

Cases from the 2015 SHOT Annual Report

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Human Factors

Failure to recognise a complication of pregnancy, with poor communication and followed by neonatal death (1)

- A baby was born with unexpected jaundice and haemolytic disease of the fetus and newborn (HDFN) due to anti-D antibodies which had not been anticipated
- The baby required urgent red cell exchange transfusion during which a cardiac arrest occurred, and the baby subsequently died
- This was the second pregnancy in a D-negative woman
- There were multiple errors in the first pregnancy
- Anti-D antibody was detected prior to the administration of routine anti-D immunoglobulin (Ig) but was misinterpreted on two separate occasions and not followed up
- The first baby was born with HDFN requiring exchange transfusion, but there was then 'no mechanism for ensuring that information was fed into future pregnancies'
- At booking for the second pregnancy the history of jaundice and transfusion at birth for the first baby was noted but this was not identified as indicating a risk for the current pregnancy

Continued...Failure to recognise a complication of pregnancy, with poor communication and followed by neonatal death (2)

- The laboratory then misinterpreted the presence of anti-D in the booking bloods at 10 weeks as being due to prophylactic anti-D Ig administration but the midwife did not pick up this error
- The woman was reviewed by an obstetric registrar at 20 weeks who noted that the first baby had required phototherapy for jaundice but missed the history of exchange transfusion
- Anti-D was again detected in blood samples at 28 weeks and was again wrongly assumed to be due to anti-D Ig administration (which had not been given) 18 weeks before
- Five hours after birth (39 weeks' gestation) the baby was jaundiced (group O D-positive) and required exchange transfusion
- The baby suffered complications and subsequently died (January 2015)
- The hospital review of this case was signed off by the hospital in June 2015
- The post-mortem report had not been available so the review was unable to determine the cause of death

Error made in a stressed environment results in staff blame

- A patient had been 'identified' by two registered nurses against the transfusion chart at the nurses' station
- The registered nurse on the night shift offered to start the transfusion because the ward was very busy and other patients were requiring attention
- She was interrupted and distracted on her way to the patient
- The final bedside check was not done so the wrong patient was transfused with part of an ABO incompatible red cell unit (1.5mL)
- A nurse practitioner quickly realised blood was being given to the wrong patient and stopped the transfusion. The patient recovered

Systems failures in a transplant centre

- A patient was incidentally noted at a laboratory meeting to have had an allogeneic haemopoietic stem cell transplant (HSCT) ten days earlier but no information had been supplied to the laboratory about the change in ABO group or specific requirements (irradiation of cellular components)
- A second case was identified a week later
- As a result, the transfusion laboratory manager undertook a retrospective review (8 month period) and found 17 HSCT had taken place that were not known to the laboratory of which 6/17 were allografts
- Four had received incorrect blood components selected by electronic issue which should have been serologically crossmatched
- One patient received incompatible red cells
- Fortunately no patients were harmed

Distraction leads to error

- A sample was taken from Patient 1 while inserting a cannula, so the midwife handed the syringe to another member of staff to decant into a tube and label
- The second midwife took a telephone call about Patient 2 at the same time, which resulted in the sample from Patient 1 being labelled with Patient 2 details, because the midwife had been distracted by the interruption

Sample taken from incorrect patient after satellite navigation (satnav) system error

- A community healthcare assistant (HCA) working out of a general practice was supposed to take a group and crossmatch sample from Patient A
- The patient's address was entered into the satnav system but the directions led to Patient B's address which was very similar to Patient A's address
- The HCA greeted Patient B using Patient A's name outside the house and the patient beckoned her to come inside
- The HCA did not perform correct positive patient identification, so did not check the patient's name or date of birth before taking the blood or labelling the bottles
- The general practitioner (GP) noticed the patient's haemoglobin was too high for the expected patient and contacted Patient A who said they had not had a sample taken

Three narrative fallacies add to confusion when grouping a patient after an allogeneic haemopoietic stem cell transplant (HSCT)

- Narrative fallacy 1

- The patient was a known original group O, but the transfusion sample gave a mixed field (MF) result with the anti-A antisera several times on the same analyser suggesting the presence of group A red cells
- Further testing on a second analyser gave the same MF result, but there appeared to be fibrin on the top of the reaction well, so the sample was manipulated to remove any fibrin and re-centrifuged
- It then gave a negative result with anti-A
- The staff concluded (narrative fallacy) that fibrin had been responsible for the MF results, and were satisfied with the clear group O
- The result from this analyser agreed with the patient's historical group, so the group O result was authorised
- The patient was transfused group O red cells, which was correct, and group O platelets, which is incorrect for a group O patient receiving a group A HSCT, but that was unknown at this point

Three narrative fallacies add to confusion when grouping a patient after an allogeneic haemopoietic stem cell transplant (HSCT)

- Narrative fallacy 2

- When it was later established that this patient was post-transplant, the analyser manufacturer was asked to explain the discrepancy of a MF group A in instrument 1, but an eventual straightforward group O using instrument 2
- The manufacturer introduced another narrative fallacy by concluding that repeat centrifugation of the sample might have concentrated pure donor cells lower in the tube
- That might be expected in many cases, because transfused donor cells would usually be older and heavier than patient cells
- That could cause the O grouping result if the sampling tip adjustment of instrument 2 was lower than instrument 1 thus sampling cells at a different level
- This is the most common explanation for failure to find expected post-transfusion MF groups on analysers, but this narrative does not fit the facts
- It is now known that when those disparate groups occurred the 'donor' cells would have been from the engrafting group A HSCT and were not group O blood donation cells, because the group O cells were the patient's original group

Three narrative fallacies add to confusion when grouping a patient after an allogeneic haemopoietic stem cell transplant (HSCT)

- Narrative fallacy 3

- Three days after the first incident a fresh sample was received, but the laboratory staff were still unaware of the patient's HSCT
- A MF result occurred again with the anti-A antisera, but this time the expected explanation by the person doing the grouping procedure, i.e. the narrative fallacy, was that the MF result would be due to the group O red cells known to have been transfused over the weekend
- Therefore, the result was modified to a 3+ positive, giving a group A result
- However, authorisation failed, because the patient was historically group O, but the amended result was a group A
- Another repeat sample also grouped as A with a MF result
- The laboratory staff eventually discovered that the patient had received an ABO-incompatible HSCT at another Trust, which had not been communicated to them
- This was the true reason for the MF result, as the transplant was engrafting, so donor origin group A cells were mixed with the patient's own group O cells
- The narrative fallacy on this occasion could have led to a patient being mis-grouped as A, transfused with O cells, instead of being a post-transplant group O patient in the process of engrafting to become group A

