Laboratory Errors Case Studies

2019-2024

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Avoidable delays, contributing to death, whilst waiting for the most suitable component (imputability 2 – probable)

- *Platelets were requested for an extremely unwell neonate with a platelet count of $13x10^9/L$*
- *The laboratory had no neonatal platelets in stock and notified the clinical team that there would be a 5-hour delay in obtaining them from the local Blood Service due to geographical reasons*
- *The patient required transfer to a specialist hospital, and this could not occur until the baby was transfused*
- *Whilst waiting, the patient received other blood components, as disseminated intravascular coagulation (DIC) was suspected*
- *The medical team queried availability of platelets once again and were notified none were available*
- *A suitable adult therapeutic dose of platelets was available but were reserved for another patient*
- *These were administered to the neonate after a 6-hour delay, following discussions with the neonatal consultant*
- *This caused delay in treatment escalation (central line insertion) and transfer to the specialist hospital, resulting in the death of the patient*

Delay in blood availability during laboratory information management system (LIMS) downtime, with incomplete guidance in business continuity plans (1)

- *A septic patient required the support of multiple blood components during an urgent invasive procedure*
- *The LIMS had entered unscheduled downtime 1 hour earlier due to a cyber-attack, therefore all components required manual issue and hand labelling*
- *Labelling and second checking took around 30 minutes instead of the normal timeframe (<20 minutes) for group-specific issue*
- *Due to haemodynamic instability and delay in receiving blood components, the patient was transferred to the intensive care unit for stabilisation*
- *The patient's condition deteriorated, and they returned to theatre 4 hours later*
- *Laboratory staff were aware of the LIMS unavailability but did not know when it would be restored*

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Delay in blood availability during laboratory information management system (LIMS) downtime, with incomplete guidance in business continuity plans (2)

- *There was a high level of stress in issuing blood components for the rest of the surgical list, as well as meeting the demand for top-up requests as there was a delay in cancellation of non-urgent procedures*
- *Staff members focused their efforts on providing blood components for this bleeding patient and had good communication with the theatre team*
- *In total, nine units of red cells, one adult therapeutic dose of platelets, one unit of fresh frozen plasma and two units of cryoprecipitate were administered over a 3-hour period*
- *Emergency issue red cells were available in the satellite refrigerator but not used as both the laboratory and the clinical team were hoping the LIMS would be restored shortly, not being aware of the true cause of the downtime*
- *Upon review, the business continuity plan in place at the time did not consider the complete loss of information technology (IT) systems in the laboratory*
- *The patient recovered from this procedure and survived*

Delay in providing group specific blood components during industrial action (1)

- *Red cell units were requested urgently from the emergency department resuscitation room due to a suspected ruptured ectopic pregnancy*
- *There was a delay in processing the request and red cell units were unavailable in theatre when the haemoglobin was 70g/L*
- *Emergency group O red cells were transfused in the patient's best interest*
- *The patient recovered*
- *The transfusion delay was caused by significant staffing issues during industrial action for 12 hours overnight on two consecutive days*
- *A single biomedical scientist (BMS) was present to maintain services of specimen reception, haematology, blood transfusion, and biochemistry (to which they had no competency assessment) 'alone, with no type of support'*
- *Management had intended to provide a medical laboratory assistant for support, but this did not occur*

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Delay in providing group specific blood components during industrial action (2)

- *Staff availability both substantive and locum/agency had been severely affected*
- *Union representatives and participates in the industrial action had not adhered to the advised minimum safe staffing levels indicated in the business continuity plan (BCP)*
- *In addition to maintaining critical laboratory functions, the BMS experienced 'undue pressure' to send biochemistry samples to a partner laboratory every hour*
- *This pressure contributed to the delay in processing the request*
- *The night BMS reported that they were not able to take a break or have any time to eat during this 12-hour night shift*
- *When support was secured, this was not properly allocated to transfusion and instead focused on sending away biochemistry samples as this required less extensive competency assessment*
- *Upon review, BCP were not met, and support was not adequately allocated to haematopathology and transfusion activities*

Complex situation with multiple factors resulting in delays for a patient waiting to receive a heart transplant (1)

- *A patient arrived on a ward for a potential heart transplant at 13:50, and at 13:55 the transfusion laboratory was informed of the patient's transplant plan*
- *A group and screen (G&S) sample was received in the laboratory at 15:30*
- *The sample was tested and showed a positive antibody screen and required further antibody investigation*
- *At 19:21 the clinician looked on the electronic patient record (EPR) system for the blood results, and everything other than the G&S result was available*
- *In this organisation results are released upon completion of all tests; therefore, this was not viewable by the clinical area*
- *When contacted by the clinical team, the BMS explained they had had an issue with the blood grouping analyser, but the sample was being processed*

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Complex situation with multiple factors resulting in delays for a patient waiting to receive a heart transplant (2)

