Cases from the 2025 Annual SHOT Report

You are free to use these examples in your teaching material or other presentations, but please do not alter the details as the copyright to this material belongs to SHOT.

They have been loosely categorised, but some cases may be appropriate to illustrate more than one type of error

SHOT Serious Hazards of Transfusion

Acknowledging Continuing Excellence in Transfusion (ACE)	Slide 3
Donor Haemovigilance	Slide 8
Human Factors and Ergonomics in SHOT Error Incidents	Slide 13
Adverse Events Related to Anti-D Immunoglobulin (Ig)	Slide 15
Incorrect Blood Component Transfused (IBCT)	Slide 20
Handling and Storage Errors (HSE)	Slide 32
Delayed Transfusions	Slide 35
Avoidable Transfusion	Slide 39
Under or Overtransfusion	Slide 45
Incidents Related to Prothrombin Complex Concentrate (PCC)	Slide 48
Near Miss (NM) Reporting	Slide 53
Near Miss – Wrong Blood in Tube (WBIT)	Slide 55
Right Blood Right Patient (RBRP)	Slide 59
Laboratory Errors	Slide 62
Errors Related to Information Technology (IT)	Slide 75
Febrile, Allergic and Hypotensive Reactions (FAHR)	Slide 79
Transfusion-Associated Circulatory Overload (TACO)	Slide 83
Pulmonary Complications of Transfusion (Non-TACO)	Slide 85
Uncommon Complications of Transfusion (UCT)	Slide 89
Transfusion-Transmitted Infections (TTI)	Slide 93
Cell Salvage (CS)	Slide 97
Paediatric Cases	Slide 101
Haemoglobin Disorders	Slide 112
Transfusion Errors in Transplant Cases	Slide 120
Immune Anti-D in Pregnancy	Slide 123

Acknowledging Continuing Excellence in Transfusion (ACE)

Enhancing patient safety through collaborative standardisation of transfusion requirements

- A hospital identified a significant gap in its transfusion pathway: there was no dedicated place or standard process for documenting and communicating specific blood requirements between clinical areas and the laboratory.
- Information was often buried in digital notes, requiring staff to scroll through multiple entries to confirm whether a treatment or diagnosis had created a new specific requirement.
- This inconsistency created delays and risked vital information being missed.
- In response, the hospital introduced a new specific requirements indicator within the electronic patient record (EPR).
- This provides a single, clearly visible location for documenting all specific transfusion needs.
- When the parent clinical team records a new specific requirement, the indicator automatically triggers an email alert to the transfusion practitioner and relevant laboratory managers across the organisation.
- This ensures the patient's laboratory information management system (LIMS) record is updated promptly and consistently.

Individual clinical insight leading to improved local transfusion-associated circulatory overload (TACO) risk assessment practice

- A staff nurse noticed that a patient with known risk factors for TACO had been prescribed 1037mL of fresh frozen plasma to be infused over 30 minutes.
- Recognising that this was unsafe, the nurse raised their concerns.
- This prompted the prescriber to seek advice from the haematology specialist registrar, which led to the transfusion being administered more slowly with prophylactic diuretics.
- Although the prescriber had completed a pre-transfusion TACO risk assessment, they had not identified the same risks that the nurse did.
- Following this incident, the blood transfusion team updated the electronic pre-transfusion checklist.
- The previous question, ‘Actions taken to mitigate TACO,’ was replaced with ‘Is the patient at risk of TACO?’ along with clearer response options.
- When clicked, this question now also displays the SHOT TACO infographic.

Improving intravenous administration set storage and packaging to reduce transfusion risk

- An initial incident occurred where blood was given through the incorrect giving set.
- Following the investigation, two contributing factors were identified.
- First, administration sets in the ward's clinic drawers had been mixed, resulting in the wrong set being selected.
- This was recognised immediately and corrected on the ward.
- Second, the packaging of the blood administration sets had recently changed.
- The word 'transfusion' had become much smaller, making it difficult to distinguish the blood sets from the standard IV fluid giving sets.
- The transfusion team were not aware of this change, and the ward had inadvertently mixed the sets while unboxing and storing them, likely caused by the unclear packaging labels.
- The manufacturer was contacted, and the safety concerns were escalated.
- In response, the packaging was redesigned to clearly identify the set as intended for transfusion, including prominent red labelling to indicate use for blood components.
- The ward also implemented improved storage practices to prevent giving set mix-ups during re-stocking.

Strengthening practice after a missed specific requirement

- Following an incident where specific requirements were not met, resulting in an abandoned stem cell harvest, the advanced nurse practitioner (ANP) who identified the issue took steps to improve both their own practice and the wider local system.
- As a registered non-medical authoriser seeing many transplant patients in follow-up clinics, the ANP now records specific requirements using the dedicated indicator within the electronic patient record (EPR).
- This means staff can immediately view any historic specific requirements.
- This entry also triggers a business intelligence alert to the transfusion laboratory.
- Previously, the laboratory had been unaware of the patient's irradiated component requirement and stem cell transplant history because their organisation was not involved in the original transplant.
- The requirement is now recorded on the laboratory information management system (LIMS) to support future transfusion safety.
- Use of the specific requirements indicator also allows the transfusion practitioner to vet and validate the information, notify the appropriate transfusion laboratory if the patient lives outside the hospital area and check whether any non-irradiated components have been issued.
- This enables retrospective review, follow-up investigation, and complete incident reporting.

Donor Haemovigilance

Myocardial infarction with non-obstructive coronary arteries (MINOCA)

- A regular whole blood donor in his 60s donated blood at an afternoon clinic without immediate complications and was discharged feeling well.
- The following morning, while playing golf, he developed dizziness and malaise that did not resolve with food intake.
- He subsequently experienced left-sided chest discomfort, shortness of breath, sweating, and a brief episode of impaired consciousness while awaiting ambulance transfer.
- On hospital admission, electrocardiography demonstrated changes consistent with a non–ST elevation myocardial infarction (NSTEMI), and troponin T levels were markedly elevated.
- Coronary angiography revealed unobstructed coronary arteries, consistent with MINOCA.
- Laboratory investigations, including lipid profile, blood glucose, and haemoglobin, were within normal ranges.
- The patient was managed medically and discharged on oral medications.
- He was permanently deferred from further blood donation.

Upper-extremity deep venous thrombosis (DVT) following blood donation

- A regular whole blood donor in his mid-50s presented with progressive swelling of his left arm one week after blood donation.
- There were no immediate post-donation complications, bruising, or pain at the venepuncture site.
- Initial assessment by his general practitioner led to treatment with oral antibiotics for suspected infection; however, symptoms worsened, with swelling extending to the shoulder, prompting hospital referral.
- Investigations demonstrated elevated D-dimer levels, while thrombophilia screening was negative.
- Doppler ultrasonography confirmed an upper-extremity DVT involving a proximal vein of the phlebotomy arm.
- The donor was commenced on anticoagulation therapy, with follow-up imaging arranged.
- Subsequent follow-up confirmed complete clinical recovery.
- The donor was permanently deferred from further blood donation, as the DVT was considered related to venous cannulation and involved a proximal deep vein.

Traumatic neuroma following finger-prick test for pre-donation haemoglobin

- A regular whole blood donor in her 30s with no significant medical history reported long-standing pain in her left middle finger, which she believed started after a pre-donation haemoglobin finger-prick test.
- She described years of intermittent but severe fingertip pain with no visible swelling or redness, despite multiple general practitioner (GP) visits for the same issue.
- The symptoms affected her work as a nurse and worsened after the birth of her child, contributing to low mood.
- The pain ranged from a constant dull ache to sudden, intense episodes triggered by light touch, sometimes leaving her feeling faint.
- Her distress eventually led to referrals for further assessment.
- An ultrasound was normal, but magnetic resonance imaging (MRI) indicated a possible neuroma.
- A hand specialist advised surgery and agreed that the finger-prick procedure was the likely cause, noting this as a rare complication.
- Surgery later confirmed a glomus tumour, which was removed.
- At follow-up, the donor remained pain-free.

Anaphylaxis in a whole blood donor

- A whole blood donor experienced anaphylaxis 10–20 minutes after completing their second donation.
- The donation itself was uneventful, but shortly afterwards the donor reported light-headedness and blurred vision, followed by itching, redness, blotching and throat tightness.
- During post-donation care, they disclosed a history of severe anaphylaxis to multiple allergens that had not been declared during screening.
- Session staff immediately called an ambulance while the donor self-administered two EpiPens.
- They were transferred to hospital, admitted for several days, and later discharged; latex allergy testing was negative, and no session-related allergen was identified.
- Chlorhexidine product details were recorded as a precaution.
- Staff were able to respond effectively due to recent basic life support and anaphylaxis-response training.
- The donor was permanently deferred from future donations.

