2023 Annual SHOT Report – Supplementary information

Chapter 15: Laboratory Errors

Additional analysis and case studies not included in the main 2023 Annual SHOT Report.

Additional laboratory case studies

Case 15.5: Incomplete knowledge of quarantine procedures leads to inappropriate transfusion

A patient on anticoagulants was due to have major orthopaedic surgery. Two units of red cells were requested for theatre the following day but were taken in error to the clinical area the day before. When this was noted, they were returned to the laboratory some 40 minutes later. The blood-tracking system highlighted to the user they were beyond 30 minutes, so the nurse spoke directly to the BMS. It is alleged that to avoid wastage the BMS informed the nurse to transfuse it to the patient within the 4-hour window. The nurse discussed this with the vascular registrar to transfuse to avoid wastage. Although not clinically indicated at the time, the registrar decided to transfuse on the basis the patient would undergo major surgery the following day and would most likely need the blood perioperatively. The initial communication error was the nurse being asked to collect the unit but, no consideration was given to use extended quarantine of the unit, or the appropriateness of advice in this specific situation.

Case 15.6: Cold chain error involving staff member lone working without competency assessment

A blood component refrigerator was not within the required temperature limits for over 30 minutes, but below 60 minutes, meaning a quarantine period of at least 6 hours was required for the stored blood components prior to issue. However, the temperature excursion was only noticed the day after this excursion and components were issued to patients without quarantine. Upon investigation, the staff member responsible for temperature monitoring had not been trained or competency assessed for this procedure and had been working alone on a weekend shift. The investigation stated 'The de-reservation of units section to be managed by blood bank when the senior one of the blood transfusion seniors is trained' indicating multiple training and knowledge gaps within the laboratory. Further equipment factors were noted, such as the refrigerator did not have a system to prevent access in case of a temperature excursion. Despite these findings, the reporter stated the cause of the incident was the member of staff not following procedure.

Case 15.7: Lack of LIMS functionality, insufficient staffing, and incomplete training leads to inappropriate issue of antigen-negative red cells when lone working

A sample and request arrived in the laboratory outside of normal working hours from a haematology patient with autoimmune haemolytic anaemia, presenting with anaemia. The sample was partly tested and then sent to the blood service reference laboratory for further investigation. A previous Blood Service report indicated to give C-negative, K-negative, ABO- and D-compatible red cells. The clinical area required blood urgently and the laboratory selected C-positive, K-negative red cells. Although the sample was beyond its' 72-hour expiry time, the LIMS allowed issue with electronic issue. Upon investigation, it was noted that the

LIMS did not automatically alert for specific requirements. Although this was known, there was no capacity within information technology to implement the change. The BMS was filling a shift at short notice as no other qualified BMS staff were available. It was later noted the BMS lacked competency, was relatively inexperienced and did not seek help with issues they did not understand.

Case 15.8: Plasma components thawed too close to issue caused temperature deviation for all components issued

Red cells and fresh frozen plasma (FFP) were packed and issued to the air ambulance. The team attended a major trauma and decided to transfuse at the scene and transfused one unit of red cells and one unit of FFP. The remaining components were returned to the laboratory upon return. When the data logger was interrogated, it indicated that the temperature was greater than 10°C for greater than 30 minutes. The returned units were disposed of. The haematology consultant was informed, and the patient assessed as no harm from the transfusion. Upon investigation it was noted suitable FFP units were not available and that the FFP issued was thawed too close to packing and had not reached a core temperature of less than 6°C.

Major morbidity – specific requirements not met n=4

There were 4 cases of major morbidity due to failure to provide K-negative units to a patient of childbearing potential. These are described below.