Laboratory Errors

D-mismatched red cells transfused to a haemopoietic stem cell transplant (HSCT) patient on 3 occasions

- A 59 year old female group O D-positive was transplanted with group A D-negative haemopoietic stem cells and as a result should have received O D-negative red cells
- There were clear notes in the laboratory information management system (LIMS), however on 3 separate occasions, 3 different biomedical scientists (BMS) issued group O D-positive red cells which were transfused
- The first BMS made the error by issuing the patient's group rather than the group indicated in the LIMS
- The subsequent BMS staff referred back to the original error and selected red cells of the same incorrect group

Testing error leads to transfusion of incompatible red cells

- Two units of red cells were requested for a 70 year old female patient
- The crossmatch was incompatible and so the result was rejected on the blood grouping analyser and 2 further red cell units were crossmatched
- Instead of returning the incompatible units to stock, the BMS (X) left these in the 'under test' refrigerator
- This was verbally communicated to BMS (Y) who was taking over the shift
- Due to staff shortages and having to deal with other emergency crossmatches, the incompatible units were overlooked and on completion of the testing, a third BMS (Z) issued the 2 incompatible units to the patient
- The root causes were a breakdown in communication and failure to adhere to procedures
- No symptoms or signs of a transfusion reaction were reported

Incorrect Blood Component Transfused

ABO-incompatible transfusion permitted by an electronic issue (EI) system which was not fit for purpose as it had not been validated

- A 29 year old male in sickle crisis required transfusion of 3 units of red cells
- The patient was known to be group O D-positive with no alloantibodies
- The BMS selected 3 group B D-negative red cell units in error and proceeded to issue these electronically via the LIMS
- Warnings stating the ABO discrepancy were displayed, but were overridden by the BMS by pressing a function key, because there was no requirement to enter text such as 'yes proceed'
- During transfusion of the first unit, the patient felt unwell and transfusion was stopped
- The unit was returned to the laboratory but rather than initiating an investigation, the unit was placed in quarantine until the day staff came on duty when the ABO discrepancy was noticed
- Overnight, 2 further ABO-incompatible units were transfused to the patient

ABO-incompatible transfusion and death of the patient

- An elderly man had urgent coronary artery bypass surgery and required postoperative transfusion
- The wrong unit was collected from a remote issue refrigerator, and an error was made when checking the patient identification against the blood
- The error was not realised until after the full unit had been transfused
- The patient developed suspected cardiac tamponade and died after some hours of active intervention

Incorrect method of patient identification followed by failure to conduct bedside check

- A patient had been 'identified' by two registered nurses against the transfusion chart at the nurses' station
- The registered nurse on the night shift offered to start the transfusion because the ward was very busy and other patients were requiring attention
- She was interrupted and distracted on her way to the patient
- The final bedside check was not done so the wrong patient was transfused with part of an ABO-incompatible red cell unit (1.5mL)
- A nurse practitioner quickly realised blood was being given to the wrong patient and stopped the transfusion
- The patient recovered but had slight haematuria

Wrong group transfused

- A 44 year old male was admitted for femoral vascular surgery and a sample was sent for group and crossmatch
- The sample grouped as A D-positive and 2 units of A D-positive blood were crossmatched and issued
- The patient was transfused the first unit without incident
- The following day the second unit was commenced and the patient had a reaction within the first 10 minutes
- The blood was stopped and a repeat sample sent for further crossmatch
- At this point it was discovered that the patient was group B D-positive
- This was confirmed by a third sample
- Local investigations revealed that the junior doctor (foundation year 1) had not completed positive patient identification correctly at the bedside before taking the blood sample and as a consequence the wrong patient had been bled

Error in manual grouping discovered after investigation by another hospital years later

- A transcription error after manual testing resulted in a 15 year old female, who was group O D-negative, being transfused 2 units of O D-positive red cells in relation to a spinal operation
- The error was detected 14 years later when she presented at a maternity unit at another hospital where her booking bloods showed she was O D-negative with anti-C+D

Adult red cells transfused to a neonate

- A preterm neonate required emergency transfusion following massive pulmonary haemorrhage
- An adult unit of emergency O D-negative red cells was collected from storage instead of the paediatric emergency O D-negative red cells that were also available for collection
- This was complicated by the usual emergency blood refrigerator being out of action
- The nurse who was collecting the unit did not realise that paediatric units were also available from the alternative location
- The attending clinicians decided to continue with the transfusion of the adult red cells rather than delay the transfusion further

Unclear nomenclature for K and k leads to a woman of childbearing potential being transfused a K-positive unit of red cells

- An emergency unit which was not K-negative was selected from the laboratory stock
- This was transfused to a 39 year old female
- The investigation identified that the BMS knew of the requirement but had mistaken the labelling on the blood pack of k-negative for K-negative
- The unit has 2 different nomenclatures on the same pack
- Although the labelling was ambiguous and contributed to the error, the electronic despatch note (EDN) showing the donor phenotypes could be sent electronically to the hospital LIMS and that could have alerted the BMS of the incorrect selection

A combination of laboratory and clinical errors result in failure to provide irradiated red cells

- A 5 year old child with DiGeorge syndrome was admitted for cardiac surgery and irradiated red cells were requested by the clinical team and provided by the laboratory
- The surgery was cancelled and the units returned to stock
- When the surgery proceeded 2 days later, irradiated red cells were not requested as the nurse in theatre was unaware they were required
- The laboratory had failed to update the LIMS with this patient's requirement
- The patient was transfused non-irradiated units
- This case shows that communication between laboratory and clinical areas is vital

Failure to communicate or acknowledge specific requirements

- A telephone request for red cells was received in the transfusion laboratory for a 39 year old lymphoma patient who was being worked up for haemopoietic stem cell transplant (HSCT) but specific requirements were not discussed
- The BMS was distracted by a number of complex telephone queries at the time and did not complete the appropriate checks with the requestor
- The specific requirements were documented on the 2nd comments page on the LIMS but were missed and non-irradiated red cells were issued
- The patient asked not to be disturbed while he was on a work-related conference call but agreed the nurse could start the transfusion
- The bedside check was compromised to minimise interruptions and the nurse failed to notice the specific requirements on the prescription
- The patient notified the nurse that the blood was not irradiated when he saw there was no irradiation sticker on the unit
- The blood transfusion was stopped

