed further in Chapters 6, Acknowledging Continuing Excellence in Transfusion (ACE) and Chapter 11, Handling and Storage Errors (HSE).

For the first time in several years, most laboratory errors resulted from omissions at the testing step 148/439 (33.7%), increasing from 126/495 (25.5%) in 2019. There has also been a dramatic drop in component labelling, availability and HSE errors to 146/439 (33.3%) in 2020 from 229/495 (46.3%) in 2019.

Figure 15.1: Laboratory errors 2016-2020 categorised by step where the error occurred



Deaths n=2

There were 20 deaths reported in total, 2 of which were possibly related to the transfusion (imputability 1). One case involved a patient with autoimmune haemolytic anaemia where there was a delay in provision of blood due to samples not being sent to the reference laboratory in a timely manner and multiple communication difficulties. The other case involved significant delays in provision of blood, which was compounded by IT failures, during a major haemorrhage. These cases are discussed further in Chapter 12a, Delayed Transfusions.

Major morbidity n=5

There were 5 cases of major morbidity relating to laboratory errors, all of which resulted in sensitisation to the K antigen in patients of childbearing potential. Anti-K has been implicated in many cases of HDFN which require antenatal intervention. Whilst antibody levels can be monitored by titration, this may not be a reliable indicator of disease severity (BSH White et al. 2016). Laboratories should take all steps possible (including the application of LIMS flags which are not easily overridden) to prevent sensitisation to the K antigen and so prevent increased risk for the fetus in future pregnancies.

Case 15.1: Historical transfusion of a unit of red cells resulted in antibody formation

An antenatal booking group and screen for a patient in her 30s at 16 weeks' gestation revealed a positive antibody screen. The sample was sent to the reference laboratory at the Blood Service for antibody identification and titration. Two antibodies were confirmed, anti-K and anti-Fy^a, both with high titration levels. On investigation by the hospital transfusion laboratory, it was found that this patient had been transfused one of two units of red cells issued in 2014 during a postpartum haemorrhage. The unit transfused was found to be K-positive and Fy^a status was not known.

Alloimmunisation is a risk with all transfusions, and every effort must be made to prevent this when possible. In this case the formation of anti-Fy^a was unpreventable, however the formation of anti-K was. All K-negative patients of childbearing potential (<50 years old) must be transfused with K-negative red cells (BSH Milkins et al. 2013). It is imperative that the LIMS alerts staff of this specific requirement, and that these alerts are heeded when issuing units for transfusion to prevent the unnecessary formation of this antibody which can cause HDFN.

Trends in error reports

The highest proportion of errors occurred within the IBCT-SRNM category 130/439 (29.6%), which is similar to previous years.