Human Factors and Ergonomics (HFE) in SHOT Error Incidents

An avoidable transfusion in the context of system pressure and staff fatigue

- A patient presented to the emergency department (ED) with abdominal pain, vomiting and diarrhoea, and suspected rectal bleeding at home, raising concern for a possible gastrointestinal bleed.
- Initial point-of-care testing (POCT) in ED, including arterial blood gas, showed a haemoglobin (Hb) of 64g/L and platelet count of 86×10^9/L.
- Coagulation testing also indicated deranged clotting parameters.
- On the basis of these results, which were consistent with blood loss and coagulopathy, the patient was transfused with two units of red cells and two units of fresh frozen plasma.
- Following transfusion, the patient was transferred to a ward, where repeat laboratory testing demonstrated a Hb of 155g/L and platelet count of 187×10^9/L, and improved coagulation results.
- These results were not clinically consistent with the components administered, nor with the patient's high body mass index, and would not be expected following the transfusion support that the patient received.
- This discrepancy prompted immediate concern among clinicians regarding the validity of the initial POCT and coagulation results.
- On review, it appeared highly likely that the initial sample analysed in ED had been taken from the wrong patient, resulting in erroneous laboratory values being attributed to this patient.

Adverse Events Related to Anti-D Immunoglobulin (Ig)

Transfusion of D-positive platelets in pregnancy during major haemorrhage (MH)

- A 23-week pregnant patient with multiple comorbidities attended the emergency department with a gastrointestinal bleed requiring urgent transfer to theatre.
- The MH protocol was activated, and the transfusion of D-positive platelets was approved by the haematology consultant.
- Anti-D Ig was not requested by the clinicians and consequently its administration was omitted.
- Immune anti-D was detected later in pregnancy.
- No impact upon the baby was reported.

Woman with immune anti-D given anti-D Ig

- Immune anti-D was detected in a pregnancy after the 28/40 routine antenatal anti-D Ig prophylaxis (RAADP) and care was transferred to the fetal-maternal medicine unit (FMU).
- Due to gaps in the electronic patient record (EPR), the FMU team did not document a plan of care for delivery.
- Unaware of the immune anti-D status, the delivery team requested a kleihauer and anti-D Ig, which was declined by the laboratory.
- A haematology registrar supporting the laboratory was unable to access clinical information from the Blood Services, which showed increasing antibody titres.
- Based on the information available at the time, the haematologist supported the request for anti-D Ig, resulting in an inappropriate administration.
- No adverse effect on the baby was reported.

Late administration of anti-D immunoglobulin (Ig) due to emergency care and communication gaps

- A woman was transferred from an external hospital to an intensive care unit (ICU), due to sepsis, following the birth of still born twins.
- The external hospital was unable to obtain cord bloods and the cell-free fetal deoxyribonucleic acid (cffDNA) prediction was not handed over to the ICU.
- The ICU were not informed that the woman required anti-D Ig.

Unavailability of O D-negative emergency red cells units and knowledge gap leads to inappropriate management of a miscarriage

- A patient became unstable during a surgical management of miscarriage with a sudden blood loss of 1.5L, a significant drop of blood pressure and increased heart rate.
- Due to the clinical presentation the medical team made the decision to transfuse the emergency group O D-positive units available in the satellite refrigerator.
- Emergency O D-negative units were not available as part of the local stock management following the activation of the national amber alert.
- Following the procedure the patient received 500IU anti-D Ig, but no sample was taken to estimate the volume or the requirement for additional anti-D Ig doses.
- The medical team assumed that the dose given for the miscarriage would be sufficient to cover the transfusion of D-positive red cells.

Incorrect Blood Component Transfused

Transfusion of ABO-compatible red cells to the wrong patient significantly impacts wellbeing

- Patient 1 (A D-positive) received blood intended for patient 2 (O D-positive) who was located in the next bed, due to a lack of pre-administration checks.
- The unit was checked against paper handover notes in the ward's treatment room and not by the patient's side.
- The error was identified by the patient during administration, who immediately alerted the ward staff.
- Although the unit was ABO compatible (group O red cells to a group A recipient), this event caused severe distress to the patient.
- They experienced an acute stress response requiring medical intervention including chlorphenamine, salbutamol, hydrocortisone and adrenaline.
- The patient made a full recovery.

Checking of units away from the patient led to two ABO-incompatible (ABOi) red cell transfusions

- Patient 1 (A D-positive) and patient 2 (B D-positive) were on the same ward, both requiring a red cell transfusion.
- The nurses caring for these patients both placed a request for collection of one unit of red cells at similar times.
- The porter received these requests and although there was a one-unit collection policy in place, the porter thought it was acceptable to collect two units if they were for the same ward.
- Two units were collected and delivered to the ward by the porter.
- The two units were both checked at the nurse's station away from the patient's bedside.
- Both patients were wearing an identification band.
- Electronic vein-to-vein scanners were available as a second checker but not used during this event.
- The units were both administered to the wrong patients, patient 1 received patient 2's and vice versa.
- Patient 1 quickly became acutely unwell, and an emergency call was placed for medical staff to urgently attend.
- At this point another member of staff stated that patient 2 was also unwell, prompting staff to check the label attached to the red cell unit still running for patient 1, and the error was identified.
- The clinical staff split into two teams to deal with both patients receiving ABOi transfusions.
- Patient 1 required urgent admission to the intensive care unit (ICU) and underwent haemofiltration, where they stayed until discharged 9 days later.
- Patient 2 experienced minor morbidity, with tachycardia, pyrexia and tachypnea and recovered.

Wrong component collected and administered without completing the correct checking procedures

- One unit of red cells was collected by two registered nurses without any collection paperwork.
- The incorrect unit was collected and taken to the ward where it was checked by the same staff against another patient's prescription/authorisation chart in the clinical room away from the patient.
- They did not check the unit against the identification band, or verbally with the patient.
- Following completion the patient became unwell but this was thought to be due to their clinical condition as the unit was ABO-compatible (O D-positive to A D-negative).

Wrong blood in tube event leads to transfusion of multiple units of platelets not meeting patient's requirements

- A patient with platelet refractoriness, haematuria, and renal obstruction was transfused over 20 units of apheresis platelets.
- Initial human leucocyte antigen (HLA) antibody testing and subsequent human platelet antigen (HPA) testing were negative, despite ongoing clinical suspicion of the presence of HLA antibodies.
- Repeat testing identified multiple HLA antibodies with a completely different HLA type, confirming the previous sample was from another patient.
- The patient received over 20 units of standard platelets over several weeks, not HLA-selected.

Patient received 25 blood components not meeting irradiation requirements due to gaps in communication

- An older child with acute myeloid leukaemia (AML) was being treated with fludarabine, and required irradiated blood components.
- This information was not communicated to the transfusion laboratory and the patient received 13 red cells and 12 adult therapeutic doses of platelets, which were not irradiated.

Renal transplant delayed due to issue of incorrect ABO group plasma

- A male patient was due to have an ABO-incompatible directed kidney transplant following a course of plasma exchange to remove circulating anti-B antibodies.
- The patient was prescribed four units of group AB fresh frozen plasma to replace depleted clotting factors following exchange, but was issued group O in error by the transfusion laboratory.
- Although compatible with the patient, this increased the anti-B titre beyond acceptable limits and the transplant was aborted after donor surgery had already begun.
- The transplant was re-scheduled a week later.

Wrong ABO group red cells transfused to a haemopoietic stem cell transplant (HSCT) recipient due to laboratory interpretation errors and missed laboratory information management system (LIMS) alerts

- A group A D-positive acute myeloid leukaemia (AML) patient received an O D-negative HSCT.
- A group and screen test was undertaken following a request for a unit of red cells due to haematuria and a low haemoglobin (Hb).
- The grouping results gave mixed field results in the anti-A and anti-D wells in the grouping cassette but the biomedical scientist mistakenly assumed this discrepancy was due to the patient receiving O D-negative red cells.
- There was a note available on the LIMS to state the patient was a transplant recipient and should receive group O red cells, but this was missed and one unit of A D-positive red cells was issued and transfused.