- *Antibody identification was required on the sample, however due to analyser 1 downtime (which was being used for antibody investigation), analyser 2 needed to be set up and quality controlled to perform this test*
- *It was at that point the clinician was informed that the patient had known non-specific red cell antibodies which would require additional tests, including a serological crossmatch*
- *Information regarding previous referral to the reference laboratory was contained in the legacy LIMS but this was not accessed by the BMS at this time*
- *The patient had been receiving a monoclonal antibody therapy at the referring hospital (which can impact blood transfusion results)*
- *This treatment plan has not been communicated to the receiving hospital or the laboratory, nor had baseline red cell phenotype been performed*
- *The BMS informed the clinician they would contact them once the sample was processed*

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Complex situation with multiple factors resulting in delays for a patient waiting to receive a heart transplant (3)

- *The theatre availability had been scheduled for a 01:00-02:00 start time*
- *When nothing was heard, at 20:58 the clinical team again contacted the laboratory, and spoke to a new BMS on duty, who had not received any handover regarding this patient from their colleague*
- *The BMS stated that it would take a further 90 minutes to provide appropriate antigen-negative components*
- *They informed the clinical team that if suitable red cell units were not available on site, the patient's sample would need to be sent to the reference laboratory*
- *At 22:54, the sample had still not been processed and the BMS stated it would be a further 40 minutes*
- *At 00:04, the BMS called the clinical area to inform them that they didn't have any suitable blood*
- *At this point, the heart was declined as blood would not be available for surgery, and it was offered to another transplant centre*
- *It was later identified that the donor heart was declined by the other transplant centre based on cardiac studies*
- *Valves from the heart were retrieved and successfully used for two further patients*

Laboratory information management system (LIMS) allowed electronic issue of red cells in presence of manual blood group serology

- *A unit of red cells was electronically issued to a child, using a sample that had a manual blood group completed due to the small volume*
- *The LIMS had no functionality to differentiate between an automated or manual ABO blood group and inappropriately allowed red cells to be released via electronic issue when manual testing was required*
- *The member of staff performing the test was lone working and demonstrated incomplete knowledge during the event review*
- *Previous and subsequent blood groups were performed automatically and had no serological abnormalities*
- *The patient had no adverse outcome*

Death probably related to delay in platelet transfusion, due to laboratory results being suppressed pending film review (1)

- *A patient with undiagnosed acute promyelocytic leukaemia presented in the emergency department (ED) at 9pm on day 1*
- *A full blood count (FBC) sample showed a Hb of 39g/L, white cell count of $86x10^9$/L and platelet count of $15x10^9$/L*
- *Results were reviewed by biomedical scientist (BMS) 1 who had not been signed off on FBC validation whilst BMS 2 was taking a break*
- *A routine blood film was requested, and an urgent review was not flagged*
- *The platelet count was not visible to clinical staff, as reporting parameters required it to be confirmed by blood film*
- *The FBC result was not phoned through to the clinical area*
- *Red cell transfusion commenced around 03:00 on day 2*

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Death probably related to delay in platelet transfusion, due to laboratory results being suppressed pending film review (2)

- *The high white cell count was referred by the ED to the clinical haematology department using the routine referral system, and was not flagged as urgent, therefore it was not viewed by the haematology team until 11:00 on day 2*
- *After seeing this result the blood film was reviewed urgently, and the diagnosis of an acute leukaemia was made*
- *The critically low platelet count and diagnosis was available to the clinical teams at around 11:20 on day 2*
- *There was over a 12-hour delay in the diagnosis of an acute leukaemia and commencement of urgent chemotherapy*
- *This also caused a delay in coagulation testing, which was requested around 12:30 on day 2 and the fibrinogen result was 1.8g/L*
- *However, when the fibrinogen level dropped to 1.2g/L on day 3 this was not escalated as an urgent referral as it was above the local threshold for telephoning results*

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Death probably related to delay in platelet transfusion, due to laboratory results being suppressed pending film review (3)

- *Cryoprecipitate was not administered for another 7.5 hours after the result was available on day 4*
- *Treatment was initiated urgently with blood component support, but the patient developed a subdural haemorrhage and died*
- *Upon investigation, there was a communication failure between the BMS staff*
- *BMS 2 originally requested that BMS 1 looked at the FBC results and make any blood films that were needed*
- *This was interpreted as being asked to validate the results. Local action was to remind BMS 1 to act within their scope of responsibility*
- *Within the laboratory, inadequate staffing levels and skill mix had already been raised within the organisational risk register and has subsequently been escalated to the divisional director*

Communication failure causes delay and major morbidity

- *A patient with sickle cell disease and a haemoglobin of 45g/L was admitted in crisis*
- *The patient had a progressive anaemia with multiple antibodies therefore frozen red cells were ordered from the Blood Service*
- *The following morning, the patient deteriorated with peri-arrest, hypoxia and acidosis*
- *One red cell unit was transfused at 08:00*
- *The transfusion consultant advised to administer further red cell units although fully compatible units would not be available for some hours*
- *The laboratory was advised by the consultant haematologist to select ABO, Rh, K matched red cells at 09:00*
- *The laboratory was contacted at 11:30 to ask about availability of the blood*
- *The patient was finally transfused after midday and recovered from this episode*
- *The transfusion delay was caused by communication failure, poor venous access for sampling and staff inexperience with issuing the best available red cells due to the presence of multiple red cell antibodies*
- *The staff are now aware that if blood is required urgently the clinical team can request red cells to be issued using concessionary release before testing is complete*