Failure to request irradiated units

- An 11 year old patient with thalassaemia major required hypertransfusion in preparation for HSCT
- A verbal request for red cells was made 2 days prior to the planned transfusion; there was no mention of any specific requirements
- The decision to transfuse irradiated components was made on the morning of transfusion but non-irradiated red cells had already been prescribed, crossmatched and issued
- The transfusion laboratory was informed of the error 13 days post transfusion

O D-negative units are incompatible

- An 81 year old patient developed acute blood loss during colorectal surgery (03:50)
- The patient had known anti-E and anti-c. A unit of emergency O D-negative red cells was removed from a ward-based remote issue refrigerator and transfused to the patient
- This would, by definition, be incompatible with anti-c
- The clinical staff did not discuss the use of the emergency blood with the transfusion laboratory and did not wait for crossmatched blood to be supplied
- There was no known adverse outcome for the patient

Missed specific phenotype for patient with sickle cell disease

- A 30 year old patient had a group and screen sample taken in a preoperative assessment clinic
- The doctor completing the request failed to tell the laboratory that the patient had received a transfusion in the previous week and also that the patient had sickle cell disease and so required phenotype-matched units
- Blood was requested and issued for theatre, again with no indication of the specific requirements and 1 unit was transfused
- A consultant then informed the laboratory that the patient had sickle cell disease

Near Miss

WBIT could have resulted in a transfusion incompatible for both ABO and K

- A sample was received from the emergency department (ED)
- The sample acceptance criteria were met
- The patient's historical record noted that the group was A D-positive, with anti-K
- The sample received tested as AB D-positive, as a result of a wrong blood in tube error

The transfusion group-check policy highlights an error in non-transfusion samples

- A group and screen sample was taken on a previously unknown patient
- The group-check sample taken the next day showed a discrepancy with the blood group and the investigation revealed that the first sample was a 'wrong blood in tube'
- Non-transfusion blood samples taken at the same time as the initial error were also from the wrong patient and this impacted on the patient's care, because abnormal liver function test results were not recognised for a further 24 hours

Incorrect second sample reveals other underlying poor practice

- A group and save sample grouped as O D-positive
- A few days later a group-check sample was taken, because the patient was having a surgical procedure, but this grouped as AB D-positive
- The patient was re-bled to check the group and this confirmed the patient was O D-positive
- Although not relevant to this case, which was separated by a few days, the investigation revealed that when the individual involved was aware that two samples for grouping were needed, she would ask a colleague to check the patient details with her and take both samples together, instead of following the correct procedure where two separate people identify and bleed the patient at different times

WBIT shows a secure electronic labelling system was being used incorrectly

- Two samples were sent for the same patient from the ED
- Sample bottles were electronically labelled and forms and bottles matched
- As the bottles had been electronically labelled, a group-check sample was not required and a single sample would have been deemed safe for transfusion purposes
- The laboratory was alerted by a telephone request for another patient in the ED, from whom no sample had been received
- When the two samples labelled for the same patient were tested, one sample grouped as B D-positive and the other as O D-negative
- The sample taker confirmed when taking the WBIT sample the patient wristband was scanned with the electronic labelling system handheld device without it being on the patient's wrist
- In addition, no verbal confirmation was done of the patient identity and all of the labelling was done away from the patient

Sample labelling error on a cord sample reveals WBIT caused by dangerous practice

- A cord blood sample was received to check whether anti-D immunoglobulin (Ig) prophylaxis was required for the mother
- This grouped as O D-negative. However, the sample was missing the baby's hospital number, so a repeat sample from the baby was requested, which grouped as A D-positive
- A further sample confirmed the correct group as A D-positive
- On investigation it was discovered that at delivery the placenta and cord had been disposed of in a clinical waste bin
- After realising a cord blood sample should have been taken, the midwife sampled the placenta in the bin
- However there was more than one placenta in the clinical waste and the incorrect one was selected, so that cord blood from another baby was sent
- As a consequence, it had initially been queried whether there could have been a switch of babies, until the discovery of the sampling error
- If the error had not been discovered, then no prophylactic anti-D Ig would have been issued as the baby would have been reported as D-negative

Avoidable, Delayed or Undertransfusion

Failure in correct patient identification contributes to fatal delay in transfusion

- An elderly woman was admitted for elective aortic aneurysm repair
- The aneurysm had been identified when she attended the emergency department (ED) with gastroenteritis
- She was transferred to another hospital where she was an inpatient for several days
- On admission for surgery a week later, blood samples were taken and 6 units of red cells crossmatched
- When the blood was required in theatre a discrepancy in the spelling of the patient's name was discovered (one letter was incorrect)
- The case notes and consent form had the wrong spelling but the blood was labelled correctly
- The units were returned to the transfusion laboratory according to the hospital protocol
- There was subsequently a delay in transfusion which contributed to her deterioration with development of coagulopathy and death later that night

Slow responses and communication failure in a critical situation

- A 65 year old man fell at home and sustained a head injury complicated by a subdural haematoma detected on a scan 3 hours after admission
- Delayed provision of platelets contributed to death
- His platelet count on admission was $9 \times 10^9/L$ (result at 09:48) and platelets were prescribed at 10:36 following confirmation of the low count on a second sample
- The transfusion laboratory, unaware that this was an urgent sample, requested a blood group-check sample at 10:55
- At 13:00 the patient fell a second time. Platelets arrived at 13:26 by standard courier and were issued at 15:30 following the receipt of the group-check sample
- They were transfused at 16:00, approximately 9 hours after admission
- Intravenous immunoglobulin was prescribed at 15:00 but not given until 04:50 the following morning
- The patient deteriorated and died as a result of the head injuries about 44 hours after admission

Delay in collection after crossmatching at the Blood Centre

- A 77 year old was admitted for an urgent blood transfusion from the medical day unit
- She had irregular antibodies and required crossmatching by the local Blood Centre laboratory
- The units arrived on site at 01:30 for her
- However, they were not collected until 09:55 by which time she arrested and died

Lack of leadership

- An 83 year old man with a leaking aortic aneurysm was transferred from another hospital
- The major haemorrhage protocol (MHP) was activated but there was delay and confusion in providing red cells with multiple different people contacting the laboratory, issues with a printer and reluctance of the surgeon to use emergency O D-negative units

Cumulative delays followed by death

- An 85 year old man with pneumonia and a gastrointestinal bleed had Hb 54g/L, the result being telephoned through to the ward at 10:41
- This anaemia was confirmed on a repeat sample, Hb 53g/L
- No request for blood was made at this stage
- A sample was taken at 11:15 for group and screen but was not received by the laboratory until 14:00
- A 2-unit request was telephoned to the laboratory at ~15:15, blood issued and placed into the blood refrigerator by 16:30
- However, the blood was not taken to the patient until 23:00, more than 12 hours after the severe anaemia was identified, when he was found dead