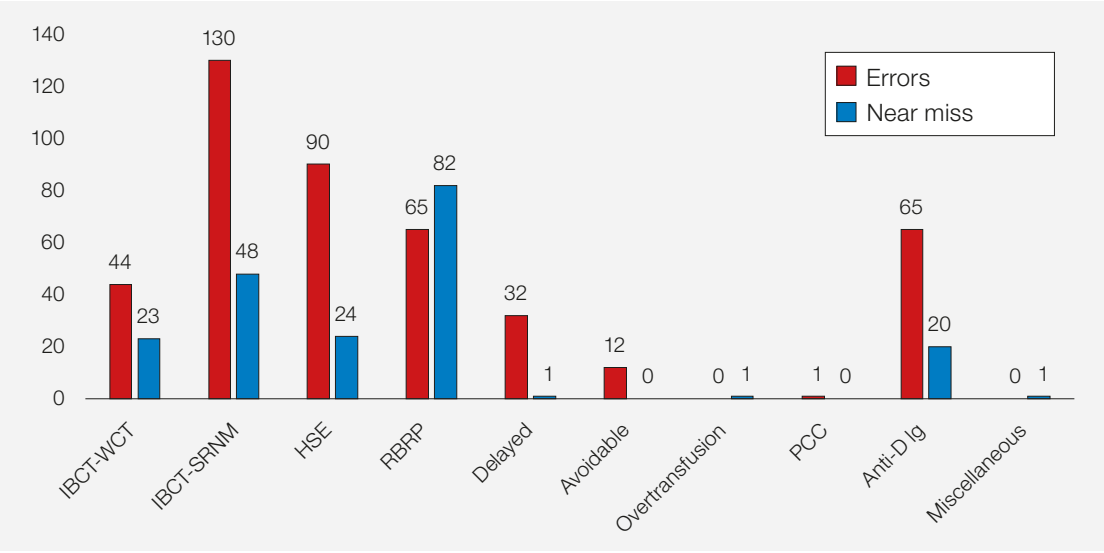
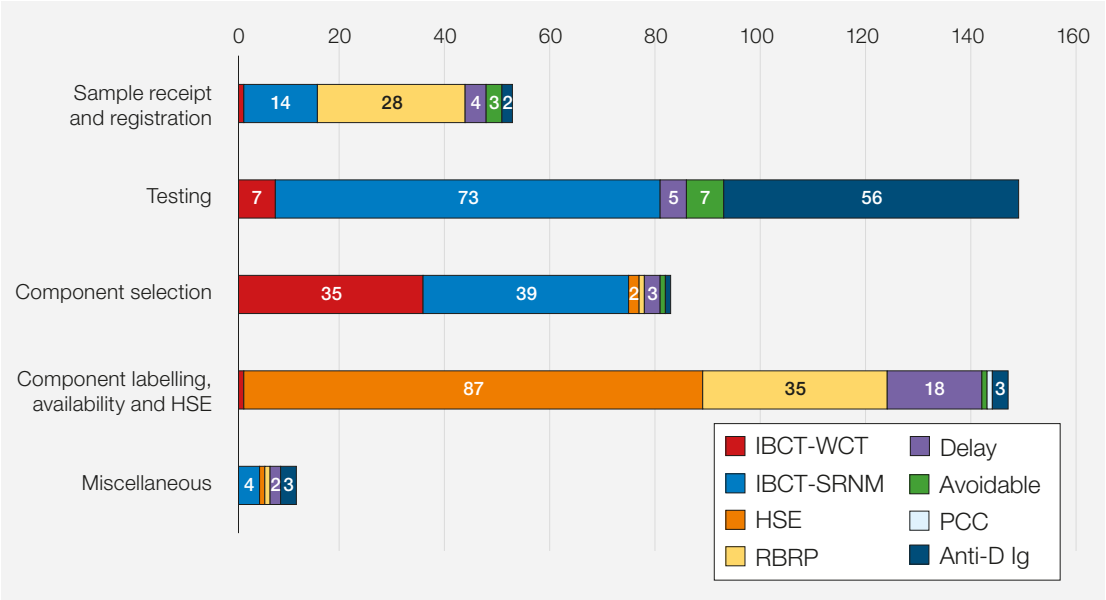


Figure 15.2: Laboratory incidents and near misses by category of outcome (n=639)

IBCT-WCT=incorrect blood component transfused-wrong component transfused; IBCT-SRNM=IBCT-specific requirements not met; HSE=handling and storage errors; RBRP=right blood right patient; PCC=prothrombin complex concentrate; Ig=immunoglobulin

Figure 15.3: SHOT laboratory data showing at which stage in the transfusion process the primary error occurred (n=439)