Laboratory testing errors and incorrect antibody identification

- A patient with liver cirrhosis in the intensive care unit required a unit of red cells due to a low Hb.
- The group and screen sample gave a weakly positive reaction in one of the screening cells.
- Further antibody investigations were incorrectly interpreted by the biomedical scientist (BMS) as a non-specific antibody.
- The BMS crossmatched a standard unit, and soon after the transfusion commenced the patient became symptomatic with a transfusion reaction.
- A second check of the panel indicated the presence of anti-Jk^b reacting with homozygous cells only.
- The patient died of their underlying clinical diagnosis prior to further investigations.

Patient develops anti-K due to laboratory error impacting the decision not to have further children

- The transfusion laboratory issued two units of red cells to a patient post elective caesarean section, one of which was K-positive.
- During antenatal testing in a subsequent pregnancy, anti-K was detected.
- As a result of the antibody development, the patient decided not to have any further children, as the antibody may impact future pregnancies.
- The patient made a formal complaint to the organisation regarding the personal impact of the event.

Lack of information technology (IT) interoperability leads to IT workaround and collection errors

- A unit of red cells was required for patient A, a request was placed in the electronic portering system, and a collection slip printed.
- The patient information details of an incorrect patient were cut and pasted from the portering requesting system into the collection slip form.
- The incorrect unit was collected and taken to the clinical area.
- The unit was spiked for transfusion, but the error was identified prior to pre-administration checks.

Lack of laboratory information management system (LIMS) functionality and IT alert fatigue lead to component selection errors

- A group A D-positive patient had received an A D-negative haemopoietic stem cell transplant (HSCT), and their LIMS record was updated with two flags to state ‘do not issue D-positive platelets’ and ‘do not issue group O platelets’.
- A unit of A D-positive platelets was issued from the laboratory, with both warning flags being acknowledged by the biomedical scientist but not actioned.
- A laboratory exit checklist had been completed but the error was not identified.
- The error was identified during pre-administration checks.

Handling and Storage Errors (HSE)

Transfusion set up and running for approximately 19 hours

- A unit of red cells was removed from temperature-controlled storage at 10:19 and the transfusion was commenced at 10:45.
- The patient was moved to a different ward while the transfusion was in progress and handed over to a member of staff.
- At 19:45 the night shift noticed that the blood had stopped transfusing but were unsure how long for and started it running again.
- The transfusion completion time was not recorded but a post-transfusion blood gas was run at 05:44 the next morning.

Transfusion of a component that was out of temperature control

- The Helicopter Emergency Medical Services team attended a trauma patient and transfused three of the four units of fresh frozen plasma (FFP) from the sealed temperature-controlled box at approximately 19:45.
- The opened box containing the remaining one unit of unused FFP was then returned to the transfusion laboratory at 22:45.
- The unit of FFP was electronically returned to stock at 00:01 the next day.
- At this point, the unit should have been discarded, but this action was not undertaken.
- There was also no record of the unit being placed into the stock refrigerator after being electronically returned to stock (in line with local procedure).
- This suggests that it was left out on the bench at room temperature in the laboratory.
- It was later issued to another patient at 01:56, and transfused at 02:21 after being out of temperature-controlled storage for approximately 6 hours.

Delayed Transfusions

Multiple issues in communication contributes to the death of a critically ill newborn baby (imputability 1 – possible)

- A full-term woman underwent an emergency caesarean section for placental abruption.
- The baby was born profoundly pale and in poor condition.
- Red cells were urgently requested.
- Although urgency was communicated to the laboratory, the O D-negative units available in the theatre refrigerator were not used.
- An adult O D-negative unit was authorised and issued within 5 minutes; however, delays occurred as the staff member transporting the unit had no access to theatres and had to wait for entry.
- On arrival, the baby had been transferred to the special care baby unit, which had not been communicated between teams, causing further delay while access was gained.
- Red cells were transfused approximately 25 minutes after the request.
- A second unit was later requested and transfused.
- Despite transfusion and resuscitation, the baby died later that evening.

Inadequate communication results in delayed blood provision for an elderly patient with red cell antibodies (imputability 2 – probable)

- A patient with known myeloma was admitted to the emergency department, which was severely overcrowded, with extensive corridor care.
- They had a significantly low haemoglobin and red cell antibodies, and compatible blood was requested from the Blood Service.
- Once the compatible blood was received in the laboratory, its availability was not communicated to the clinical team.
- While waiting for blood, the patient fell, became unresponsive and suffered a cardiac arrest.
- During resuscitation, one unit of emergency O D-positive red cells was administered; however, resuscitation was unsuccessful.

Lack of knowledge of major haemorrhage protocol (MHP) contributes to the harm of an obstetric patient

- The obstetric MHP was activated in maternity theatres for a patient with placental abruption.
- Confusion arose regarding whether fresh frozen plasma (FFP) was included in MH packs.
- An outdated protocol, which included FFP in standard packs, remained displayed in theatres despite an update removing FFP from packs and directing staff to a rotational thromboelastometry (ROTEM)-guided pathway.
- As a result, FFP was not requested when indicated, leading to a 28-minute delay.
- The patient suffered a seizure and rapidly deteriorated due to haemorrhage and disseminated intravascular coagulation.
- Leadership and communication challenges were noted.
- At the time of submission, the investigation into patient harm was ongoing.

Avoidable Transfusions

Multiple units transfused for anaemia due to B12 and folate deficiency

- A patient with severe anaemia (haemoglobin (Hb) 29g/L) due to profound B12 and folate deficiency, who was moderately symptomatic but stable, was transfused seven units of red cells in the medical assessment unit.
- Post-transfusion Hb was 86g/L.
- It was noted that the patient presented overnight, resulting in decisions being made without senior or specialist input.
- Shift handovers did not clearly highlight the reversible cause for the chronic anaemia.

Missed opportunity to review a decision to transfuse based on a haemodiluted sample

- A haemoglobin (Hb) result of 67g/L was telephoned through for a patient on the surgical assessment unit.
- A consultant told a resident doctor to authorise two units of red cells.
- A venous blood gas taken an hour later gave a Hb of 96g/L, in keeping with the patient's baseline.
- The resident doctor filed these results but did not question the transfusion decision.
- During transfusion of the second unit, a nurse noticed the blood gas result and queried the discrepancy with the out-of-hours biomedical scientist.
- The transfusion was paused whilst a repeat full blood count (FBC) was performed.
- The repeat Hb was 110g/L.
- The original FBC sample was found to have been taken from the same arm that had intravenous fluids running.

Change in plan for an iron infusion rather than blood transfusion in pregnancy not communicated

- A pregnant woman reported tiredness and was found to have a haemoglobin of 88g/L.
- A blood transfusion was initially planned, but this was changed to an iron infusion following medical review after haematinic results were available.
- This was not communicated to the midwife, although the plan was documented.
- The notes were not checked at the change of shift, and a unit of red cells was transfused.
- Two units had originally been requested, but this was reduced to one after challenge by the laboratory.

Lack of training in electronic systems resulted in an avoidable transfusion based on a verbal handover

- Two units of red cells were crossmatched for a patient presenting with a suspected ectopic pregnancy, in preparation for possible surgery.
- The haemoglobin was 116g/L.
- One unit was administered on the ward following a verbal handover from an emergency department nurse.
- None of the ward staff were trained to use the electronic blood tracking system and a nurse was called from another ward to start the transfusion.
- Staff did not know where to locate the prescription/authorisation on the electronic patient record and were therefore unaware that one had not been completed.

Delay in taking a group and screen in a patient with gastrointestinal bleeding results in the avoidable use of emergency group O

- An elderly male presented to the emergency department (ED) with haematemesis.
- No group and screen sample was taken at the primary assessment.
- Six hours later, it was noted he had ongoing haematemesis, but no blood tests were taken at that time.
- A further two hours later, he deteriorated and was transfused with a unit of emergency group O.
- The first transfusion sample was only taken after this. In addition, group O.
- D-negative was selected when he could have received O D-positive.
- It was noted that staff numbers in the ED were insufficient for the volume of patients received.

Under or Overtransfusion

Rapid transfusion followed by respiratory compromise

- A young patient with a history of renal transplantation and continued renal dysfunction was admitted with abdominal pain and prescribed a single-unit red cell transfusion.
- This was infused over 30 minutes instead of 3 hours.
- Eight hours later, the patient developed haemoptysis and desaturated, necessitating admission to the intensive care unit.
- Chest X-ray changes favoured infection rather than fluid overload.
- The patient received furosemide without obvious benefit.
- Criteria for transfusion-associated circulatory overload (TACO) were not met, and the patient made a full recovery.