Massive obstetric haemorrhage with slow response

- A 37 year old lady pregnant with twins was admitted at 32/40 weeks with a history of antepartum haemorrhage
- The patient was delivered by caesarean section complicated by major haemorrhage, suffered a cardiac arrest and later died
- The cause of death was acute blood loss
- A delay in activation of the major haemorrhage protocol and a need for earlier involvement of obstetric consultants were noted in the review

Cardiac ischaemia exacerbated by delay

- A 77 year old man with myelodysplastic syndrome was admitted for routine immunoglobulin treatment but reported that he had chest pain in the night
- The Hb was reported as 49g/L at 11:00
- There was difficulty crossmatching resulting in the sample being sent to the red cell specialist laboratory, but the urgency of the transfusion was not communicated to the local nor specialist laboratory so that it was processed as routine and not urgent
- Chest pain recurred in the afternoon and further ischaemic cardiac damage was detected on the electrocardiogram (ECG) with elevated troponin
- The transfusion started at 22:30
- The delay in transfusion was considered to contribute to the myocardial damage

Failures of telephones at two Blood Centres

- An 81 year old man admitted in the middle of the night with haematuria required urgent transfusion of platelets (count $4 \times 10^9/L$) and red cells
- The biomedical scientist (BMS) ordered 2 units of platelets electronically at 03:13
- Approximately 30 minutes later, the emergency department consultant asked for the platelets urgently
- The BMS tried to phone two Blood Centres on two different numbers but all, including the emergency number, were unobtainable
- He was also crossmatching blood, and was unable to find compatible blood
- He then tried to contact the red cell specialist laboratory but again was unable to get through on several attempts
- Eventually, after leaving this number ringing out for approximately 5-10 minutes, it was answered
- He then requested an emergency crossmatch
- This message was not understood, as became evident some hours later, when another BMS working the day shift contacted the red cell laboratory on the same number for an update
- The BMS was advised that she should not be using this telephone number unless we required an emergency crossmatch, to which she replied that she did
- These miscommunications resulted in a delay to the transfusion of both platelets and red cells

Failure of correct patient identification in an emergency

- Two patients with the same first name were having identical procedures in theatre
- The first patient bled excessively, but the MHP was activated for the wrong patient
- Red cells were sent to the clinical area for the patient who was not subject to a MHP
- The blood was returned to the transfusion laboratory issue refrigerator
- Blood was then sent to theatres for the correct patient
- The incident occurred out-of-hours at the end of a week
- The notes of the wrong patient were used for identification

Delay due to power failure at refrigerator

- Red cell units could not be released in an emergency from a remote issue refrigerator due to power failure
- The patient had irregular antibodies and the units had been prepared in advance of his elective surgery but were required urgently when he bled during the procedure (Hb 57g/L)
- After a 20-minute delay group-specific units were supplied from the main laboratory and further units crossmatched

Delay due to computer confusion

- Three units of FFP issued for Patient 1 were returned to stock
- The units were re-issued to Patient 2 on the following day
- On removal from the secure remote refrigerator the 'XM' to 'ISSUE' status message related to Patient 1 not Patient 2 as expected
- The units were now at 'ISSUE' status in the blood inventory on the laboratory information management system (LIMS) for Patient 1, 'ISSUE' in blood product history (audit trail) on LIMS for Patient 2 and 'XM' in patient file in LIMS for Patient 2
- Furthermore the 'ISSUE' status was transmitted to the hospital information system for Patient 1 not Patient 2 so the units could not be electronically given to the correct patient
- This caused significant delay to the patient's transfusion and required a manual process to be applied by the transfusion practitioner
- This is an information technology (IT) issue to be resolved by the provider

Delayed transfusion due to poor practice

- A patient required a 2-unit transfusion following rectal bleeding at 13:25
- A sample with a crossmatch form was sent by the locum doctor but the form was not signed
- The sample was discarded and no further sample received until the patient had a cardiac arrest
- There was a 7-hour delay from the blood being requested to patient receiving a transfusion

Delayed urgent transfusion

- There was a delay of 2 hours to obtain red cells suitable for neonatal use for a neonate with Hb 47g/L, but there was no discussion with a haematologist to consider concessionary release of adult units

Irradiated unit without adequate labels

- A 3 day old baby required urgent red cell exchange for hyperbilirubinaemia
- A suitable irradiated unit was sent from the Blood Centre but without confirmation-of-irradiation labels attached
- The delay to obtain another unit would be 3-4 hours, so this unit was given concessionary release and transfused with a 3-hour delay

Exchange transfusion but poor communication

- A 31 weeks gestation baby at 24 hours of age required exchange transfusion with the decision made at around 01:00
- Neither the verbal or written request indicated that this was an exchange
- The baby's bilirubin levels had been above the exchange transfusion threshold 12-13 hours earlier
- When blood arrived at 03:30 it did not meet the requirements for neonatal exchange transfusion (i.e. blood was not less than 5 days old and was not irradiated)

Communication confusion with misunderstanding of antibody information

- A sample was received for a group, direct antiglobulin test and crossmatch late at night
- The information on the request form stated 'maternal anti-E and -C antibodies' and that the patient had received intrauterine transfusions (IUT) although the question 'Has the patient previously been transfused?' was answered 'No'
- The BMS crossmatched blood appropriate for the antibody information (the IUT and delivery had been performed in a different hospital so there was no way of confirming the maternal details out-of-hours), but the blood was found to be incompatible
- The BMS spoke to the registrar at 05:21 who confirmed the blood transfusion was not urgent yet
- On investigation it was discovered that the information about the maternal antibodies was incorrect. These were actually anti-c and anti-Jka. This explained the incompatible crossmatch
- It then took the Blood Centre a further 5 hours to provide suitable blood
- The baby had a considerable delay to transfusion of more than 12 hours due to inaccurate information being provided initially

Transposition of results for twins results in one delayed and one unnecessary transfusion

- Twins in the neonatal unit had their Hb checked
- Twin 1 had previously been transfused and the Hb was 134g/L
- Twin 2 had Hb 76g/L
- At some point during the night shift the results for Twin 1 and 2 were transposed
- Twin 1 received an unnecessary transfusion resulting in Hb 171g/L
- The staff realised the error when this result was reviewed together with Twin 2's repeat Hb which was 74g/L
- Twin 1 was kept under observation, and Twin 2 given a top up transfusion (post-transfusion Hb 114g/L)
- Fortunately there were no adverse sequelae