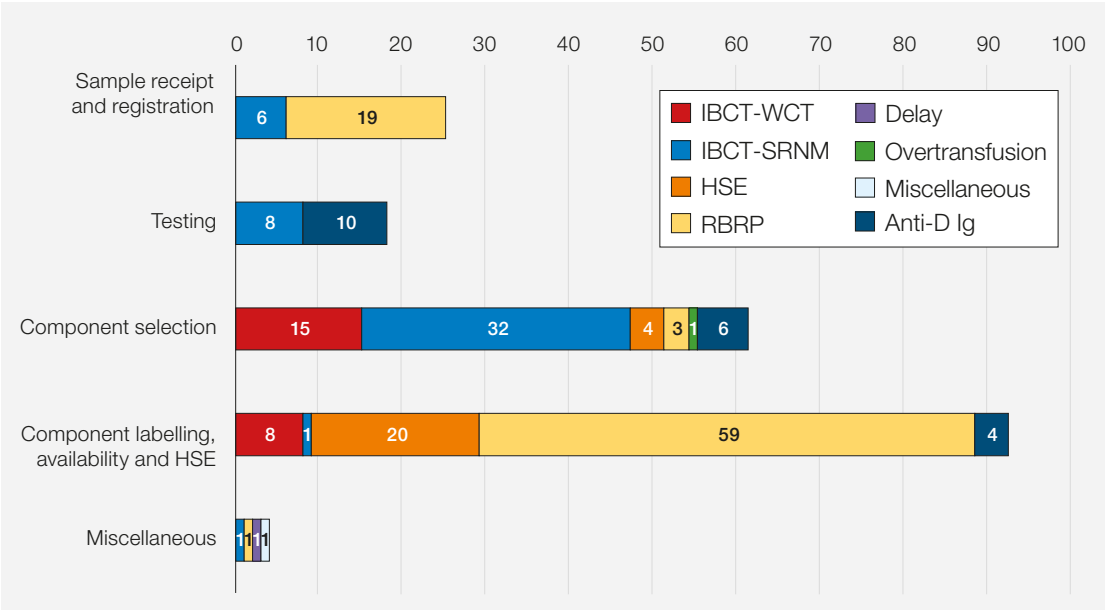


IBCT-WCT=incorrect blood component transfused-wrong component transfused; IBCT-SRNM=IBCT-specific requirements not met; HSE=handling and storage errors; RBRP=right blood right patient; PCC=prothrombin complex concentrate; Ig=immunoglobulin

Near miss cases n=200

There has been a reduction in NM laboratory errors, to 200 from 301 in 2019 (Narayan et al. 2020). In contrast to laboratory errors, the pattern of NM events is consistent, with the largest reporting category being component labelling, availability and HSE, 92/200 (46.0%). The highest proportion of laboratory NM cases remain RBRP events 82/200 (41.0%), of which 52/82 (63.4%) involved labelling errors. The use of electronic solutions to review component labelling may help detect these errors prior to components leaving the control of the laboratory and being available in the clinical area (BSH Jones et al. 2017). A total of 128/200 (64.0%) cases were due to failure to follow procedure and 129/200 (64.5%) laboratory errors were detected at pre-administration bedside checking. This demonstrates that robust transfusion policies and procedures, if followed correctly, can minimise errors in transfusion. Incident investigations should focus on why policies were not followed to reduce error recurrence.

Figure 15.4: SHOT near miss laboratory errors showing at which stage in the transfusion process the primary error occurred with outcome (n=200)



IBCT=incorrect blood component transfused; WCT=wrong component transfused; SRNM=specific requirements not met; HSE=handling and storage errors; RBRP=right blood right patient; Ig=immunoglobulin

Errors by step in the transfusion process in the laboratory

Sample receipt and registration (SRR) n=77 (52 transfused errors and 25 near misses)

The majority of SRR errors occur when available information on LIMS are not heeded. Distractions should be avoided at booking in, as this is the first opportunity to prevent mistakes potentially impacting on a patient's wellbeing.

Many cases reported this year have errors where data was available on a transfusion request form or on other IT platforms (such as Sp-ICE) but were not accessed or considered. Gaps in understanding the current clinical situation also lead to errors in testing and component selection.