Dim light associated with wrong infusion settings

- A small child was transfused an excessive volume of red cells (327mL) resulting in a haemoglobin rise from 82g/L to 169g/L.
- The prescribed volume was 150mL over 4 hours.
- The parents had requested the child not be disturbed, so the transfusion was set up in dim light and not checked later at staff changeover.

Incidents Related to Prothrombin Complex Concentrates (PCC)

Delayed treatment of haemorrhagic stroke (imputability 1 – possible)

- An elderly patient developed neurological deterioration, and the computed tomography (CT) scan demonstrated intracranial haemorrhage (ICH).
- Prothrombin complex concentrate (PCC) was recommended for anticoagulant reversal but was not given before the patient was transferred to a ward.
- There was communication confusion which resulted in a 5-hour delay in treatment.
- The patient died and the delayed treatment was considered contributory.

Head injury and intracranial haemorrhage with delayed prothrombin complex concentrate (PCC) (imputability 2 – probable)

- An elderly patient with atrial fibrillation (AF) fell at home, hit their head and lost consciousness for 5 minutes.
- They waited 3 hours for a paramedic crew to arrive.
- A head computed tomography (CT) scan showed an acute subdural haematoma.
- Neurosurgeons advised warfarin reversal with PCC, but this was not achieved for 8 hours.
- The patient deteriorated neurologically with a subsequent seizure and a massive increase in bleed size.
- The patient never regained consciousness and passed away.

A series of mishaps leading to delayed administration of prothrombin complex concentrate (PCC)

- A patient on a direct oral anticoagulant (DOAC) was admitted with a haemorrhagic stroke.
- PCC was prescribed but administered after a 3-hour delay caused by a combination of errors.
- An incorrectly completed request form sent to the transfusion laboratory had to be rewritten.
- The form was taken to the transfusion laboratory late because staff were not aware that the request was urgent.
- The ward staff were not aware that the order was ready.
- PCC was then delivered by the porter to the wrong ward.

Lack of communication about prothrombin complex concentrate (PCC) storage for emergency use

- A patient required emergency above-knee amputation due to necrotising fasciitis.
- Their international normalised ratio (INR) was 4.9.
- The haematology consultant advised 2000 international units of PCC and to recheck the INR and give further PCC if INR >1.5.
- There were multiple telephone calls between the clinical team, the transfusion laboratory and the on-call pharmacist which led to a misunderstanding as to which blood product was required and where it could be found.
- This resulted in factor IX concentrate (BeneFIX®), being issued from the factor issue refrigerator and administered, instead of PCC.
- Emergency stocks of PCC were held in the emergency department but were not listed on the pharmacy ward list on the intranet and could therefore not be located out-of-hours.

Near Miss (NM) Reporting

ABO-incompatible transfusion prevented by pre-administration checks

- A porter collected a unit of red cells from the blood issue refrigerator for patient 1 (group A D-positive) who had the same first name and surname as patient 2 (group B D-negative) without performing robust safety checks.
- The porter was distracted by a colleague, and there was also a backlog of tasks due to a long-running major haemorrhage call on the previous shift.
- The unit of red cells was received in the clinical area and when the nursing staff were completing their pre-administration checks at the patient's bedside, they noticed that the date of birth and unique patient identification number on the blood component did not match the details on the patient identification band.
- They contacted the blood transfusion laboratory and arranged for the unit of red cells to be returned.

Near Miss - Wrong Blood in Tube (WBIT)

Discrepant full blood count results identify a wrong blood in tube (WBIT)

- Samples were taken from a patient for haematology, biochemistry and blood transfusion laboratories.
- Upon testing, the full blood count (FBC) showed pancytopenia which was discrepant with the patient's previous results.
- A repeat FBC confirmed that the first sample was a WBIT.
- Biochemistry and transfusion samples taken at the same time were rejected.
- Following investigation, it was identified that at the time of the event there was an unusually high number of staff on annual leave and sick leave and many requests for phlebotomy.
- In this case the request form had been labelled with the incorrect patient's bed number which resulted in the incorrect patient being bled.

Multiple staff involved in sample taking and labelling to avoid delays

- A group and screen (G&S) sample was taken by a resident doctor and handed over to a locum doctor for labelling.
- The locum doctor did not have access to the printer, so the sample was passed to the nurse.
- The nurse felt reluctant to label a sample that they had not taken but did not feel confident to challenge the request.
- Additionally, the nurse was aware that delays in sending the sample might lead to surgery cancellation.
- The wrong blood in tube (WBIT) was identified in the laboratory when the blood group did not match the patient's previous record.

Assumed clerical error and incorrect patient record amended

- A midwife registered a pregnant woman new to the healthcare organisation under a hospital number belonging to a different patient.
- Both individuals had the same forename, surname and year of birth.
- When the midwife confirmed the details with the woman and identified the discrepant date of birth, the midwife assumed that a clerical error had been made at registration and amended the details and previous records on the system.
- When the group and screen sample was tested in the laboratory the wrong blood in tube (WBIT) was identified as the blood group did not match previous record.
- Both women were contacted, and the error rectified.

Right Blood Right Patient (RBRP)

Blood component administered without patients details on the authorisation chart

- An obstetric patient undergoing a planned caesarean section, received one unit of red blood cells as a top-up transfusion without patient identification (PID) details being documented on the blood authorisation chart.
- No care plan was evident in the patient's notes and there was no evidence that pre-transfusion safety checks were carried out.
- The blood transfusion authorisation documentation was frequently attached to the drug chart, and it was noted, after discussion with the staff members, that they had used the drug prescription chart to check the patient’s identification details.
- This contradicted hospital policy which was to complete PID on both sets of documentation.

Blood component compatibility label mismatch alert unheeded after name change

- A name was changed on the patient administration system from ‘Stephen’ to ‘Steven’.
- The sample and request form contained the new spelling (‘Steven’).
- The sample was booked in under the older name (‘Stephen’), so the issued component and compatibility label still carried the outdated details.
- At the bedside, an electronic blood management system was used to administer the component, and a compatibility label mismatch error occurred.
- The alarm was disregarded; the blood component was manually checked and administered despite the alarm alert and mismatch.

Laboratory Errors

Death related to delay in transfusion due to incomplete handover and lack of recognition of clinical urgency (imputability 2 – probable)

- A patient with a likely new diagnosis of transfusion-related acute myeloid leukaemia on background of myeloma was admitted to the emergency department (ED) with a haemoglobin (Hb) of 56g/L and platelet count of $8x10^9$/L.
- They were stable and had been receiving regular top-up transfusions over the past 2 months.
- Red cells were requested and as the patient had atypical red cell antibodies the sample needed to be tested at the reference laboratory.
- Clinicians were informed the estimated time of red cell delivery would be on the following day, but the haematology consultant was not contacted for advice by laboratory staff as per policy.
- Information about the impending delivery and urgent transfusion was not verbally handed over at laboratory shift change.
- The units were recorded as being expected on the laboratory handover sheet, but the urgency of the transfusion was not logged.
- The red cells arrived much quicker than expected, but the ED was not informed that they were available.
- The clinical team were hesitant to transfuse emergency group O red cells due to the presence of alloantibodies, despite the patient's Hb dropping further to 40g/L during this period.
- No further communication was made by the ED team to the laboratory to chase blood availability as they were expecting the delivery the next day.
- Fifteen hours after admission an emergency call was made as the patient had collapsed onto the floor with cardiac arrest an hour after they had last been reviewed.
- A unit of emergency O D-positive blood was administered but the patient did not survive.