Case 15.9: High-titre anti-K detected in a pregnant patient, sensitised by previous transfusion

During a postpartum haemorrhage in which six red cell units were required, a woman was transfused one unit of red cells which were not typed for the K antigen. The laboratory information management system (LIMS) flagged that the requirement was not met but this was overridden by the biomedical scientist (BMS) who was lone working. When booking samples were analysed for the subsequent pregnancy 7 years later, an anti-K antibody with a titre of 1 in 256 was detected. The woman required monitoring for haemolytic disease of the fetus and newborn throughout the pregnancy.

Case 15.10: K sensitisation in a patient of childbearing potential detected through dual population

When performing a group and screen for a patient of childbearing potential, a dual population of cells in the anti-K well was detected at hospital 1. They confirmed with the Blood Service that a red cell unit was transfused to the patient which was K-positive at hospital 2 (another site within the same organisation). A LIMS flag was overridden at the point of issue. The BMS, who did not have an in-date competency assessment for this procedure, stated there was a high workload on this particular day. The laboratory at hospital 2 was looking to implement a new LIMS system which would prevent the issue of K-positive units to patients of childbearing potential.

Case 15.11: K-positive blood issued to a patient of childbearing potential with irradiated requirement, leading to sensitisation

During a major bleed, a patient who required irradiated blood was issued O D-negative units which were not K typed, as these were the only irradiated components available on site. This unit was issued to prevent delay in ordering units with all requirements from the Blood Service. The patient subsequently developed an anti-K antibody. The BMS was lone working and reflected they may have provided more information to the

clinical area about the risks of providing K-unmatched red cells if they had extra support in the laboratory and were less rushed. The laboratory has submitted a business case to have 2 BMS staff working during night shifts to reduce future risks out-of-hours.

Case 15.12: K sensitisation in a patient of childbearing potential

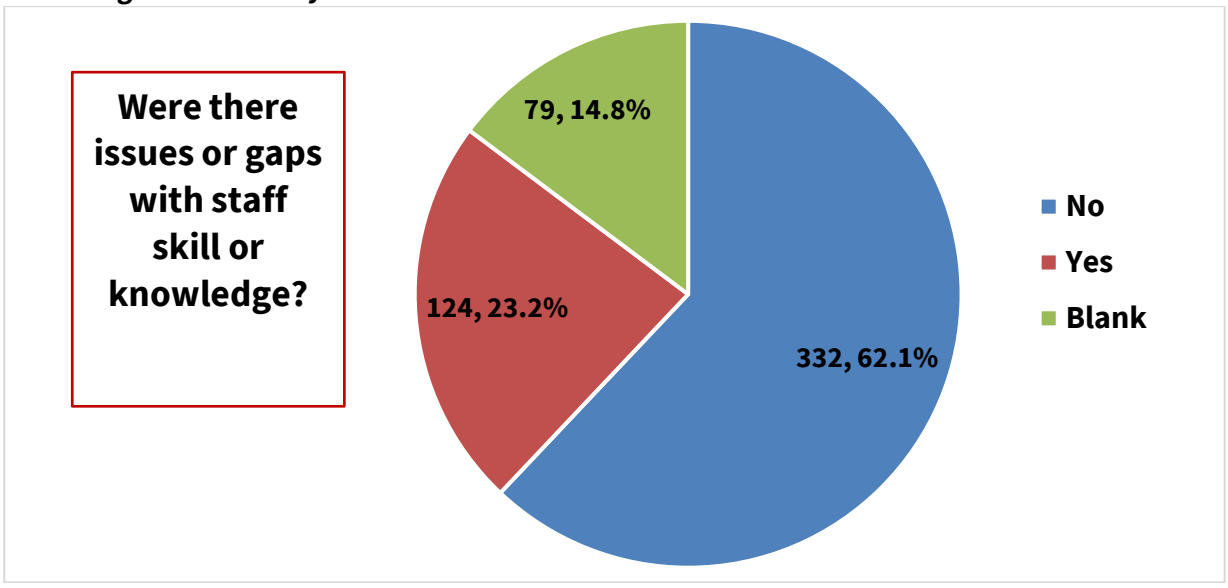
One unit of red cells was requested for a patient of childbearing potential due to low Hb of 68g/L. The patient had a negative antibody screen, the red cells were electronically issued and transfused. The next time the patient presented, they had developed anti-E and anti-K antibodies, indicating the patient had been sensitised to the K antigen. The transfused red cell unit was confirmed to be K-positive by the Blood Service. Upon investigation, the BMS issuing the unit was lone working, outside of routine hours.