Learning points

- All clinically relevant information should be taken into account at the sample receipt and registration stage of the laboratory process
- Patient records must be kept up to date
- All relevant transfusion history must be available to laboratory staff to aid with the decision-making process

Testing n=166 (148 transfused errors and 18 near misses)

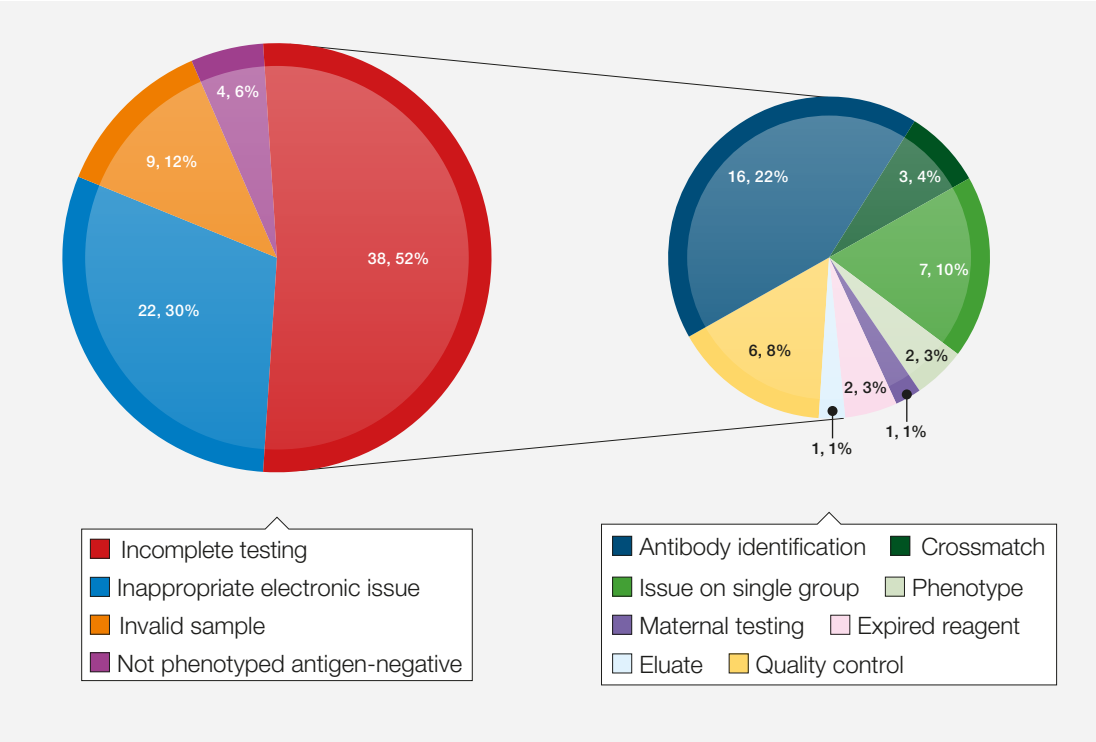
Laboratory testing errors have increased from 2019 and is the highest yearly total reported to SHOT. Most testing errors have been recorded as due to failure to follow procedure 84/148 (56.8%). Procedural errors are largely IBCT-SRNM errors 56/84 (66.7%), followed by anti-D Ig errors 22/84 (26.2%). The key SHOT message from 2019 remains pertinent, 'Laboratory staff should be comfortable working within routine procedures – these procedures should be safe and fit for use, especially in high-pressure situations'. If repeated errors with the same procedure are seen, it is important to review the SOP to ensure it reflects 'work as done', and whether adjustments are required to allow safer practice to occur.

IBCT-SRNM testing errors n=73

Most testing errors occurred in the IBCT-SRNM category 73/148 (49.3%) and were failures to complete relevant tests prior to blood issue 38/73 (52.1%). Most incomplete testing was due to failure to complete ABID in 16/38 (42.1%), followed by absence of up to date QC testing 6/38 (15.8%) (Figure 15.5).

Errors in ABID were mostly due to assumption of results and issue prior to completion of testing in 6/16 (37.5%) followed by incorrect interpretation 3/16 (18.8%), a lack of maternal testing for neonatal crossmatch 2/16 (12.5%) and positive screen not followed up, screen not performed and incorrect antigram used all occurring once each.