Delay in blood provision for exchange transfusion causing admission to paediatric intensive care unit (ICU)

- A known sickle cell patient was urgently transferred from another hospital to a paediatric high dependency unit (HDU) with sickle cell crisis at 19:30.
- The HDU, clinical haematology and blood transfusion laboratory were informed prior to admission of the need for an urgent red cell exchange transfusion.
- Eight suitable units of red cells were ordered from the Blood Service prior to arrival in readiness.
- A sample for crossmatching was taken and sent via the pneumatic tube system at 21:30 to the pathology specimen reception.
- The sample did not arrive in the transfusion laboratory until 23:39.
- Specimen reception staff had no system in place to differentiate routine or urgent samples.
- Crossmatching was carried out manually as a neonatal sample tube had been used and the volume of blood was insufficient for the analyser, causing further delay.
- A discussion took place with the haematology consultant as to whether irradiated red cell components were needed, and the decision was that this was not necessary.
- The historical local policy in place for paediatric HDU and ICU was that all blood components to these areas should be irradiated.
- This requirement was set up in the laboratory information management system (LIMS) and the electronic blood management system (EBMS), so the biomedical scientist had to override multiple alerts on the system when allocating the red cell units and also needed to manually issue the red cell units.
- This also meant that staff were unable to enter the units on the EBMS, so their availability was not displayed, and cold chain information was not monitored electronically.
- The red cell units were finally available for collection at 04:11 the next morning and red cell exchange was commenced at 05:00.

Multiple serology interpretation errors lead to lack of blood availability during major haemorrhage

- A patient with Hodgkin lymphoma and hemophagocytic lymphohistiocytosis was admitted with a low Hb and was symptomatic. A group and screen sample was sent to the laboratory with a request for one adult therapeutic dose of platelets.
- The antibody investigation was performed overnight with anti-K and anti-e identified. However, the anti-e was misinterpreted as an alloantibody, when it was in fact an autoantibody.
- The auto control was positive, however this was not noticed. The direct antiglobulin test was also positive but did not trigger any further investigation.
- Furthermore, anti-e reactivity was not confirmed with two separate examples of positive and negative cells, and no Rh phenotype was performed to confirm specificity in opposition to British Society for Haematology guidance, local policies and available decision aids and standard operating procedures .
- In the morning, the serology was second checked, but the error was not identified. On the next day, two units of red cells were requested for the patient.
- There was only one unit on site that was negative for the combination of alloantibodies erroneously assigned to the patient. Whilst this unit was being crossmatched, the major haemorrhage protocol (MHP) was activated.
- Alternative red cell units were discussed with the clinical team for possible issue under concession, but the decision was made to wait for blood from the reference centre.
- The antigen-negative unit was crossmatched and issued to the patient and six further units were urgently transported from the Blood Service, which took 75 minutes.
- The patient was treated with volume replacement and was unresponsive. The MHP was stood down before the patient passed away, and the cause of death was recorded as being related to the underlying condition.
- The serology misinterpretation was subsequently highlighted by a third biomedical scientist who was performing the outstanding Rh phenotype and identified the patient was e-positive.

Incomplete communication results in surgery postponement, severe emotional distress and financial burden

- An older patient was admitted for total hip replacement in a hospital which was in an isolated location.
- A preoperative group and screen sample was taken the day before surgery.
- Due to logistical challenges this did not arrive in the laboratory as scheduled because samples were transported to this site via aeroplane and the flight was cancelled.
- The surgery was cancelled due to lack of blood availability and rescheduled for a later date.
- The sample was received by the transfusion laboratory the following evening.
- There was no communication from the laboratory to the clinical team about the cancelled flight as expected.

Lack of staff support and multiple human factors contribute to component selection error

- A female patient was issued a unit of K-positive red cells during a major haemorrhage protocol activation in obstetric theatre.
- Available emergency O D-negative red cells were not used, and standard laboratory information management system processes were not followed, meaning alerts did not appear.
- The member of staff was lone working outside of routine working hours and the capacity plan was not met at the time.
- There was also excessive workload due to haematology equipment failures, which had caused a backlog of work.

Inappropriate delay in provision of fresh frozen plasma (FFP) possibly contributes to patient death

- A patient was admitted to the emergency department after suffering a hypovolemic cardiac arrest due to trauma.
- The major haemorrhage protocol (MHP) was activated.
- The policy in this hospital was for FFP requirements to be communicated by clinical staff upon MHP activation, but this did not occur.
- As such, no FFP was thawed by the biomedical scientist (BMS) and the availability of pre-thawed FFP was not checked by the BMS or queried by the clinical team.
- The patient received seven units of red cells and three units of FFP.
- There was a delay in obtaining haemostatic control and the patient passed away.

Major obstetric haemorrhage - laboratory delay in emergency blood provision causing major morbidity

- A woman was experiencing a major antepartum haemorrhage and was immediately taken for emergency caesarean section under general anaesthesia.
- The anaesthetist called the laboratories emergency telephone to activate the major haemorrhage protocol (MHP) but there was no answer.
- They tried a further two times, but the call remained unanswered causing a sense of panic for theatre staff.
- They then called the other enquiry call numbers for the laboratory with no success.
- Advice was sought from switchboard to obtain a bleep number and finally got to speak to the biomedical scientist (BMS) on duty.
- The BMS was lone working overnight and currently taking a break.
- It took 10-15 minutes to contact the laboratory whilst the patient was experiencing acute bleeding, which would become life threatening without immediate intervention.
- Due to the urgency for blood at this point, there was insufficient time to issue any group specific units to the patient on the laboratory information management system, resulting in emergency group O D-negative units being taken.
- The units were taken immediately and transfused and the patient stabilised.
- On investigation the laboratory has a mobile phone as well as a landline phone that simultaneously ring when a MHP call is activated.
- On this occasion, the BMS accidentally left the mobile phone in the laboratory when they went to the cafeteria for a short break.
- There was also further confusion caused as switchboard had an outdated number listed to activate the MHP.
- Following the event, laboratory staff were reminded that they must hand over the mobile phone during the shift handover and must carry it with them at all the times while on duty.
- Switchboard have also updated their contacts.

Woman sensitised to D antigen in the context of many systemic issues

- A female patient of childbearing potential, who was O D-negative, was inadvertently transfused with O D-positive blood during an emergency theatre request when no valid pre operative sample was available.
- An initial group and screen sample had been rejected due to labelling errors.
- The sample rejection was communicated to the department who requested the group and screen, but this information was not passed on to the admitting ward.
- The lack of a valid result was not noted by the clinical team for the next 2 days, resulting in the patient going to theatre without appropriate blood cover 48 hours later.
- On later admissions, the patient was found to have developed anti D, anti-C and anti E antibodies, confirming she had been sensitised by the incompatible transfusion.

K-positive blood issued to woman of childbearing potential causing sensitisation to the K antigen

- In 2023, two K-positive red cell units were issued and transfused to a female patient of childbearing age.
- The patient subsequently developed anti K, identified during laboratory testing in 2025, indicating sensitisation caused by the earlier transfusion.

Inadvertent sensitisation to the K antigen impacts future pregnancies and family planning for a woman of childbearing potential

- In 2022, a pregnant woman received two units of red cells following a caesarean section; one of these units was later found to be K-positive.
- During antenatal screening in 2024 for a subsequent pregnancy, the patient was identified as having developed anti-K, indicating sensitisation linked to that earlier transfusion.
- This was further compounded by incomplete antibody monitoring, as a sample in later pregnancy was not sent onto the reference laboratory for titration.
- The error was not detected at the time of issue due to limitations in the checklist design, which did not adequately support identification of K-incompatibility.

Patient requiring resuscitation prior to blood component provision due to communication issues

- A patient with gastrointestinal bleeding was in the resuscitation are of the emergency department at 13:35 and was found to have a low haemoglobin of 39g/L and was demonstrating marked clinical deterioration.
- There was difficulty obtaining patient samples and the doctor decided to activate the major haemorrhage protocol (MHP). They called the transfusion laboratory on the designated number to activate the MHP.
- The biomedical scientist (BMS) who answered the phone asked if a group and screen had been taken. The doctor emphasised that these would be completed as soon as possible but the patient required immediate MHP support.
- After 5 minutes, the doctor called the laboratory again on the designated number to confirm that the MHP had officially commenced but again the BMS questioned whether a group, screen and crossmatch sample had been taken.
- Again, it was highlighted to the BMS that the patient was in immediate need of blood components and issuing the components was more important than sending the samples at that moment in time.
- At 13:58, the patient went into pulseless electrical activity arrest and cardiopulmonary resuscitation (CPR) was started.
- The patient had already received 2L of intravenous fluid as stat. At 14:11, two units of emergency O D-negative red cells arrived while CPR was ongoing.
- The two units were administered and at 14:14 the patient was noted to have returned to spontaneous circulation.
- At 14:35, four units of fresh frozen plasma and four units of group-specific red cells arrived. The patient was stabilised and admitted to the critical care unit a short time later.
- The delay in the initial transfusion was around 25 minutes. The patient passed away from their underlying condition.