Incorrect Hb result obtained from use of wrong point-of-care testing device

- A 64 year old patient was bleeding heavily during arterial surgery (1200mL)
- The anaesthetist asked the operating department assistant (ODA) to order 4 units of red cells and the transfusion laboratory advised that this would take around 40 minutes
- The Hb result of 5.7g/dL from point-of-care testing was lower than anticipated but was feasible in the circumstances
- The anaesthetist decided he could not wait for the crossmatched units and requested emergency O D-negative units instead
- The nurse who came to help in theatre identified that the Hb had been measured using a glucometer and there was no haemoglobin testing device in the department

Prothrombin Complex Concentrate (PCC) Cases

Wrong, wrong and wrong

- An 80 year old man on warfarin was admitted to the emergency department (ED) with possible gastrointestinal haemorrhage
- He was inappropriately supplied with 6 vials of PCC as a 'take home' prescription; this dose was supposed to have been administered while an inpatient when he was first admitted (international normalised ratio (INR) 5.1), but as a result of delay and transfer between wards, the INR fell without treatment to 1.6
- He did not need the PCC at all

PCC administered to wrong patient

- An 82 year old man was admitted to the ED with a 1-week history of reduced mobility and left sided weakness
- A computerised tomography (CT) scan showed a large cerebral haematoma
- The junior doctor tried to contact the neurosurgical team by telephone (at another hospital) to discuss the results of the CT scan
- While she was waiting on the telephone, she was also trying to arrange a CT scan for another patient
- When asked about the patient's INR result she read results from the wrong case notes in error
- Treatment with PCC and vitamin K was advised by the haematology consultant
- PCC was issued and checked with the staff nurse before administration
- Another staff nurse on the ward advised that the patient actually receiving PCC had not had an INR sample taken
- The administration was stopped after 1.5mL
- The patient came to no harm

Inappropriate PCC prescription

- A patient with liver disease and acute renal failure needed a central line
- Coagulation tests showed minimal derangement (normal fibrinogen, borderline activated partial thromboplastin time, and prothrombin time of 22.8 seconds)
- PCC was given inappropriately as it was not indicated for this clinical scenario
- No repeat coagulation tests were performed

Confusion over batch numbers for a blood product

- A dose of 2500IU PCC was requested
- The BMS selected 1 vial from one batch and 2 vials from another batch
- The BMS did not realise the mistake and the wrong batch labels were attached to the vials
- This was not detected at the final check prior to administration

Acute Transfusion Reactions

A severe febrile reaction

- An adult male with chronic bone marrow failure was transfused standard red cells and within 30 minutes he developed severe rigors with dyspnoea, hypertension and tachycardia
- Symptoms and signs resolved on cessation of the transfusion
- Culture of the implicated unit was negative
- Screening for HLA antibodies was also requested and prophylaxis with hydrocortisone and chlorphenamine planned for future transfusions

A moderate febrile reaction resulting in admission

- A girl receiving treatment for a brain tumour attended hospital for a platelet transfusion
- At the end of the infusion her temperature had increased from 37.6°C pre transfusion to 40.1°C
- Other observations remained stable
- Blood cultures were taken; she was given paracetamol, started on intravenous antibiotics and admitted
- Within three hours post transfusion her temperature had returned to normal
- Blood cultures were negative

An anaphylactic reaction with classic rise in mast cell tryptase

- An adult male with chronic bone marrow failure who was refractory to standard platelets, with HLA antibodies, was transfused with HLA-matched platelets
- He rapidly developed hypotension with collapse and hypoxia
- Resuscitation with adrenaline, hydrocortisone, chlorphenamine, intravenous fluids and high flow oxygen was successful
- Serial samples for mast cell tryptase identified a high level at 84 picograms (pg)/L in the first sample taken post reaction, 121pg/L 30 minutes later and a normal level of 9pg/L the following day

An allergic reaction following plasma infusion to reverse warfarin

- An adult male was given FFP prior to cystoscopy to reverse a raised international normalised ratio (INR) of 7 associated with warfarin
- After the first bag had been infused he developed an itchy rash with shortness of breath and chest tightness
- The transfusion was discontinued and adrenaline and hydrocortisone given
- He made a complete recovery.

A severe reaction in a patient with IgA deficiency

- An adult female presented with acute myeloid leukaemia (AML)
- She had been found to be IgA deficient, with IgA antibodies, during investigation for chronic fatigue several years previously but had never received blood
- She was transfused a unit of standard red cells and experienced a severe reaction with nausea, rigors, wheeze and a feeling of impending doom
- She subsequently received washed red cells and platelets without problems, achieved remission and underwent a successful allogeneic stem cell transplant
- The stem cells were washed to remove donor plasma

Haemolytic Transfusion Reactions

Death due to anti-Wr^a following electronic issue

- An elderly male patient with myelodysplastic syndrome (MDS), chronic obstructive pulmonary disease (COPD) and renal impairment, became hypertensive and complained of severe back and abdominal pain 160mL into the first of a two-unit transfusion, which was immediately stopped
- The patient was admitted from outpatients, but continued to deteriorate and died about 12 hours later
- Post-transfusion testing showed an elevated LDH (300U/L), increased creatinine (168 to 251micromol/L) and a raised bilirubin (5 to 101micromol/L)
- The antibody screen was still negative, but a retrospective indirect antiglobulin test (IAT) crossmatch showed the unit to be incompatible and anti-Wr^a was identified in the plasma and in an eluate made from the patient's red cells, and the unit was confirmed as Wr(a+)
- The post-mortem report supported the diagnosis that death was caused by the transfusion reaction

AHTR possibly contributed to death – cause of reaction unknown

- A patient with MDS became acutely unwell 75mL into a red cell transfusion, immediately following a platelet transfusion
- She became acutely short of breath, developed severe rigors and turned blue
- She also passed dark urine, and Hb was confirmed in the urine by dipstick
- Her Hb fell and bilirubin rose from 29 to 40micromol/L
- She was given chlorphenamine, pethidine, hydrocortisone, oxygen and albuterol (Ventolin), and was admitted to critical care but died the next day following a cardiac arrest
- Anti-E was identified post transfusion, but this unit and previously transfused units were confirmed as E-negative, as this was not a new antibody
- The DAT was positive and anti-E was identified in an eluate made from the patient's post-transfusion red cells
- It is possible this was an autoantibody
- Anti-Wr^a was also identified post transfusion, but the unit was confirmed as Wr(a-)
- The cause of death was determined as multiorgan failure and drug-induced myocarditis, however the reporter felt that the transfusion may have contributed