Lack of staff knowledge leads to inappropriate editing of results and incomplete testing when lone working

- *A sample was received from a patient requiring red cell transfusion postoperatively when the biomedical scientist (BMS) was lone working in the laboratory*
- *The analyser flagged the sample as haemolysed, and the results were validated and accepted by the BMS rather than being rejected, as the BMS did not know how to reject a haemolysed sample*
- *There was no result in the patient reverse group (B cells) and the BMS inappropriately amended the result to a 3+*
- *The laboratory information management system excluded the patient from electronic issue (EI) and highlighted the requirement for a serological crossmatch due to the group amendment*
- *The BMS was unaware that a modification would de-select EI and entered a negative reaction (compatible) into the crossmatch result, even though no test had been performed, due to the patient not having any antibodies or alert flags*
- *Although the BMS was deemed competent, they were bank staff who did not routinely work core hours and were previously employed as a transfusion BMS within the organisation*
- *This incident happened over a weekend where there was no second checker available*
- *The reporter identified that samples prior and after this incident were suitable for EI suggesting there was a primary issue with the sample being tested at the time*

Laboratory safety culture and leadership issues influence a component selection error

- *A patient with thalassaemia received red cells which did not match their Rh and K phenotype*
- *The requirement for phenotype-matched components was recorded in the laboratory information management system (LIMS) (despite an initial mistaken diagnosis of sickle cell disease being communicated)*
- *An additional step to highlight this requirement in the patient notes field on the LIMS was not completed which resulted in the biomedical scientist (BMS) not selecting phenotype-matched red cells*
- *During investigation the BMS stated they were multi-tasking and rushing, and the event happened at a weekend when there were less staff available than normal*
- *The report stated that staff do not have the correct amount of protected time to develop their knowledge and are less prepared to deal with complex cases*
- *Additionally, the BMS stated they felt they were 'being watched' and there was a blame culture within the laboratory*
- *Leadership and staffing issues within the laboratory had been identified during a recent inspection*
- *Corrective actions included updating standard operating procedures for issuing phenotype-specific blood and potential changes to LIMS but did not mention culture issues identified*

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 biomedical scientist (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*

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*

Lack of laboratory information management system (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 biomedical scientist (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*

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*

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 flagged that the requirement was not met but this was overridden by the biomedical scientist 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*

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 laboratory information management system (LIMS) flag was overridden at the point of issue*
- *The biomedical scientist, 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*

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 biomedical scientist (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*

K sensitisation in a patient of childbearing potential

- *One unit of red cells was requested for a patient of childbearing potential due to low haemoglobin 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 biomedical scientist issuing the unit was lone working, outside of routine hours*

Missed anti-D Ig administration following delivery due to multiple errors with inconclusive cell-free fetal deoxyribonucleic acid (cffDNA) result

- *A D-negative woman in her 30s had an emergency caesarean section*
- *The cffDNA result was inconclusive, so cord and maternal samples were sent for testing*
- *The cord sample was found to be positive but no anti-D Ig was issued*
- *The biomedical scientist (BMS) assumed this had been done immediately following delivery as with pregnancies that are predicted D-positive*
- *The ward was not contacted to inform them that anti-D Ig was needed and a Kleihauer test was also not performed*
- *The clinical staff did not check whether anti-D Ig was required, the woman was discharged without having anti-D Ig administration and had to return for this >72 hours after giving birth*
- *The reporter noted that staffing levels directly impacted the correct procedures being followed*
- *The laboratory had implemented contingency plans for staffing and non-registered staff were the only staff present for 4 and a half hours earlier in the day, causing a large backlog of work*
- *This sample was also processed whilst two other major haemorrhages required support by a single member of BMS staff*

Major morbidity due to a component selection error for a female of childbearing potential

- *A female in her 30s was found to have an anti-K as part of antenatal screening*
- *She had required two units of red cells post-delivery in a previous pregnancy due to active bleeding*
- *One of these units issued by the biomedical scientist (BMS) was K-positive*
- *The laboratory information management system had an alert for all females less than 50 years to state 'Females of childbearing potential should receive K-negative red blood cells unless they are unavailable in an emergency', but this did not prevent the issue of K-positive red cells to this patient despite the availability of K-negative units*
- *The investigation stated there was a lack of knowledge in recently qualified BMS staff about K-negative requirements, and that continued recruitment and retention issues had placed a training burden on the remaining staff*
- *Additionally, there were leadership issues due to changes to restructuring*

Good practice by laboratory staff triggers lifesaving treatment of baby

- *A biomedical scientist (BMS) identified a mixed field result within a group and screen sample for a pregnant patient*
- *This prompted the BMS to contact the clinical area to request an additional sample and highlight the risk of large fetomaternal haemorrhage*
- *The patient was brought back into hospital for cardiotocography, the results of which were suspicious and resulted in early delivery of the baby*
- *The baby was very anaemic and required red cell transfusion*
- *If this had not been noted by the BMS and escalated, the mother may not have been reassessed and the baby not successfully delivered*
- *A 'Greatix' report was raised within the organisation to acknowledge the prompt action of the BMS who has also received acknowledgment throughout the pathology network*