Figure 15.5: IBCT-SRNM laboratory testing errors separated by error subcategory (n=73)



Case 15.2: Red cell antibody identification error due to heterozygous cell selection

A male patient in his 50s was admitted with haematemesis and a Hb of 53g/L. The antibody screen was positive, and the initial antibody panel appeared to identify anti-c and anti-E. A full crossmatch was performed with c-negative and E-negative units and were found to be incompatible. The results were referred to the senior BMS who noted that anti-M and anti-S had not been excluded from the initial antibody panel and suggested it was probably anti-M and to select and crossmatch four M-negative units while more panel work was being done. One of these four units was found to be compatible, it was issued and subsequently transfused to the patient. A further four M-negative units were requested from the Blood Service and crossmatched but only one of these four was compatible. At this point the patient refused any more blood so the remaining compatible unit was kept on standby. The next day samples were sent to the Blood Service for antibody investigation as anti-S had still not been excluded. The Blood Service later rang the laboratory to say the patient had a historical anti-S from a sample sent from a different hospital and these results were available on the Sp-ICE system. On investigation the cells selected to exclude or confirm anti-M were homozygous but were heterozygous for the S antigen and gave a negative result (dosage effect). The Blood Service were contacted, and they confirmed the unit transfused was S-negative as was the unit on standby so there was no patient harm.

Laboratory procedures should include any limitations to be aware of during testing, such as dosage effect of panels cells that are heterozygous. There should be robust procedures in place for selection of blood in an emergency, and advice from senior colleagues, or reference centre staff sought if in doubt. It may not be possible to check Sp-ICE in emergency situations, but this should be checked when feasible to enable appropriate follow up to occur.

Misidentification of antibodies can have serious clinical consequences. In 2020, misidentification of an anti-Jk^{a} resulted in a delayed haemolytic transfuion reaction. This is discussed in more detail in Case 19.1, Chapter 19, Haemolytic Transfusion Reactions (HTR).

Anti-D testing errors n=56

Anti-D Ig errors account for 56/148 (37.8%) testing errors, which is an increase from 24/126 (19.0%) in 2019. Errors relating to cffDNA testing occurred in 23/56 (41.1%) of reports, with errors in prediction of fetal D-type conducted by testing laboratories accounting for 16/23 (69.6%) of these. An additional

cffDNA error was categorised as 'miscellaneous' and was not counted under 'testing' as it involved a member of laboratory staff providing incorrect advice.

Case 15.3: Anti-D Ig omitted due to misleading information in product instructions for use (IFU) document

A female patient in her 20s had antenatal booking blood samples received in the transfusion laboratory at hospital A. She was found to be D-positive (with a 3+ reaction strength) and had no antibodies detected, these results were also found at 28 weeks. Her care was later transferred to hospital B who used the same grouping analyser as hospital A. At hospital B she also had a 3+ strength reaction with anti-D, however her result was entered as D-negative, her sample was sent to the reference laboratory for confirmation and she was provided with anti-D Ig prophylaxis. The sample was further tested within IBGRL and the result found to be a D variant. For the analyser used by both sites, a 3+ reaction requests the BMS to review and acknowledge the results and the IFU documentation states 2+ or <2+ reactions are to be confirmed by an alternative method. No referral took place from hospital A as the results were 3+ for D grouping, however hospital B had experienced a previous incident regarding reaction strengths in 2017 and now referred all D-positive reactions of 3+ strength or below to the reference laboratory. Despite this previous incident, and this case being raised at user group meetings, the reporter had indicated they were yet to receive a field safety notice highlighting this issue, nor had the IFU been updated, though the manufacturer had indicated they would escalate this matter. The manufacturer had communicated to the reporter that they believed a review of 3+ reaction strength was a sufficient safety measure. Locally, the SOP at hospital A was updated and all staff informed of the change in procedure. This patient was scheduled to be followed up at 6 months post-delivery to determine if sensitisation to the D antigen had occurred.