Human factors in laboratory reports

Many additional factors can influence the likelihood of an error occurring. These are examined within the 'Human Factors' (HF) section of the SHOT questionnaire. In 2023 questions were no longer graded for severity, making comparison to previous years less clear cut. However, it is clear to see a noticeable impact of additional pressures on laboratory staff.

The largest influencing factor observed was that of a lack of available staff education, with 124/535 (23.2%) of reporters stating there were issue or gaps with staff skill or knowledge contributing to the incident (Figure 15.4). This is an increase to the levels seen in 2022, where 87/431 (20.2%) reporters stated there were 'some', 'a lot' or 'fully' gaps with staff skill or knowledge at the time of the incident. Whilst a modest increase in overall percentage, this is an increase of nearly 40% in absolute numbers.

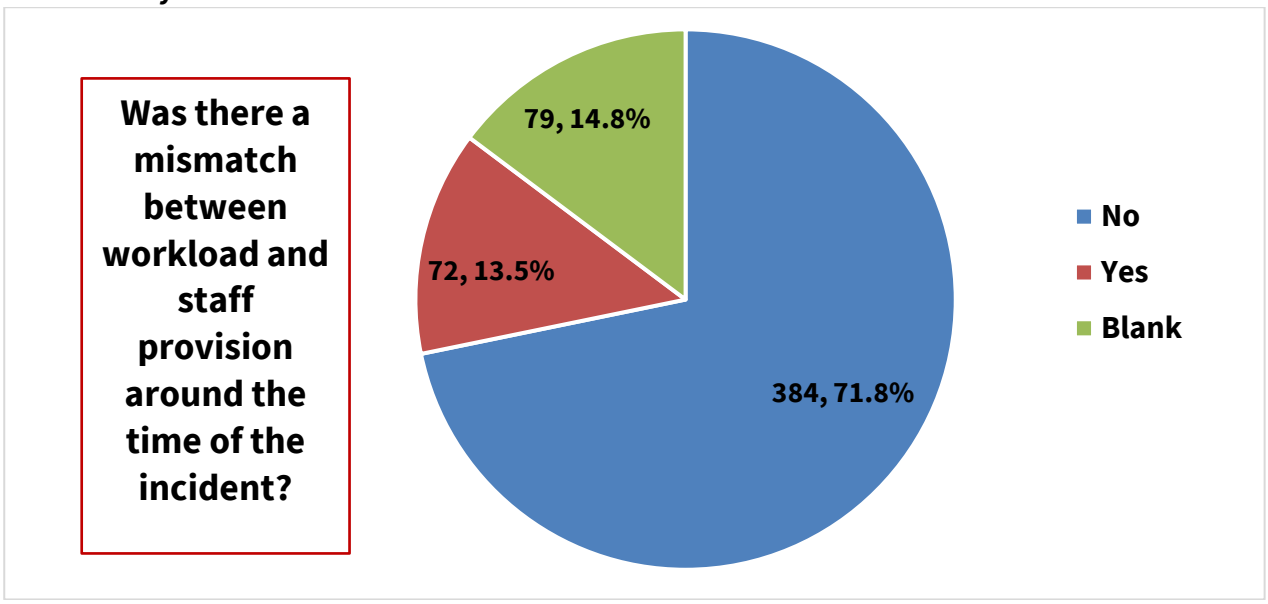
Figure 15.4: Responses to human factors investigation tool regarding gaps in staff skill or knowledge in laboratory incidents in 2023