Transfusion of K-positive red cells resulted in antibody formation

- *A female patient in her 20s was transfused two red cell units post miscarriage, one of which was K-positive*
- *The laboratory information management system (LIMS) alerted the biomedical scientist (BMS) to the requirement for K-negative units, but alerts were not heeded and were overridden, with the LIMS allowing users to skip past alerts*
- *This incident occurred towards the end of a night shift*
- *This patient became pregnant again, with anti-K titre of 128, where the partner was Kk*
- *Cell-free fetal deoxyribonucleic acid (cffDNA) results indicated the fetus was K-negative*

Lack of provision of emergency stock red cell units

- *An elderly patient in his 80s was admitted with haemoglobin (Hb) 110g/L, which had fallen to 92g/L the following day*
- *The patient became hypotensive with rapid deterioration, and an arterial blood gas result indicated the Hb had fallen further to 70g/L*
- *One unit of emergency O D-negative red cells was requested urgently, but the biomedical scientist (BMS) refused the request as they felt this was not appropriate given that there were no obvious signs of blood loss*
- *The BMS suggested to contact the consultant haematologist, which did not happen*
- *By the time the BMS had a confirmed Hb result of 50g/L and contacted the ward to state group specific red cells could be released, the patient had already died*
- *Post-mortem results identified the patient died due to a bleeding duodenal ulcer*

Incorrect inputting of surname for patient who later required major haemorrhage protocol (MHP) activation

- *A group and screen sample was received in the transfusion laboratory for female in her 50s*
- *The name was inputted incorrectly into the laboratory information management system (LIMS), but the error was not detected during processing checking points*
- *The MHP was activated for the patient and red cells, platelets and fresh frozen plasma (FFP) were all issued with incorrect details on the labelling*
- *The error was not detected at administration checking, and units were transfused*

Error inputting group into the laboratory information management system (LIMS)

- *A group and screen sample was received for a female in her 70s*
- *The patient could not be positively identified (unconscious and unable to communicate) and so was given an unknown patient identification (ID)*
- *The sample was processed, and the patient had a forward group A, but no reverse group to confirm, therefore the LIMS required a manual overall ABO D interpretation*
- *The biomedical scientist (BMS) entered the group as A D-positive, when in fact the patient was A D-negative*
- *There was no information available as to whether a manual confirmation of group was carried out*
- *The patient was transfused D-positive red cells*
- *The patient was subsequently discovered to require irradiated cellular components, but this was not identified prior to administration*

Neonatal crossmatch without antibody screen

- *Neonatal red cells were requested for a new born infant*
- *The biomedical scientist (BMS) checked the laboratory information management system (LIMS) and confirmed that the mother had a negative antibody screen and units were issued and transfused*
- *It was subsequently detected that the maternal antibody screen was 5 days old, and therefore did not meet British Society for Haematology (BSH) 2016 guidelines (BSH New et al. 2016) requiring a sample to be ±72 hours from delivery*

Postnatal patient incorrectly given anti-D immunoglobulin (Ig) after biomedical scientist (BMS) used cell-free fetal deoxyribonucleic acid (cffDNA) result from previous pregnancy to determine newborn's blood group

- *A D-negative postnatal patient was transfused anti-D Ig following delivery of a D-negative infant after the BMS used the cffDNA result from a previous pregnancy to confirm the infant's D group, rather than the current cord group result*
- *The estimated date of delivery (EDD) date of this pregnancy was exactly 1 year from the EDD of the most recent previous pregnancy*

Miscalculation of fetomaternal haemorrhage (FMH) post delivery resulted in excessive anti-D immunoglobulin (Ig) administration

- *A biomedical scientist (BMS) tested a postnatal maternal sample for FMH, but during the calculation entered an incorrect FMH value and the bleed estimate was tenfold larger than the actual value*
- *The actual bleed was 6.4mL, but the estimated bleed was 64mL*
- *The BMS issued 9000IU anti-D Ig to cover this bleed*

Incorrect D group issued to patient – multiple influencing factors

- *A confirmed B D-negative patient was issued two B D-positive red cells via electronic issue*
- *The biomedical scientist (BMS) selected the incorrect D group red cells and proceeded to assign them to the patient record on the laboratory information management system (LIMS)*
- *The LIMS alerted the user to the D-incompatibility, but this was overridden*
- *The BMS signed a laboratory issue checklist to say the units had been checked as compatible*
- *Theatre staff waiting in the transfusion department were pressurising the BMS to prepare the units urgently*
- *The units were collected and transfused in theatre without checking the D-status of the units and the patient*

Red cell units out of temperature-controlled environment not quarantined correctly and mistakenly returned to stock and issued

- *Two red cell units were placed into a temperature monitored cool box for a major haemorrhage protocol (MHP) and were returned unused to the laboratory after 5 hours 21 minutes*
- *These units should have been discarded but were instead quarantined in the laboratory refrigerator, without clear handover to next staff member*
- *These units were returned into routine stock, issued, and transfused to other patients with no patient harm occurring*