DHTR due to anti-Jka possibly contributed to death of an already sick patient

- An elderly patient was transfused 3 units of red cells in cardiac intensive care over 4 days following heart surgery
- Twelve days post surgery this very sick patient developed anti-Jk^a with a positive DAT, increased bilirubin, a fall in Hb, and spherocytes, suggesting a DHTR
- Her death was multifactorial, but the reporter believes that the reaction contributed to her critical illness

Transfusion- Transmitted Infections

Confirmed bacterial TTI

- A six day old pooled platelet unit was transfused to a female neutropenic patient with acute myeloid leukaemia who was in her 70s
- Fifteen minutes into the transfusion, the patient became agitated and experienced symptoms of rigors, tachycardia and pyrexia
- The patient's temperature spiked at 38.7°C and continued to rise overnight reaching 40°C
- The transfusion was stopped and the patient was given hydrocortisone, chlorphenamine and started on broad spectrum antibiotics, ciprofloxacin, piperacillin/tazobactam and gentamicin
- The patient recovered and was well enough to be discharged from hospital
- Bacterial screening of the pooled platelet was negative at day 7; investigation revealed no obvious errors in either sampling or in the screening protocol
- The same strain of *Staphylococcus aureus* was isolated from patient blood cultures, cultures from the almost empty pack of the transfused unit and skin swabs from one of the donors whose donation was included in the pool
- The strains were compared using molecular typing and were found to be indistinguishable

Possible bacterial TTI

- A seven day old pooled platelet unit was transfused to a female patient in her 50s at a routine outpatient appointment as part of ongoing treatment for aplastic anaemia
- The patient previously had allergic reactions to platelets and was routinely given prophylaxis with hydrocortisone and chlorphenamine
- Half-way through the transfusion, the patient developed rigors and angioedema, but the blood pressure was normal
- The patient was admitted overnight and treated with piperacillin/tazobactam and steroids and recovered
- Bacterial screening was negative and no obvious errors were detected in sampling or screening protocol
- The hospital reported that Streptococci were identified in both the pack and the patient blood culture 24 hours post transfusion

Confirmed viral TTI (1)

- A male patient in the 50-60 age group (life-long vegetarian) with multifocal central nervous system lymphoma diagnosed in December 2014, underwent an autologous stem cell transplant for reversible bone marrow failure and received extensive transfusion support from June 2015
- HEV testing was carried out because the patient developed persistent transaminitis
- The patient eventually died with decompensated liver failure

Confirmed viral TTI (2)

- A male patient in the 40-50 age group with non-Hodgkin lymphoma received 2 doses of platelets and 2 doses of cryoprecipitate (18 donor exposures) on 31st July 2015
- On the 19th October 2015 (80 days post transfusion), he was admitted to hospital with jaundice, nausea and abdominal discomfort
- He was hepatitis A virus (HAV)-, HBV- and HCV-negative, however he was HEV IgG (low) and IgM (high) positive

Confirmed viral TTI 2014

- A male liver transplant recipient received blood components in the perioperative period
- He was found to be significantly HEV viraemic 68 days post transplant (October 2012) whereas he was negative when assessed in June 2012
- The liver donor tested negative for HEV

Transfusion-Associated Circulatory Overload

Confounding clinical features leading to conflicting assessments

- A patient with pre-existing congestive cardiac failure (CCF) and acute renal failure was admitted to an emergency department complaining of shortness of breath and swollen legs
- The patient was prescribed a diuretic and two units of red cells (Hb 74g/L)
- Pre-transfusion vital sign observations were normal except for slightly low oxygen saturation
- After three quarters of the unit had been transfused the patient experienced rigors, tachycardia, shortness of breath, tachypnoea, mild fever, mild periorbital oedema and bilateral wheeze
- The transfusion was stopped and the patient was treated with a bronchodilator, antihistamine and steroid, and continued on oxygen
- Six hours later the oxygen saturation dropped further and crackles could be heard in the chest
- The chest X-ray revealed increased pulmonary oedema compared to the previous image
- Treatment with an intravenous diuretic did not result in adequate diuresis and there was no change to the patient's respiratory function
- The patient eventually recovered and survived

Inappropriate transfusion in a patient with CCF and poor fluid management

- A patient with pre-existing CCF developed rectal bleeding following surgery
- Four units of FFP were given to reverse warfarin over a total duration of one hour (two of which were given simultaneously), and a litre of crystalloid was also given
- Three hours after the transfusion, the patient developed shortness of breath, reduced oxygen saturation, tachycardia, tachypnoea, hypertension and pulmonary oedema
- No fluid balance had been recorded
- The patient's respiratory function improved following treatment with diuretics, antihistamine and nitrates
- The patient required admission to the intensive therapy unit and subsequently recovered

Transfusion-Associated Dyspnoea

An elderly man with renal failure

- An 82 year old man with type-2 diabetes, sepsis and acute renal failure on dialysis was transfused a unit of red cells over one hour
- He developed hypertension (blood pressure 198/111), tachycardia (130 bpm) and wheezing
- He was treated with oxygen, steroids and antihistamines and recovered

An elderly woman with malignant disease and sepsis

- A 69 year old woman with cancer of the lung and neutropenic sepsis (C-reactive protein 279mg/L) was transfused with red cells for anaemia resulting from chemotherapy
- With the second unit she developed rigors, dyspnoea with wheezing, hypertension and hypoxia
- She was treated with antihistamines, hydrocortisone, diuretics and oxygen and recovered, and was transfused again uneventfully four days later

An elderly woman with leukaemia and sepsis

- A 79 year old woman with acute myeloid leukaemia and neutropenic sepsis developed breathlessness and decreased oxygen saturation after transfusion of a unit of apheresis platelets
- Her respiratory rate increased from 20 to 36, her pulse rate from 56 to 101 and her blood pressure from 130/78 to 180/100
- She was known to have pre-existing pulmonary fibrosis with angina and cardiac failure
- Investigations gave no support for TRALI and she was not fluid overloaded

Paediatric Cases

Severe clinical deterioration following neonatal exchange with adult red cells (1)

- A neonate, blood group A, with severe ABO haemolytic disease of the newborn underwent a double volume exchange transfusion, following continuing rise in bilirubin levels despite phototherapy and intravenous immunoglobulin (IVIg)
- There were no clinical problems noted with carrying out the exchange procedure according to protocol but immediately following exchange, the baby deteriorated and developed multiorgan failure with disseminated intravascular coagulation and evidence of ongoing haemolysis
- The baby required resuscitation and multiple blood component transfusions over several days and was also given further IVIg as well as steroids and ongoing antibiotics
- The haematology team liaised closely and gave advice on management but unfortunately did not instigate formal investigations for a transfusion reaction
- The baby was discharged home well several days later

(continued...)