A further influencing factor was that of available staff to perform work in a timely manner. A total of 72/535 (13.5%) reporters stated there was a mismatch between workload and staff provision (Figure

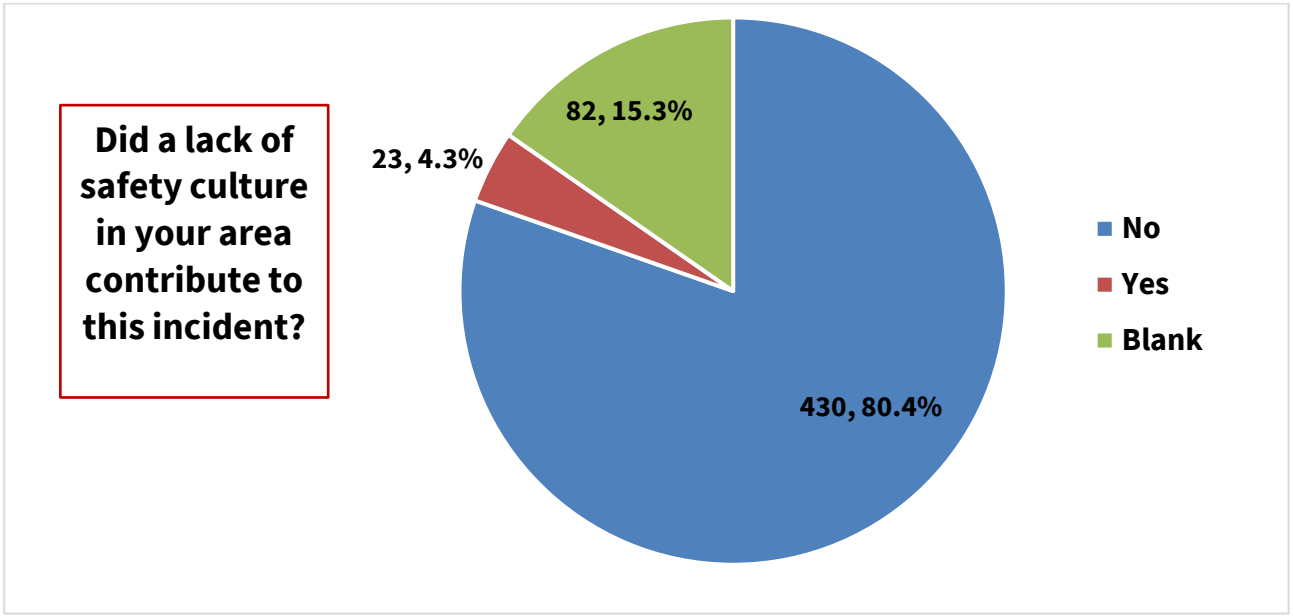
15.5). This is a slightly lower percentage than levels observed in 2022, where 70/431 (16.2%) reporters stated there was 'some', 'a lot' or 'fully' a mismatch between workload and staffing provision at the time of the incident, however a higher total number.

Figure 15.5: Responses to human factors investigation tool regarding workload and staff provision in laboratory incidents in 2023



The impact of safety culture was examined in 2023 but had not been considered in the 2022 analysis (Figure 15.6). A total of 23/535 (4.3%) reporters stated that a lack of safety culture contributed to the incident. Whilst a small number, it is concerning to see that a lack of positive safety culture has contributed to any errors, with the potential to cause patient harm. Additionally, this question had the highest percentage of reporters failing to provide an answer, indicating a potential lack of understanding of the term safety culture, or how it could impact upon transfusion errors.