Transfusion delays due to lack of handover by laboratory staff

- *An elderly male had a delay of over 24 hours for his transfusion due to lack of handover within the transfusion laboratory regarding this patient's red cell units requiring transport to the satellite refrigerator*
- *The biomedical scientist (BMS) forgot to add the need to organise transport for these units on the laboratory handover log*

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*

Red cell antibody identification error due to heterozygous cell selection (1)

- *A male patient in his 50s was admitted with haematemesis and a haemoglobin 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*

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Red cell antibody identification error due to heterozygous cell selection (2)

- *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 Specialist Services electronic reporting using Sunquest's Integrated Clinical Environment (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*

Anti-D immunoglobulin (Ig) omitted due to misleading information in product instructions for use (IFU) document (1)

- *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 international blood group laboratory 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*

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Anti-D immunoglobulin (Ig) omitted due to misleading information in product instructions for use (IFU) document (2)

- *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 standard operating procedure 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*

Sickle Cell Disease (SCD) patient with a haemoglobin (Hb) of 51g/l transfused incorrect red cells (1)

- *A six year old female patient who was unknown to the hospital was admitted with SCD and a Hb of 51g/l. A sample was sent for a group and antibody screen*
- *The blood group was processed and a dual population of red cells was seen in the D type. The biomedical scientist (BMS) rang the ward to ask for the patient's transfusion history but they did not have any details*
- *The BMS then translated the blood group to O positive as the population of D positive cells looked greater than the D negative cells. This was also done in the assumption that the patient had been given group O D negative blood at another hospital*
- *The BMS then issued two group O D positive red cell units and both were transfused. The laboratory procedure is to give O D negative red cells when the patient's D type cannot be established, if the patient is a woman of childbearing potential or a child <16 years old. This was not done in this case*

Continued…

Sickle Cell Disease (SCD) patient with a haemoglobin (Hb) of 51g/l transfused incorrect red cells (2)

- *For SCD patients, it is also required to transfuse red cells that are negative for HbS and to perform and Rh phenotype and issue phenotype compatible units, but this was also not done*
- *The Specialist Services electronic reporting using Sunquest's Integrated Clinical Environment (Sp-ICE) system was checked the next day and it was found that the patient was a D variant requiring D negative, E negative and HbS negative red cells for transfusion*
- *On investigation it was found that not only were both units D positive, but one unit was E positive and only one was HbS negative*

Red cells and cryoprecipitate issued with incorrect date of birth (DOB)- Cryoprecipitate transfused (1)

- *A female patient in her late teens was admitted to hospital B as an emergency transfer from hospital A. The laboratory had been given advance notice of the patient as a haematological referral (acute promyelocytic leukaemia with disseminated intravascular coagulation and multisite bleeding)*
- *The laboratory information management system (LIMS) at hospital B has a shared database with hospital A and the patient identification details had been registered on this prior to transfer*
- *Patient had received two units of emergency O D negative red cells prior to transfer. The laboratory at the receiving hospital B received group and screen samples and a request for four units of red cells at 20:22*
- *The samples were booked in against the patient details accessed by the LIMS from hospital A, however there was a discrepancy in DOB which was not detected at this stage*
- *A further request was received for two units of cryoprecipitate and these issued and collected and transfused at 22:30hrs. The four red cell units moved to the Critical Care Fridge at 23:00*

Continued…

Red cells and cryoprecipitate issued with incorrect date of birth (DOB)- Cryoprecipitate transfused (2)

- *When a nurse checked the patient details on the first unit removed for transfusion, a DOB discrepancy was noticed, and the laboratory was informed. When the BMS checked the patient information on the request form and samples against the laboratory information management system (LIMS), the error in DOB on the LIMS was noticed*
- *The red cell units were recalled, error corrected on the LIMS and red cells re-labelled, but the two units of cryoprecipitate had already been transfused*
- *On investigation the DOB error occurred in hospital A and the laboratory was aware but was unable to amend as the record had become locked, but did not alert hospital B of this*
- *The laboratory in hospital B has a sample to LIMS second check process in place prior to analysis and the paperwork was signed to say this had been completed but the error had not been picked up*
- *The nurse who transfused the cryoprecipitate failed to notice the error in the pre administration checks*

Patient blood group O D-positive transfused a unit of group A D-positive red cells in error

- *Following activation of the major haemorrhage protocol (MHP) for a ruptured abdominal aortic aneurysm (AAA) patient when their blood group was unknown, a biomedical scientist (BMS) selected four units of group A red cells instead of O for pack one*
- *This was collected and taken to theatres where one unit was transfused*
- *The patient's sample then arrived and was processed and grouped as O D-positive and the error was then realised. All remaining units were immediately recalled*
- *Initial assessment of the patient showed no adverse reaction, but laboratory investigations showed evidence of haemolysis postoperatively, renal function declined minimally and then improved*
- *There was evidence of intravascular coagulopathy with low platelets*
- *All indicators improved with conservative treatment and there were no clinical sequelae directly related to the ABO-incompatible transfusion*
- *The patient recovered and was discharged home a week later*