Delay in intraoperative blood provision leading to cardiac arrest

- A patient was admitted for an extensive surgical procedure with a haemoglobin (Hb) of 137g/L. Two group and screen samples were sent to the laboratory prior to the start of surgery due to potential for bleeding. A member of theatre staff rang the blood transfusion laboratory at 12:37 to request two units of crossmatched red blood cells for intraoperative bleeding. The patient's Hb at this point was 107g/L. A member of laboratory staff began processing this request.
- When no blood had been made available an hour later at 13:40, a member of theatre staff rang the laboratory requesting two units of crossmatched red cells and two units of fresh frozen plasma (FFP). The laboratory staff started processing this request on a different sample than the initial request. There was no system in place within the laboratory to identify that a crossmatch had been requested and started for the patient on the previous sample. There was no specific urgency for blood provision communicated at this time, though clinical staff had stated that blood loss was 2.5L during the phone call with the laboratory.
- At 13:42 another request for crossmatched red cells was made via telephone to the laboratory. The laboratory staff member taking this call advised that fully crossmatched red cells would take at least 40 minutes to prepare. They were unaware that red cells were waiting to be issued from the initial crossmatch request at 12:37. After querying the urgency of the request, the theatre confirmed they wanted group-specific blood.
- When the laboratory staff attempted to issue group-specific blood, the laboratory information management system showed a sample mismatch as staff were scanning against the wrong sample and staff were unable to issue the group-specific blood.
- At 13:55 the major haemorrhage protocol was activated, at 13:58 the porter collected the emergency issued red cells, the crossmatched red cells and FFP. At 14.03 the patients Hb was 40g/L. In total they received nine units of red cells, six of FFP, two of cryoprecipitate and two adult therapeutic doses of platelets. The patient did suffer a cardiac arrest and required admission to the intensive care unit but survived.

Errors Related to Information Technology (IT)

Alert fatigue results in delayed transfusion

- A patient requiring a second unit of red cells for a suspected upper gastrointestinal bleed experienced a delay in transfusion due to poor venous access and failures in electronic task management in an out-of-hours setting.
- Repeated electronic requests for venous access were sent to the hospital-at night team but were deleted, having been misinterpreted as historic or duplicate tasks based on the fact that the patient had been cannulated earlier, but this had stopped working after the first transfusion.
- No clarification was sought with the ward and reduced overnight staffing with competing clinical commitments further contributed to delay.
- The second unit was eventually administered once venous access was obtained.

Delay in issue of emergency blood following new laboratory information management system (LIMS) go-live

- A patient undergoing emergency bowel surgery developed significant intraoperative bleeding requiring activation of the major haemorrhage protocol (MHP).
- Laboratory staff experienced repeated failures when attempting to electronically issue compatible red cell units due to an error message that appeared when scanning a group & screen sample.
- Two valid samples were present in the laboratory; however, the more recent sample had invalidated the older one, and the system did not clearly guide users to the appropriate sample, resulting in repeated scanning attempts against the incorrect barcode.
- This situation had not been anticipated or tested during pre-implementation validation, and this was the first MHP activation since the LIMS go-live.

Lack of familiarity with contingency plans during cyber-attack led to delay

- During a cyber-attack incident, the laboratory information management system was unavailable, and an interim process was introduced requiring prior authorisation of blood provision for surgical patients from the clinical haematology team.
- A patient undergoing coronary artery bypass graft surgery, who was borderline anaemic and likely to require perioperative transfusion, proceeded to theatre without compatible red cells being requested, authorised or prepared via the interim manual process.
- When the clinical team contacted the transfusion laboratory intraoperatively, they were informed that no blood had been approved, necessitating an urgent escalation to the on-call haematologist, resulting in an avoidable delay in blood provision.

Febrile, Allergic, and Hypotensive Reactions (FAHR)

Cardiac arrest during transfusion of red cells attributed to possible anaphylaxis (imputability 1 – possible)

- A frail elderly patient admitted in a very poor condition had a cardiac arrest during the first 15 minutes of a red cell transfusion.
- Post-mortem mast-cell tryptase result was markedly elevated, and anaphylaxis due to transfusion (alongside underlying conditions) was considered a likely cause of the deterioration.

Severe inflammatory reaction in a patient found to have immunoglobulin A (IgA) deficiency precipitates deterioration (imputability 1 - possible)

- A patient under investigation for probable lymphoma and with positive blood cultures developed fever, rigors and dyspnoea after 40 minutes of a red cell transfusion.
- Their blood pressure became unrecordable, requiring admission to intensive care, where they developed progressive multi-organ failure and died 4 days later.
- Serological incompatibility and bacterial contamination of the unit were excluded.
- Subsequent investigation showed the patient had severe IgA deficiency with anti-IgA antibodies.
- It was felt that the acute severe reaction precipitated the deterioration in this already unwell patient.

Untargeted treatment and investigation of a febrile platelet reaction in a haematology patient

- A patient on the haematology ward developed rigors, breathlessness without wheeze and a temperature rise from 37°C to 38.7°C on completion of a unit of platelets.
- They were treated with paracetamol, hydrocortisone, chlorphenamine and pethidine.
- A repeat group and screen and serial mast cell tryptase were sent, along with patient blood cultures.
- The transfusion incident review team documented a plan for ‘premedication’ before subsequent transfusions.

Transfusion-Associated Circulatory Overload (TACO)

Inappropriate/excessive red cell transfusion contributes to a patient's death (imputability 2 – probable)

- A 64kg patient with joint sepsis and pneumonitis was transfused two units of red cells.
- The indication for transfusion was coded as R3 in accordance with the NBTC indication codes (i.e. acute anaemia in the presence of acute coronary syndrome).
- The patient's haemoglobin (Hb) was 80g/L and there was no evidence of acute coronary syndrome.
- The patient had cardiac comorbidities predisposing to transfusion-associated circulatory overload (TACO): heart failure, aortic stenosis and regular diuretic use.
- A TACO pre-transfusion risk assessment was completed, and risks identified, but no specific mitigations were implemented, including questioning the appropriateness or volume of transfusion.
- The patient developed respiratory compromise with dyspnoea, tachypnoea, and hypoxia (oxygen saturation 81%) requiring 15L of supplemental oxygen.
- There was tachycardia, hypotension, and a grossly raised N-terminal-pro brain natriuretic peptide (NT-proBNP).
- There was no pre-transfusion NT-proBNP level for comparison. The post-transfusion Hb level was 117g/L. The chest X-ray showed pulmonary oedema with possible infection.
- The patient initially improved following a treatment dose of diuretic but later deteriorated.
- TACO was cited on the death certificate.

Pulmonary Complications of Transfusion: Non-TACO

TAD-C pulmonary oedema after transfusion not satisfying TACO or TRALI definitions (imputability 1 – possible)

- A patient of advanced age with pulmonary fibrosis was admitted due to breathlessness; there was renal impairment, pneumonia and a haemoglobin of 69g/L.
- They deteriorated 40 minutes into a red cell transfusion with pulmonary oedema on imaging.
- There were no cardiovascular changes, and they worsened despite receiving a diuretic.
- They died from respiratory failure the following day after declining ventilation.

TRALI type 2

- A patient was admitted with a single stab wound, grade 2 liver injury, and large volume haemoperitoneum.
- A laparotomy was performed and 15 units of red cells, 14 units of fresh frozen plasma, two adult therapeutic doses of platelets and two units of cryoprecipitate were transfused.
- About 6 hours after transfusion, the patient became hypoxic with SaO2 65%, hyperexpanded lungs and bronchospasm.
- There was no response to diuretic.
- Chest X-ray showed bilateral infiltrates.
- The patient required 3 days of mechanical ventilation.

Dyspnoea associated with hypocalcaemia during red cell exchange

- A patient with sickle cell disorder developed tachycardia, hypoxia and breathlessness during a regular planned exchange transfusion.
- There were classical features of hypocalcaemia such as tetany and paraesthesia.
- There was a clear chest X-ray and normal post-transfusion brain natriuretic peptide (BNP).
- They improved quickly after administration of a fluid bolus and calcium and were discharged the following morning.