Severe clinical deterioration following neonatal exchange with adult red cells (2)

- Subsequently it was realised that the unit ordered and used for the exchange procedure was an irradiated group O adult unit of red cells suspended in saline adenine glucose mannitol (SAGM), that was not high-titre (HT) negative, containing high-titre anti-A (IgM 1:512)
- The unit had been requested in the early hours of a Sunday morning by a biomedical scientist (BMS) without previous experience of ordering blood for neonatal exchange transfusion and who had last been rotated into the blood transfusion laboratory 3 months previously
- The standard operating procedure (SOP) did not include specific instructions about the correct component to order
- The product name for neonatal exchange units on the Blood Service electronic ordering system drop-down menu is 'Exchange Red Cells Irradiated', without specifying 'neonatal'
- The BMS was confused by this and selected 'Red Cells Irradiated' instead, ticking several additional optional requirements and adding a line note that the blood was required for neonatal exchange transfusion, HT-negative
- The Blood Service staff did not take account of all the line notes as these did not align with the system-controlled component requested by the BMS

Inappropriate method of administration in an emergency

- A 1 year old boy was transferred to the emergency department (ED) from a private clinic with major haemorrhage following circumcision
- He was managed by a paediatric trauma team who activated the major haemorrhage protocol resulting in 2 emergency O D-negative adult units being brought to the ED
- No paediatric giving sets could be found in the ED so the anaesthetist punctured the blood bag several times with needles and syringes and gave blood directly by peripheral venous access with no blood giving set which would normally incorporate a mesh filter
- The punctured bag was found leaking in the sink in the ED
- The child recovered fully

TACO following exchange transfusion for hyperbilirubinaemia

- A preterm baby aged 6 days was admitted unwell with severe hyperbilirubinaemia and acidosis, requiring ventilation
- During the exchange transfusion, the respiratory function deteriorated with decreased oxygen saturations and increased respiratory rate
- The Hb increased from 132g/L to 218g/L following the exchange, and the fluid balance was 105mL positive (45mL/kg)
- The baby developed worsening renal failure, coagulopathy and poor perfusion, had cardiac arrests and died the following day
- It was felt that the exchange transfusion was contributory to the deterioration

TACO following a top-up transfusion

- A 13kg one year old showed evidence of TACO following transfusion of an apheresis unit of platelets (approximately 20mL/kg) followed by 150mL red cells (approximately 400mL in total)

Right Blood Right Patient

Patient identification error

- Using the BloodTrack electronic system a nurse checked the patient's ID band against the compatibility tag on the unit of red cells
- The system alerted the nurse to a wristband compatibility mismatch
- There was a difference in spelling of the surname
- This was the right blood for the right patient and the nurse proceeded with the transfusion ignoring the alert
- The transfusion was stopped because the blood transfusion laboratory staff noticed the alert on BloodTrack and contacted the ward to instruct them not to proceed

Labelling error

- Two units of red cells were issued to a patient where the blood tags were transposed
- The first unit was collected and transfused
- It was not noted that the bag and the label details did not fully match
- The error was identified on checking the second unit prior to transfusion, when the staff realised that the blood tag and blood unit did not correspond
- The staff notified the transfusion laboratory staff of the incident and the unit was returned, the error was corrected, and the unit was reissued and transfused

Bedside override of electronic system results in several units not being checked properly at the bedside

- These incidents (discussed also in Chapter 10, Information Technology (IT) Incidents) are related to a previous 2014 SHOT report in which the BloodTrack electronic bedside checking and tracking was set up and used inappropriately resulting in RBRP checks not being performed
- Despite identification of the problem a further 164 units were transfused in this way over a 13 month period, from November 2014–November 2015

Handling and Storage Errors

Units available beyond expiry and excessive time to transfuse

- A 69 year old male patient received solvent-detergent fresh frozen plasma beyond its expiry once thawed
- Four units were thawed and were to be used by 02:18
- The first two were transfused, however the second two were available for collection at 03:30 and 03:45 respectively
- They were taken to the ward but not started until 07:00, and transfusion was completed at 10:40
- This was 7 hours after removal from cold storage

Cold chain error

- A unit of blood was released by remote issue for a patient and returned to the refrigerator after 46 minutes
- This unit was quarantined by the refrigerator as it was outside the 30 minute rule and should have been wasted
- However, when the unit was returned to the laboratory it was returned into general stock
- The biomedical scientist (BMS) made an error and returned the unit by overriding a computer rule
- It was later issued and transfused to another patient the next day

Administration error

- While attaching a blood administration set to a bag of platelets, the bag was pierced
- The doctor then drew up the platelets into 4x50mL syringes and injected the contents into a bag of saline before infusing into the patient using a blood administration set

Anti-D Immunoglobulin

Assumption coupled with poor handover leads to unmonitored pregnancy

- A biomedical scientist (BMS) tested a woman's sample and found anti-D to be present
- A message was left for the next shift to ask maternity whether anti-D Ig had been administered
- The message was misinterpreted as meaning that the detectable anti-D was prophylactic, and the pregnancy continued unmonitored, along with further prophylaxis
- The baby was born extremely jaundiced, requiring immediate exchange transfusion, but developed complications leading to death

Laboratory report misinterpreted

- Anti-D Ig was issued for routine prophylaxis at 28 weeks from clinical stock, after midwives misinterpreted 'Antibody Screen Negative' as 'D negative'
- The laboratory has changed the wording on their grouping reports to; 'No antibodies detected' in an attempt to stop this happening again

Poor advice from the laboratory

- A woman did not receive anti-D Ig for a sensitising event after the laboratory advised that free anti-D was detectable following RAADP and no further anti-D Ig was indicated
- This is contrary to national guidance that states further anti-D Ig should be given regardless of detectable (prophylactic) anti-D in a woman's sample

System failure

- When a woman was admitted for delivery with spontaneous rupture of membranes it was noted that she had received no appointments with her midwife since her booking blood tests had been taken, and had therefore missed anti-D Ig for RAADP and any sensitising events during her pregnancy

Poor decision following intrauterine death

- A doctor advised that anti-D Ig was not required following an intrauterine death 'unless the woman is actively bleeding'