Delay in transfusion of solvent-detergent fresh frozen plasma (SD-FFP) in a bleeding acute myeloid leukaemia (AML) patient

- *A phone call was received from a ward requesting three units of SD-FFP for an actively bleeding AML patient*
- *The biomedical scientist (BMS) on a night shift was unable to issue the units because they had not been shown how to issue this product*
- *The BMS attempted to issue the product on the laboratory information management system (LIMS), but failed as they were entering the incorrect code for the product and group – creating an alert for ABO-incompatible transfusion*
- *They called the ward to inform them that they were unable to issue the SD-FFP*
- *The plasma was not issued until the day staff arrived which was then 3.5 hours since the requesting phone call was received*

Non-irradiated cells issued for a patient with a history of Hodgkin lymphoma due to convoluted laboratory information management system (LIMS) procedure (1)

- *A patient in his 80s, with a history of Hodgkin lymphoma, in the intensive care unit (ICU) required a red cell transfusion*
- *The request sent to the laboratory clearly indicated the requirement for irradiated blood and this information was inputted on the patient's record on LIMS, however a secondary step of adding this requirement to the product issue page was not completed*
- *Non-irradiated blood was issued remotely through Hemobank 80®*
- *The requirement for irradiated blood was overlooked at collection, however it was identified by the healthcare support worker and nurse at the patient's bedside*
- *The laboratory was contacted and a new unit of blood issued via Hemobank 80®*

Continued…

Non-irradiated cells issued for a patient with a history of Hodgkin lymphoma due to convoluted LIMS procedure (2)

- *Only one of the two members of laboratory staff involved in the issue of the blood had completed their competency assessment, and the other was a new starter (a large volume of staff turnover was also listed as a contributory factor)*
- *The investigation also noted that the application of flags in LIMS is not uniform and has caused confusion*
- *Some flags are for information only, whilst others require direct action; for some flags a single step is required to apply this to the patient record and others require the two steps*
- *Furthermore, the information regarding specific requirements on the clinical patient record does not link to the LIMS*
- *The laboratory management team are investigating the possibility of altering the irradiated flag on LIMS to prevent remote issue of blood but cannot currently change the system of recording specific requirements*

Untrained staff supporting lone worker causes sample labelling error to go unidentified

- *A unit of red cells was transfused overnight to a patient in his 60s*
- *The following morning it was discovered that the sample used for crossmatching had an incorrect date of birth written on it*
- *This had not been picked up by the biomedical scientist (BMS) during processing*
- *A second check was not performed before analysis of the sample due to staffing issues, which should have picked up the discrepant date of birth*
- *The laboratory information management system (LIMS) had the correct date of birth, which meant that the blood unit compatibility paperwork was correct and the error would not be picked up at collection or administration*
- *An additional unit of red cells which had been issued was recalled, and replacement units were issued on a correctly labelled sample once received and processed*
- *The incident occurred following increased pressure on a lone working BMS, who was not adequately supported by the medical laboratory assistant (MLA) on duty*
- *The MLA later stated that they were not confident to work in the transfusion laboratory and required further training*

Patient post autologous haemopoietic stem cell transplant (HSCT) transfused with non-irradiated blood

- *The laboratory information management system (LIMS) contained two records for a patient in her 50s who had undergone a HSCT, however only one record had an alert flag for irradiated blood components recorded against it*
- *A sample for group and screen was received and booked in against the patient record with no alert flag*
- *A verbal request was later received for red cells, and non-irradiated red cells were selected and transfused*
- *The duplication of records was not identified by the laboratory*
- *Irradiated blood requirements were not identified from clinical details provided with previous samples*
- *There was no indication that irradiated blood was required on the group and screen request form or the transfusion prescription chart*
- *Staff performing the bedside checks not aware that the patient required irradiated components*

Specific requirements not met due to incorrect antibody identification

- *The red cell immunohaematology (RCI) laboratory contacted the hospital transfusion laboratory regarding a sample that had been sent to them in October for confirmation of anti-Fy^a identification*
- *RCI said that they could not find anti-Fy^a, but they had identified anti-M, anti-K and anti-Kp^a and that the patient themselves was Fy^a positive*
- *On investigation the previous testing in the hospital laboratory in April had identified anti-Fy^a because the antibody identification worksheet used had an expiry date of 28th March, so this red cell panel was no longer in use*
- *The antibodies which should have been detected using the correct worksheet was anti-M and anti-Kp^a*
- *The transfusion dependant chronic kidney disease patient in her 80s had been transfused with a unit of red cells that was negative for Fy^a and K but unknown to M in October*
- *It is assumed that the unit was M negative as the crossmatch was compatible. There were no reported adverse events for the patient during or after the transfusion*

Neonate transfused a unit of red cells that was not antigen-negative for a maternal alloantibody (1)

- *A neonate was transfused a unit of red cells that was not compatible with the maternal specific requirements*
- *The mother of the neonate was known to have Anti-M of IgG sub-class*
- *One unit of red cells was requested for transfusion and an O D-negative paediatric pack unit was selected from stock*
- *This was then crossmatched by indirect antiglobulin test (IAT) against both the maternal plasma and also the neonate's plasma*
- *The neonate's plasma by IAT was compatible and the unit was issued and transfused*
- *It was later noticed by a second biomedical scientist (BMS) during the second check performed on all manual compatibility tests, that the IAT maternal plasma crossmatch was incompatible*