The reagent manufacturer involved has confirmed the above case details as an accurate representation. The IFU is being reviewed to determine if additional information is required to provide further clarity in relation to D variants. There has been no communication circulated to customers so far regarding this issue.

It is vital that manufacturers provide accurate safety critical information within their documentation, and highlight these issues during training. Furthermore, there must be a robust feedback mechanism for when changes in practice are required to prevent patient safety incidents.

There are many cases reported this year that have the same underlying features around inadequate systems to stop the selection and issue of components, especially where incomplete/inadequate testing has occurred. Ideally automated group and screen analysers should prevent the processing of samples or transfer of results when outside of valid IQC or failed IQC. Regarding electronic issue, a key recommendation of BSH guidelines (BSH Milkins et al. 2013) states that 'The overall process for determining eligibility for electronic issue must be controlled by the LIMS and not rely on manual intervention or decision making.'

Learning points

- The laboratory information management system (LIMS) should be able to prevent component issue, especially electronic issue, until all relevant testing is complete without anomaly. If this is not possible then a robust procedure must be in place to ensure that all steps of testing, component selection and issue are completed and appropriate, for example having additional checks
- If a LIMS cannot determine eligibility for electronic issue, then this should not be used to issue red cells

Component selection n=143 (82 transfused errors and 61 near misses)

The principal failures in this section related to the selection of correct component specification. Many incidents occurred due to failure to follow information readily available within the LIMS (e.g. irradiated or K-negative red cells).

Learning point

- The competency-assessment of a biomedical scientist working in transfusion should include an understanding of requirements for irradiated components. Staff should also be aware of when to discuss with clinicians if the correct specification has not been requested

ABO-incompatible transfusion (ABOi) n=2

There were 2 cases of ABOi transfusions which were attributed to laboratory errors in 2020, and there were no adverse patient outcomes in either case. Both errors involved plasma components (1 FFP and 1 CCP) and occurred at component selection, and in both cases LIMS flags alerting to the incompatibility were overridden.

Case 15.4: Group O CCP transfused to a group A recipient

A female in her 30s who was blood group A, was enrolled on the convalescent plasma arm of the REMAP-CAP (A Randomised, Embedded, Multi-factorial, Adaptive Platform Trial for Community-Acquired Pneumonia) trial and was transfused with a unit of group O CCP. On investigation there was no ABO-compatible convalescent plasma in stock and instead of ordering this from the Blood Service the BMS selected group O after discussion with a less experienced member of staff and thought this would be acceptable because the unit was HT-negative. The LIMS had an alert flag for the ABO-incompatibility, but this was not heeded. A unit of group O CCP was also issued to the same patient the previous day, however this was wasted as it had been stored inappropriately in the ward refrigerator. The ABO-incompatibility was not detected upon return of this unit and was only raised when a different BMS was issuing the 2nd dose (3rd unit) and saw the ABOi units in the patient's history. The laboratory has now had the LIMS updated to prevent group O plasma components being issued to a non-group O recipient. No patient harm was reported.

This incident occurred in challenging circumstances with a new blood component. Appropriate advice for such situations should be provided in documentation and a central point of contact should be available 24/7 for escalation in critical situations. Incidents where the LIMS alerts and flags are being ignored and overridden occur year on year. LIMS providers need to address this particular outcome by making it impossible to issue group O plasma to a non-group O patient without specifying a reason for the exceptional issue of ABOi plasma (e.g. major incident). This process should also include communication and referral to a haematologist for concessionary release if required.

Case 15.5: Two units of group O FFP transfused to a group A recipient despite a LIMS flag being present

A female patient in her 50s was admitted as a code red trauma patient following a road traffic accident. She suffered a massive haemorrhage, arrived in the ED and received several units of emergency group O red cells before a group and screen sample could be taken. A sample was taken and processed by the laboratory, but the results showed dual populations because of the O red cells transfused and the group was inconclusive. There was a historical blood group from 1992, but this could not be linked to the current record in the LIMS. The patient's blood group was manually edited to group O with a flag added to the LIMS record to give universal components only as stated in the laboratory procedure for this situation. FFP was later requested and the BMS on duty selected, thawed, and issued two units of group O instead of AB or A as a universal plasma component. The alert flag to give universal components was shown but not acted upon. Both units were collected and transfused with no reported harm to the patient.