Figure 15.6: Responses to human factors investigation tool regarding safety culture in laboratory incidents in 2023



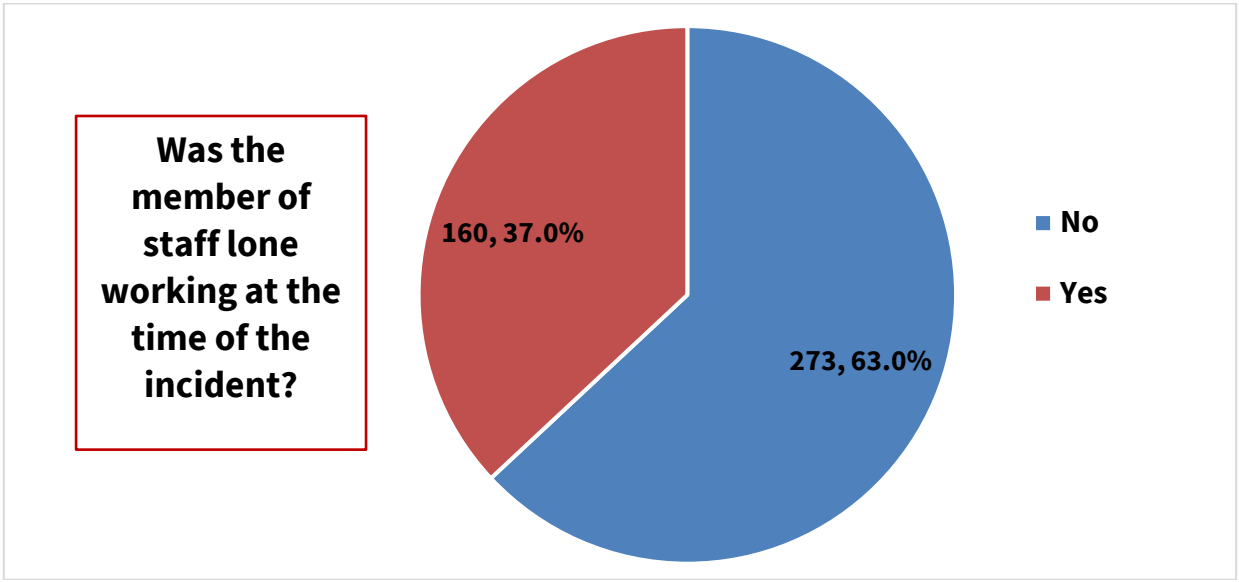
It is interesting to note that reporters who responded 'Yes' to one of these HF related questions, were more likely to respond 'Yes' to further HF related questions. This could either signify a culmination of pressure in that particular laboratory, or a greater understanding of HF by these reporters and an appreciation of their influence.

There has been a lack of significant improvement or deterioration in these areas.
The service provided by transfusion laboratories is stressed, resources are constrained, with a lack of cover. People are being taken outside of their areas of expertise to compensate for this, without the requisite training provided. Individual staff members are not intentionally making mistakes. Human factors are stacking up and leading to errors. These are systemic problems – not individual ones. Laboratories require proper resource allocation, and investment for long term improvement. In the absence of these, error rates may continue to climb which will be detrimental to patient safety.

Lone working in laboratory reports

Laboratory data in 2023 showed that errors occur at a disproportionate rate when individuals were lone working. A total of 431 reports provided an answer to the question 'Was the member of staff lone-working at the time of the incident', with 160/431 (37.1%) staff lone-working (Figure 15.7).

Figure 15.7: Responses to human factors investigation tool regarding lone working in laboratory incidents in 2023



The highest number of lone working errors was seen within IBCT-SRNM reports, 64/156 (41.0%) (Figure 15.8), suggesting this in an area more prone to error by multi-tasking. It may also be an area where specialist knowledge is required, and which would benefit from support from colleagues. Of note, both PCC errors which supplied an answer to this question, indicate the incident occurred when the member of staff was lone working – one of which was a labelling error and one which was a delay.

Figure 15.8: Responses provided to question 'Was the member of staff lone working at the time of the incident' in laboratory incidents in 2023, by SHOT reporting category