Uncommon Complications of Transfusion (UCT)

Acutely unwell patient with severe renal impairment and hyperkalaemia (imputability 1 – possible)

- A patient with microcytic hypochromic anaemia who presented with pallor and a raised respiratory rate received a red cell transfusion in the emergency department.
- Approximately 10 minutes after commencement, the patient deteriorated, experienced cardiac arrest, and died.
- Subsequent review revealed the transfusion was initiated before the availability of blood test results showing severe kidney impairment and hyperkalaemia.
- Post-transfusion investigations were limited due to the unused blood component being discarded and incomplete documentation which was attributed to the clinical workload exceeding available staffing.
- The pathologist recorded the cause of death as cardiac arrest secondary to hyperkalaemia, blood transfusion, severe anaemia, and acute kidney injury.

Ocular ischaemic complications following rapid red cell transfusion

- A patient with a relapsed seminoma receiving chemotherapy had a red cell transfusion over 30 minutes instead of the prescribed 2 hours due to incorrectly set infusion pump parameters.
- Post transfusion, the patient was subsequently discharged home and 48 hours later presented in the emergency department with visual changes.
- There was no evidence of any visual impairment at the time of or prior to the transfusion.
- Ophthalmology review noted slow-flow retinopathy, possible right central retinal artery occlusion at the time of transfusion, and bilateral ocular ischaemic syndrome.

Cardiac arrest following red cell transfusion in severe anaemia

- A haemodynamically stable patient with menorrhagia presented to the emergency department with a haemoglobin level of 37g/L.
- The patient received two units of red blood cells but subsequently experienced a cardiac arrest, necessitating admission to the intensive care unit (ICU).
- A computed tomography pulmonary angiography ruled out a pulmonary embolism, but did detect widespread lung consolidation interlobular septal thickening, dilated left ventricle, soft tissue oedema (suggestive of cardiac dysfunction, possibly high-output state from anaemia).
- No other cause for the cardiac arrest was identified aside from its temporal association with the transfusion.
- The patient was stabilised and continued to receive care on the ICU.
- No further information was available.

Transfusion-Transmitted Infections (TTI)

Near miss identified prior to issue to a patient (Staphylococcus aureus)

- Staphylococcus aureus was cultured from a visually abnormal pooled platelet unit.
- The unit was tested and released as negative to date with no visual abnormality.
- Routine bacterial screening remained negative.
- The hospital noted a visual abnormality described as a white deposit in the two day old platelet pack prior to transfusion.
- The unit was returned and cultured, with Staphylococcus aureus identified.
- Associated units were discarded; there was no patient harm.
- All four donors were followed up and nasal swabs taken.
- One donor was carrying Staphylococcus aureus; however, this was a different strain to that cultured from the pack.
- This donor has been withdrawn from donation.

Near miss identified through presence of aggregates in apheresis platelets (Staphylococcus aureus)

- Bacterial growth of Staphylococcus aureus was confirmed following identification of aggregates in apheresis platelets (2 splits) prior to issue.
- Initial BacT/ALERT platelet screening was negative.
- There was no patient impact, as no components were transfused.

Near miss identified through presence of aggregates in pooled platelets (Staphylococcus aureus)

- Growth of Staphylococcus aureus was confirmed following identification of aggregates in a platelet pool, prior to issue.
- Initial BacT/ALERT platelet screening was negative; the platelet pool was positive when retested.
- Three associated red cell units and one plasma-for-medicine component were available for recall and testing; all were negative.
- One red cell unit had been transfused, but following clinical review no transfusion reaction or illness in the patient was noted.

Cell Salvage (CS)

Loss of salvaged blood as a result of untrained operator and procedural issues

- A patient (known to be anaemic) underwent elective obstetric surgery, with planned cell salvage.
- The surgery was described as ‘difficult’, with 2 litres of intraoperative blood loss.
- Half a litre of blood was salvaged; however, an incorrect procedure followed during machine disconnection resulted in the blood bag having to be discarded.

Metallosis in revision hip surgery and impact on cell salvage

- A patient underwent an elective revision of hip replacement due to trunnionosis (a complication of hip arthroplasty from the mechanical wear and corrosion of the femoral head-neck interface, causing the release of metal debris).
- Preoperative imaging revealed debris, but metal specific blood tests were not carried out.
- The orthopaedic team anticipated that the issue was ceramic joint failure.
- Cell salvage was scheduled; however, metal debris was noticed on collection and collected blood was discarded appropriately.
- This correlated with markedly raised metal-specific blood tests postoperatively.

Environmental factors result in unplanned allogeneic transfusion

- A patient underwent elective surgery, with cell salvage performed by an operating department practitioner (ODP) working in a dual-operator role using both cell salvage suction and a surgical waste management suction system.
- The ODP's view of the suction and cell salvage reservoirs was obstructed by the patient, surgeons, scrub staff and equipment.
- The team lost track of blood loss until the patient became symptomatic.
- The 'wrong' suction was used for blood loss, and so there was an inadequate volume of blood in the cell salvage reservoir, and the patient required allogeneic blood transfusion.

Paediatric Cases

Transfusion delay and death in a neonate (imputability 1 - possible)

- There was a 23-minute delay in provision of red cells to a neonate who was born in poor condition due to placental abruption.
- Urgent neonatal/infant red cells were requested following birth; however, collection of adult O D-negative units present on site in the maternity refrigerator was not considered.
- A further delay occurred when a biomedical scientist was unable to access the theatre to deliver the unit urgently.

Use of emergency O D-negative adult units for a neonate with maternal antibodies

- A neonate with known haemolytic disease of the fetus and newborn secondary to maternal antibodies (anti-e, anti-C, anti-Kp^a) had a strongly positive (4+) direct antiglobulin test at birth.
- Antigen-negative units had been ordered for the mother and were available in the hospital.
- Shortly after birth the laboratory was alerted that a unit of adult emergency group O D-negative red cells had been removed from the satellite refrigerator and transfused to the baby.
- This was authorised by the neonatal consultant due to the poor clinical condition of the neonate at birth.
- The transfusion laboratory staff communicated to the clinical team that the emergency red cells were not the best choice for this child going forward, however later that day a further O D-negative adult unit was transfused.
- It transpired that the birth plan specified the use of O D-negative for the neonate until an exchange unit was available.
- The baby received further treatment and survived.

ABO-incompatible fresh frozen plasma (FFP) administered to an infant wrongly assigned as group O

- A group B D-positive infant was transferred to a different hospital.
- At the receiving hospital, the infant appeared to be group O D-negative on testing and therefore group O FFP was issued.
- The infant had been transfused with a large amount of O D-negative red cells.
- Neither the ABO/D group of the infant nor the transfusion history had been communicated to the teams at the receiving hospital.

Failure to provide an antigen-negative component for an infant with maternal anti-M

- An infant (<4 months of age) whose mother had historical allogeneic anti-M received an M-unselected component in error.
- The unit was subsequently found to be M-positive.
- The infant's direct antiglobulin test was negative, and no harm occurred.

Inappropriate electronic issue for a child with sickle cell anaemia

- A teenager was transfused with one unit of red cells issued via electronic issue rather than serological crossmatch.
- The transfusion laboratory was not informed that the patient had been transfused elsewhere and red cell antibodies had been detected.
- A sample had been sent away to a reference laboratory by the previous hospital for antibody identification and the results were available on a national antibody database.
- Even though this report was accessed, the patient's record on the laboratory information management system was not updated
- There was no adverse clinical effect.

Delay in provision of red cells for neonatal exchange transfusion

- A neonate who required an urgent red cell exchange transfusion for hyperbilirubinaemia had a 4-hour delay in the provision of red cells.
- The initial request occurred out-of-hours and the biomedical scientist was unclear about what component specification to order from the Blood Service.
- A component was ordered by the day staff with the support of the transfusion practitioner.

Over 2-hour delay in provision of red cells for a severely anaemic neonate

- A neonate was born with a haemoglobin of 34g/L due to fetomaternal haemorrhage.
- The clinical team had some knowledge of neonatal components and asked for ‘Cytomegalovirus-negative components (leucodepleted)’.
- The case was discussed with the haematology consultant on call, but the urgency and status of the baby was not communicated, resulting in a 2-hour delay whilst awaiting a neonatal/infant specification component from the Blood Service.
- The adult-specification O D-negative units which were available to use in an emergency were not given.

An infant received an undertransfusion due to use of an adult-sized giving set

- An infant received around 20mL less red cells than prescribed due to the use of an adult-sized blood giving set (via a volumetric pump) which has a larger priming volume than when given with a paediatric giving set.
- Pre-transfusion haemoglobin (Hb) was 68g/L and post-transfusion Hb was 79g/L.