This case shows another example of LIMS warning flags and alerts being overridden. Critical LIMS flags should not be easily overridden and should require definitive action to overcome the influences of cognitive bias and alert fatigue. The laboratory has put in place a preventative action which now requires the BMS to enter a comment in the alert when it is displayed to acknowledge that the flag has been seen. This should be made a mandatory requirement of LIMS providers when building systems for laboratories. Distractions during critical transfusion processes are dangerous. Workspaces should

be designed in a manner that reduces distractions in safety critical steps.

These cases demonstrate the influence laboratory decision making can have on clinical care. All appropriate information should be contained in a clear SOP, however if staff are in doubt and cannot locate the appropriate information in a SOP, then appropriate escalation measures must be in place, in accordance with UKTLC standards (UKTLC Chaffe et al. 2014). Laboratories should foster a collaborative culture and encourage asking the appropriate person for advice when required as these decisions could impact a patient's safety.

Component labelling, availability and HSE n=238 (146 transfused errors and 92 near misses)

This is the last point where the component is under the control and care of the laboratory and should be treated as a critical safety step. Most errors at this step were HSE, such as cold chain errors.

Learning points

- Laboratory staff should stop and objectively review all component labelling prior to release to the clinical area. Never assume, and always check previous steps have been performed correctly
- Consideration should be made to ensure the labelling process is robust with appropriate checks as required to ensure the correct label is on the component pack
- Information technology (IT) solutions for label verification should be used wherever possible

Further laboratory learning

Rapidly changing workforce

The UKTLC survey (UKTLC 2019) showed that 28% of laboratories did not have the adequate staffing levels to fulfill capacity plans, approximtely 50% of responding laboratories carried vacancies and 79.4% of respondents were supporting trainees (in 16% of responses, >50% of staff required training). Whilst new staff are being recruited to these positions, many are trainees and cannot perform all tasks of registered and experienced staff. Continuity of service is required whilst training and supervising new recruits. Trainees require extra supervision and can increase the workload burden of experienced staff members. Once registered, these staff members are still relatively inexperienced, must be supported whilst gaining experience from practice and must have access to specialist support.

A total of 102/439 (23.2%) reports received involved a member of staff who was lone working. As the majority of work occurs during core hours, this figure is disproportionately high. Staff should feel empowered to raise concerns if they do not have sufficient training, knowledge, and skills to be working alone, and should never be allowed to work alone until they have passed a robust competency-assessment. The 2019 Annual SHOT Report suggested an UPTAKE model for competency-assessment, which remains a pertinent tool.

Please see additional case studies contained within supplementary information for this chapter (https://www.shotuk.org/shot-reports/report-summary-and-supplement-2020/), which reflect the effects of a rapidly changing workforce.

Handover in the laboratory

SHOT analysis of all laboratory incidents reported from 2015-2019 showed that 5.0% of incidents involved the handover process between members of staff and between shifts. Handover was found to be insufficient in 69.0%, no handover was documented in 26.9% of these. It is essential that accurate and timely information is communicated between members of staff to ensure continuity of care. This information should be written in a standardised format where possible to ensure clarity and limit any

interpretation errors. Structured, standardised communication methods overcome barriers and foster a safety culture. Communicating relevant information, focus on goals and actions and prioritising urgent needs is essential to reduce errors. Key questions to consider when developing handover procedures and quality improvement initiatives are:

- Who should be involved?
- When should it take place?
- Where should it occur?
- How should it happen?
- What needs to be handed over?
- Has this been appropriately actioned?

An example handover log is included in the supplementary material for this chapter, available on the SHOT website (https://www.shotuk.org/shot-reports/report-summary-and-supplement-2020/).