Continued…

Neonate transfused a unit of red cells that was not antigen-negative for a maternal alloantibody (2)

- *The transfused unit was confirmed as being M positive*
- *On investigation the maternal IAT crossmatch had not been documented on the manual crossmatch worksheet*
- *The 'family link' had not been made on the laboratory information management system between mother and baby, therefore, maternal flags were not seen and the alert flag to indicate maternal antibodies was not added onto the babies record*
- *It was also found that the standard operating procedure (SOP) required clarification, as there was some confusion over the crossmatch method and what sample should be used for the IAT crossmatch*
- *This led to the unnecessary set-up of both the baby and maternal IAT crossmatches*

Transcription error results in specific requirement not being met (1)

- *A patient in her 70s with a history of anti-Jk^{b} required a one-unit red cell transfusion*
- *The biomedical scientist (BMS) checked the patient records and noted the history of the patient and specific requirements but wrote anti-Jk^{a} on the request form instead of anti-Jk^{b}*
- *The BMS then selected a Jk^{a}-negative unit and crossmatched it alongside a manual group and antibody screen on the patient*
- *The antibody screen was negative and the crossmatch was compatible*
- *The unit was then issued to the patient on the laboratory information management system (LIMS) and subsequently transfused*

Continued…

Transcription error results in specific requirement not being met (2)

- *When issuing the unit to the patient on the LIMS, a warning flag was displayed notifying the BMS that the special requirements were not met*
- *The BMS did not take heed of the warning, accepted it and carried on*
- *The error was identified when a further request for one unit was sent 2 days later*
- *The antibody screen was negative and direct antiglobulin test negative*
- *The patient was monitored and no symptoms of delayed transfusion reaction were observed*

Incorrect blood group manually entered on to the laboratory information management system (LIMS)

- *A patient in her 80s requiring a two-unit transfusion was grouped manually due to persistent analyser maintenance failures*
- *The blood group result was as O D-negative; however, it was transcribed onto the LIMS as O D-positive*
- *Two O D-positive units were issued*
- *The sample should then have been put on to the analyser for processing, but there was a delay to the maintenance of the analyser and the sample was not processed until later that day*
- *The analyser grouped the sample as O D-negative and flagged the discrepancy, but the error was not picked up in time and both units were transfused*

Patient transfused platelets unnecessarily

- *A patient in her 80s was bleeding and was prescribed two units of platelets following a reported low platelet count*
- *During transfusion of the second unit the patient experienced a suspected transfusion reaction. They developed a fever of 39.2^{0}C, rigors, increased respiratory rate of 24, normal O_2 saturations of 98% on air, with no change to blood pressure but heart rate did increase to 100 beats per minute*
- *The patient had a history of platelet aggregates*
- *The platelet count of 29x10^{9}/L was reported while a blood film was being made and looked at*
- *The film confirmed the presence of platelet aggregates and this was written on the report, however the count was not removed from the laboratory information management system (LIMS)*
- *The incorrect platelet count was seen and acted upon by medical staff who prescribed two units of platelets for the patient. The patient went on to have a transfusion reaction during transfusion of the second unit of platelets*
- *It was during the investigation of the transfusion reaction that this error was identified*

Delayed transfusion for a patient on monoclonal antibody therapy (1)

- *A transfusion dependant myeloma patient in his 60s on monoclonal antibody therapy, had a crossmatch sample taken and sent to the laboratory on a Friday morning for booked transfusion on the following Monday in the day case ward*
- *This patient's sample needed to be sent to the red cell immunohaematology (RCI) laboratory for testing due to pan-reactivity caused by the anti-CD38 drug they were on*
- *The hospital laboratory did not send the sample until 11:00 on the Sunday and also did not let RCI know that it was being sent to them*
- *The hospital laboratory contacted RCI at 08:45 on the Monday chasing up the crossmatched blood as the patient was attending that day for transfusion*

Continued…

Delayed transfusion for a patient on monoclonal antibody therapy (2)

- *RCI informed the laboratory that they were not aware of the sample until that morning and the results would not be available until that afternoon*
- *The crossmatched blood was received from RCI and issued by the hospital laboratory on Tuesday afternoon at 15:17*
- *This resulted in a 2-day delay in the blood transfusion to this patient*
- *There were no adverse effects reported*
- *On investigation the SOP needed more clarification on sending samples to RCI for investigation, especially at weekends and that RCI require at least 24 hours to work on samples from patients on monoclonal antibody therapies*

Specific requirement not met for a patient of childbearing potential

- *A patient in her 30s, with per vaginal bleeding following miscarriage, was transfused three units of red cells in April 2018*
- *Antenatal booking bloods were received and analysed in February 2019*
- *The patient now had a positive antibody screen and the antibody was identified as being anti-K*
- *On investigation one of the three units transfused in 2018 was K-positive*
- *The biomedical scientist (BMS) who issued the units failed to select a K-negative unit, as per requirements for a patient was of child bearing potential*
- *The laboratory information management system (LIMS) had a flag alerting of the need for K-negative units for this group of patients but this was not adhered to*