An infant was prescribed two adult units of red cells

- A small transfusion-dependent infant was prescribed two adult units of red cells.
- The nursing team realised the error immediately prior to hanging the second unit of red cells.
- However, the child had already received 38mL/kg of red cells (maximum dose is 20mL/kg).
- No significant morbidity resulted from this error.

Transfusion-associated circulatory overload in a young child following a platelet transfusion

- A young child with neuroblastoma who had previously received chemotherapy developed increasing shortness of breath 1-2 hours after a platelet transfusion.
- The child had also received intravenous fluids and exhibited respiratory symptoms.
- Pre-transfusion imaging showed some pulmonary congestion which worsened in post-transfusion imaging.
- The child responded to diuretics and supportive care in the paediatric intensive care unit.

Haemoglobin Disorders

Delayed reaction after antenatal transfusion resulting in death (imputability 2 - probable)

- A transfusion was arranged for a pregnant patient with sickle cell disorder; they had no history of alloimmunisation or adverse transfusion reactions and had no other notable comorbidities.
- Post transfusion, they were initially well and returned home, but re-presented to hospital 10 days later with pain and dark urine.
- The patient was treated with further transfusion support, steroids, intravenous immunoglobulin, eculizumab and plasma exchange, but developed multi-organ failure and died on the fourth day of admission.
- The working diagnosis was hyperhaemolysis or fat embolism syndrome.

Delayed transfusion with pulmonary embolism (imputability 1 - possible)

- A patient with sickle cell disorder was admitted with generalised pain and acute kidney injury.
- The patient became particularly unwell on the evening of the third day of admission with parvovirus and an undiagnosed pulmonary embolism.
- Two units of red cells were prescribed, but there was a significant delay of around three hours in receiving the second unit despite the blood being available in the laboratory.
- The patient arrested shortly after transfusion of the second unit began.
- Subsequent review identified a delayed recognition of the need for blood as well as issues in communication and prioritisation.
- These issues contributed to the delay in transfusing this patient.
- Pulmonary embolism was identified as the likely cause of death at post-mortem, but it was possible that earlier transfusion would have improved the patient's physiological reserve.

Multifactorial delayed transfusion in severe illness

- A paediatric patient with sickle cell disorder was transferred between hospitals to facilitate a red cell exchange transfusion for acute chest syndrome.
- They arrived in the evening and a sample for crossmatch was sent to the laboratory one hour later following a delay obtaining blood from the patient's implanted port.
- Samples were sent via the pneumatic tube system, and the urgency of the sample was not communicated, meaning that the sample was not received by the transfusion laboratory for a further two hours.
- The sample was small, requiring a manual crossmatch which took further time.
- Additional delays occurred because there was a blanket requirement in the laboratory information management system for irradiated blood components for patients on the paediatric high dependency unit; however, this patient did not require irradiation.
- Clarification of this requirement and the subsequent manual issue of components resulted in the delay.
- Blood was therefore not available until eight hours after patient arrival during which the patient became more unwell and required intubation.
- The patient recovered after several days of intensive care unit care.

Haemolysis following urgent blood transfusion without concessionary release

- A patient with sickle cell disorder was admitted to a hospital they had not previously attended for acute chest crisis.
- They required urgent transfusion; the antibody screen and direct antiglobulin test were negative, and red cells were crossmatched.
- An extended red cell phenotype had not been performed at their previous treating hospital and although an Rh phenotype had been performed in this organisation prior to transfusion, it was not used to guide decision-making due to anomalous results.
- Blood was released based on advice from haematology consultants without formal concessionary release.
- Following transfusion, the patient was found to have developed anti-C, and extended phenotyping was subsequently performed.
- Later in the year, the patient again received urgent blood without formal concessionary release.
- The patient developed severe haemolysis treated with intravenous immunoglobulin, steroids, erythropoietin and eculizumab.
- Additional alloantibodies (anti-S, -Kp^a, -Fy^b, and -Jk^b) were detected in the post transfusion sample, posing increased lifelong transfusion complexity and risk.

Acute febrile reaction to red blood cells

- A paediatric patient with sickle cell disorder received two units of red blood cells.
- After the first unit, their temperature was 37.7°C and during the second it increased to 40.0°C.
- The transfusion was discontinued, and the patient was treated with paracetamol.
- A repeat group and screen sample was taken and it had a negative direct antiglobulin test result.
- The patient needed no further escalation of care and recovered completely from the febrile reaction.

Error due to data sharing issues between partnered organisations

- A patient with sickle cell disorder (SCD) attended for an elective top-up transfusion ahead of a planned surgery.
- The transfusion took place at the patient's local hospital while much of their care was coordinated by a larger tertiary centre.
- The two centres were in a partnership, but specific requirements were not automatically shared and were instead communicated via an email inbox which was not checked daily.
- The local hospital's laboratory was not aware that the patient had a diagnosis of SCD and therefore transfused blood that was not Rh- and K-matched.

Wrong phenotype issued, missed opportunity to avert sensitising event

- A patient with sickle cell disorder with known alloantibodies (anti-S, -Jk^b and -C) and a history of hyperhaemolysis presented in vaso-occlusive crisis and required an urgent top-up transfusion.
- The patient was found to have a pan-reactive antibody, meaning that samples were sent to the Blood Service reference laboratory.
- No new antibodies were found and a phenotype could not be carried out due to recent transfusion.
- The reference laboratory did not check previous genotype results, and four red cell units were issued which, although suitable for the patient's known antibodies, were noted by the hospital laboratory to be incorrectly Rh-matched.
- The hospital laboratory identified the problem, and following discussions with the haematology consultant on call, the red cell units were given.
- The patient developed a new anti-E antibody.

Transfusion Errors in Transplant Cases

Incorrect manual entry of donor blood group leads to D-sensitisation

- A male patient with blood group A D-positive received an allogeneic A D-negative haemopoietic stem cell transplant.
- The transplant protocol was inputted onto the laboratory information management system 7 days post-transplant, but the blood group of the donor was incorrectly entered as A D-positive with no reconciliation between the donor and recipient records.
- The patient was transfused with several A D-positive blood components.
- Over four years later, a group and screen sample was taken which revealed that the patient's blood group had changed to the donor's group of A D-negative and immune anti-D developed.

A patient highlights the need for a specific requirement in platelet transfusion

- A haemopoietic stem cell transplant patient emphasised to their clinical team that they needed human leucocyte antigen (HLA)-selected platelets.
- This information was not acted upon and the patient received an adult therapeutic unit of platelets that did not meet this specific requirement.
- Following investigation, it was identified that none of the shared-care documentation sent by the referring hospital mentioned this requirement.
- The Blood Services were contacted and confirmed that HLA-selected platelets had been previously provided to the original treating hospital.

Immune Anti-D in Pregnancy

Unnecessary anti-D immunoglobulin (Ig) administration with inadequate follow up

- A woman with a normal body mass index and in her first pregnancy was found to have immune anti-D antibodies at 28 weeks' gestation, with a quantification level of 0.7IU/mL.
- It was not documented whether she had received anti-D Ig before the group and screen sample was taken.
- At 30^{+5} weeks' gestation, routine antenatal anti-D Ig prophylaxis was offered and administered.
- No further samples were taken for repeat antibody quantification following this dose.
- The baby was born at 40^{+1} weeks' gestation and required phototherapy postnatally.

Unrecognised immune anti-D and unnecessary anti-D immunoglobulin (Ig) administration

- A woman in her first pregnancy and with a normal body mass index received routine antenatal anti-D Ig prophylaxis at 28 weeks' gestation.
- A maternal group and screen (G&S) sample was taken 2 days after administration.
- Anti-D was detected; however, the sample was not referred for antibody quantification.
- No further antibody monitoring was undertaken for the remainder of the pregnancy. Additional prophylactic anti-D Ig was administered after birth.
- The postpartum G&S sample was sent for quantification, and the anti-D level was reported as 77.3IU/mL.
- The baby was D-positive, developed jaundice, and required phototherapy.

Severe haemolytic disease of the fetus and newborn (HDFN) following late detection of immune anti-D

- A woman with a high body mass index and a history of two previous pregnancies outside the UK booked for antenatal care at 36^{+2} weeks' gestation.
- An antibody screen identified immune anti-D, with a quantification level of 71.04IU/mL.
- There was no record of anti-D Ig administration in her previous pregnancies.
- The birth occurred at 37 weeks' gestation.
- The baby was D-positive and developed significant HDFN, requiring phototherapy, intravenous immunoglobulin, and an exchange transfusion.