UK Transfusion Laboratory Collaborative (UKTLC): Culture Concerns

Author: Rashmi Rook, Chair UKTLC

SHOT have developed capacity plan guidance in conjunction with the UKTLC. This document should be used in conjunction with local process and can help provide a guide to developing a capacity plan which is line with UKTLC standards (see recommended resources section).

UK National External Quality Assessment Scheme (UK NEQAS)

Authors: Claire Whitham and Richard Haggis

The year 2020 certainly presented some unprecedented challenges on a global scale, and although the team at UK NEQAS Blood Transfusion Laboratory Practice felt the impacts of the pandemic, overall, the vast majority of the scheduled programme of EQA exercises were delivered, and our UK participants were able to test the samples and return results for analysis.

Participation in EQA offers the chance to learn from 'free lessons'; errors made during EQA exercises are those that can and do occur during clinical testing in the blood transfusion laboratory, and detection of these errors offers opportunities to improve. This is especially relevant during occasions when there are unusual pressures placed upon laboratories, such as the necessary additional precautions and re-prioritised workload that a pandemic naturally causes.

An examination of the errors that occurred during EQA testing during 2020 has shown that procedural errors, such as inadequate sample identification, sample transposition, result transcription and/or transposition, continue to cause the most problems for laboratories. Procedural errors occurred in all four of the 'R' exercises, and in five out of the six 'E' pre-transfusion testing exercises distributed during 2020. Learning points from these errors have centred on the need to confirm the identity of all samples before testing. For clinical samples, this requires a full check of the patient demographic details to ensure that results are assigned to the correct patient; EQA samples need to be subject to the same process, with a check of the patient number and exercise code on each sample. In crossmatching, a number of errors have been related to using the wrong samples for testing. The risks associated with using the wrong samples or assigning the wrong donors to a crossmatch are increased if more than one patient is crossmatched simultaneously. To reduce the potential for procedural errors it is advisable that crossmatching is only performed on one patient at a time. When entering data for EQA samples it is important to check that the data is recorded and transcribed against the correct patient or donor; this also applies to the data entry of results of manual testing into a LIMS.

The DAT programme became a full EQA scheme at the end of 2020. An examination of the errors has shown that there continues to be a failure of some laboratories to apply the manufacturers recommended interpretation when the internal inert control shows a positive reaction. For laboratories using automated technologies, any issues relating to the appearance of false positive reactions in an internal inert control should be referred to the supplier.

Conclusion related to laboratory reports

The overall themes seen in laboratory errors remain similar to previous years, however the impact of IT is even more pronounced. Implementation of flags and rules with the appropriate requirements for override could have prevented ABOi transfusions and would have vastly reduced the number of components provided to patients where testing was incomplete. These errors are compounded by staff performing workarounds and not following specified procedures when faced with staffing challenges and often working autonomously with very little experience. As a new generation of less experienced staff is welcomed into the laboratory, it is essential that the training provided to these individuals provides a safe and strong foundation which can then be built upon to create the expert scientists of the future. Long term fixes are needed for many of these highlighted problems, which may seem disheartening to those working within laboratories. It is essential that the contributing factors are recorded within incident investigation even if they cannot be immediately addressed, to provide evidence of deficiencies that can be trended and escalated frequently and consistently.

A detailed analysis and commentary on MHRA data can be found in Chapter 26, Medicines and Healthcare products Regulatory Agency Report.

Recommended resources

The UKTLC capacity plan guidance
https://www.shotuk.org/resources/current-resources/uktlc/

An example handover document
https://www.shotuk.org/shot-reports/report-summary-and-supplement-2020/

ABO-incompatible transfusions video
Laboratory errors video
https://www.shotuk.org/resources/current-resources/videos/

SHOT Bite No. 18: Transfusion errors in haemopoietic stem cell transplant patients
https://www.shotuk.org/resources/current-resources/shot-bites/

Blood Assist - a blood administration safety app developed by the Patient Blood Management team at NHS Blood and Transplant.
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 (www.bloodassist.co.uk)

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