Group O fresh frozen plasma (FFP) selected for a group A patient (1)

- *A patient in her 70s attended the emergency department with a catastrophic intra-abdominal bleed after suffering a fall onto her left side while in the nursing home*
- *The group and screen sample was being analysed when the massive haemorrhage protocol was activated*
- *The blood group results showed a forward group of A but the reverse group had no reactions with A or B cells*
- *The blood group was later confirmed as group A D-positive*
- *While the biomedical scientist (BMS) was waiting to confirm the blood group, O D-negative red cells and four group O FFP were issued*

Continued…

Group O FFP selected for a group A patient (2)

- *The patient was taken to theatre and during the procedure was transfused all four units of FFP*
- *This ABO-incompatible transfusion was only detected when an incident relating to a delay in blood component provision was being investigated*
- *It was then noted that group O FFP had been transfused. The patient was on the intensive care unit (ICU) postoperative for 7 days and was monitored more closely for any signs of a transfusion reaction*
- *On investigation it was found that the BMS had issued group O red cells to the patient then proceeded to incorrectly select group O FFP instead of group AB or A as emergency issue*
- *The BMS failed to take head of the alerts to ABO-mismatch on the LIMS before accepting and issuing the incompatible units*

Test tube labelled with incorrect barcode

- *Retrospective crossmatching of two units of red cells, which were issued and transfused in an emergency situation, showed an error in the labelling of the test tubes containing cells from the units*
- *Both test tubes had been labelled with the barcoded donation number for unit A*
- *It was later discovered that the blood units had both been labelled with the barcoded donation number for unit B on the traceability tags.*
- *The error on test tubes was discovered when they were put on the analyser for crossmatching against the patient's sample*
- *The analyser would not perform the crossmatch because the tubes were labelled exactly the same*
- *The standard operating procedure (SOP) had not been adhered to; printing the barcodes for the donor units twice, labelling the test tubes with one barcode and the second left to place on the traceability tags before labelling the units*
- *This resulted in the both test tubes being labelled as donor unit A and the blood units both being labelled as donor unit B*

Unit of red cells transfused to a patient after the sample used for testing had expired

- *A member of clinical staff rang the laboratory enquiring about blood for a patient, as a unit had been collected earlier that morning but on return to the refrigerator the other units had been removed*
- *The units had been returned to the laboratory at 10:20 that morning, but should have been returned at 09:00 when the reservation expiry was reached*
- *The laboratory staff were too busy to get down to the theatre refrigerator at 09:00*
- *This meant that at 10:00 a unit was collected by clinical staff and transfused*
- *The blood track collection competency did not cover the checking of the reservation expiry on the blood bag and label but it is clearly stated in the policy*

Transfusion of a blood component that was out of temperature control (1)

- *A request was made to the laboratory at 02:00 four units of fresh frozen plasma (FFP) and two units of cryoprecipitate (cryo) for a patient in his 30s with disseminated intravascular coagulation (DIC)*
- *The request had been discussed with consultant haematologist who advised to correct the coagulopathy*
- *All units of FFP and cryo were thawed and then issued to the patient at around 03:00*
- *The units were sent to the ward at 05:45*
- *The first unit was connected at 06:00 and an attempt was made to run the component through the giving set; however, the component was not fluid enough to get through the filter and continue through the giving set to port end*

Continued…

Transfusion of a blood component that was out of temperature control (2)

- *The laboratory was contacted immediately by nursing staff; they were advised to discard the component that had been spiked by the giving set and to warm the second component to room temperature prior to transfusion*
- *As a blood warmer was not available this was achieved by placing in the pocket of one of the nursing staff, delaying transfusion of cryo by 20 minutes*
- *On investigation it was discovered that once thawed, the FFP and cryo were all placed in the refrigerator until needed*
- *This storage error was realised by the biomedical scientist (BMS) when the above call was received from the ward, which is why nursing staff were instructed to warm up the second unit of cryo before transfusing*
- *The following day the patient had further blood components and the coagulopathy was corrected but unfortunately they did not survive*

Incorrect sample used for crossmatching detected prior to transfusion – systemic factors addressed

- *Four units of blood were requested for a patient, these were manually crossmatched and issued to the patient during the night shift, and subsequently collected by clinical staff*
- *At 09:30 the next day more units were requested, however on looking for the sample to test and allocate the additional units, the sample in the position for this laboratory number belonged to another patient*
- *The laboratory number label had been placed on another patient's sample and this sample used to crossmatch the four units of red cells*
- *However, the label on the request form was for the correct patient*
- *The ward was contacted to inform them of the error and the units retrieved*
- *This error could have been identified at five points in the laboratory processes and was missed by two members of staff*
- *Staff members recorded excessive tiredness and stress due to increased workload on the shift*
- *The department has introduced several corrective measures to ensure resilience in the shift system, such as a training rota to ensure cross cover between departments, shortening of night shifts and additional staff being allocated*