Poor decision by obstetric doctor

- Anti-D Ig was requested for a woman confirmed to have immune anti-D
- When the BMS challenged the request, the obstetric doctor insisted it was issued and administered

Anti-D Ig issued without reference to grouping results

- During the on-call period, the duty BMS issued 1500IU anti-D Ig to the mother of a baby confirmed to be D-negative
- The BMS was 'very busy' and did not check the LIMS to confirm blood groups before issuing the anti-D Ig

Bedside checking means 'at the bedside'

- Anti-D Ig was issued by the laboratory for a post-natal woman
- The anti-D Ig was checked by two qualified midwives away from the woman and then taken to the wrong woman for administration

Confusion over availability and correct dosage of anti-D Ig

- Two doses of anti-D Ig were available in the refrigerator at the general practitioner (GP) surgery for the same woman
- A 500IU dose had been issued in response to a potentially sensitising event (PSE) some weeks earlier, but never given, the other was a 1500IU dose for RAADP
- The midwife administered the 500IU dose at the 30-week RAADP appointment and returned the 1500IU dose to the laboratory unused

Lack of stock control at GP surgery

- Anti-D Ig was administered by a community midwife from stock held at the GP surgery
- On receipt of the traceability record, the laboratory noted that it had expired three months prior to administration

Inappropriate use and questionable storage of previously issued anti-D Ig

- Anti-D Ig was administered to a woman undergoing a surgical termination of pregnancy
- On receipt of the compatibility tag, the laboratory realised that the anti-D Ig had been issued for a completely different woman six months earlier
- There was no indication of how the anti-D Ig had been stored in the meantime

Post-Transfusion Purpura

PTP followed by immune thrombocytopenia

- A 61 year old multiparous female was admitted with multiple injuries following a road traffic accident. She required several surgical interventions and a total of 5 units of red cells
- Her platelet count was $195 \times 10^9/L$ on admission, $12 \times 10^9/L$ on day 10 and $5 \times 10^9/L$ on day 15. She had petechiae, bruising, wound oozing and oral blood blisters. Platelet transfusions were given without increment
- Serological investigation confirmed the presence of HPA-1a alloantibodies. She received 2g/kg of intravenous immunoglobulin (IVIg) in divided doses (day 17–21)
- Her platelet count remained $<10 \times 10^9/L$. Plasma exchange was performed on 4 alternate days (day 32–39) without effect. IVIg 2g/kg in divided doses (day 43–46) was repeated
- Three days later her platelet count was $448 \times 10^9/L$ and she was discharged. One month later she attended a preoperative assessment clinic
- Further neurosurgery was required but deferred as her platelet count was $43 \times 10^9/L$. No further blood transfusions had been given
- At this point a diagnosis of immune thrombocytopenia (ITP) was made
- She commenced prednisolone 60mg/day and her platelet count recovered to $127 \times 10^9/L$ allowing surgery to be performed. HPA-1a-negative red cells were made available but were not required

Transfusion-Related Acute Lung Injury

A transplant patient with pneumonia

- This patient died following 2 units of red blood cells in optimal additive solution (RBCOA)
- The patient was already on oxygen for pneumonia post autologous haematopoietic stem cell transplant (HSCT) but deteriorated rapidly 20 minutes after transfusion and died of respiratory failure 7 days later
- Serology showed human leucocyte antigen (HLA) class 1 antibodies cognate with the recipient
- The event was classified as probable TRALI and it was assessed that TRALI had probably contributed to his death (imputability 2)

Possible TRALI follows transfusion for a variceal bleed

- This patient developed breathlessness 40 minutes following 6 units of red cells, 4 units of fresh frozen plasma (FFP) and 1 pool of cryoprecipitate for a variceal bleed
- There was pre-existing fluid overload before transfusion and a chest X-ray before transfusion suggested pneumonia
- However antibodies cognate with the recipient were present in one red cell unit and two donors to the cryoprecipitate pool
- The case has been classified as possible TRALI and the patient's subsequent death was assessed as possibly related to transfusion (imputability 1)

A sick patient with multiple contributory factors

- A patient had alcoholic liver disease with encephalopathy and developed hypoxia 30 minutes after a platelet transfusion, but had pre-existing fluid overload and pulmonary effusions
- The cause of death was considered to be hepatorenal syndrome
- Serology showed HLA class 1 antibodies cognate with the recipient
- This case was classified as possible TRALI and death possibly related to transfusion (imputability 1)

Deterioration following HSCT

- A patient with acute myeloid leukaemia (AML) deteriorated during transfusion of the second of 2 units of red cells
- The patient was already receiving inotropic support for neutropenic sepsis following an allograft HSCT for relapsed AML
- Serology was negative
- The case was assessed as unlikely TRALI and death possibly related to transfusion (imputability 1)

Breathlessness due to myocardial infarction

- A patient became breathless 6 hours after a 3 unit transfusion following admission in a state of collapse with a myocardial infarction
- Serology was negative
- The case was classified as unlikely TRALI and death unrelated to transfusion (imputability 0)

Probable TRALI (further details)

- A 60 year old man with multiple myeloma, day 24 post autologous HSCT and with hospital-acquired pneumonia had been stable, maintaining oxygen saturation of 100% on 3L/minute oxygen
- Within 20 minutes of commencing a unit of red cells, respiratory rate increased to 30/minute and oxygen saturation dropped to 70%
- Blood pressure fell to 85/49 from 103/59mmHg at baseline and heart rate rose to 180 from 100 beats per minute at baseline
- Chest X-ray showed bilateral changes in addition to the previously noted lower lobe pneumonia
- The patient was clinically volume depleted and was in negative fluid balance over the previous 24 hours
- An echocardiogram pre transplant had shown good left ventricular function
- Despite ITU admission and ventilation the patient died 7 days post transfusion
- Investigation of the female red cell donor showed HLA-A2 antibodies cognate with the recipient

Cell Salvage

Cell salvage for an obstetric complication associated with disseminated intravascular coagulation (DIC)

- A woman with a low lying placenta and a history of a previous myomectomy was undergoing a lower segment caesarean section
- The initial procedure appeared relatively uneventful and the woman's transfusion requirements included a single bag of packed red cells and 770mL of cell-saved blood
- Two hours later the patient developed gum bleeding and experienced a 600mL haematemesis and the laboratory findings revealed an extremely low fibrinogen especially for a woman at term and in addition activated partial thromboplastin time ratio (APTT-R) and international normalised ratio were both elevated at 2.3 and 2.4 respectively
- Her platelets had dropped to $96 \times 10^9/L$. A diagnosis of DIC was made and the woman treated with 4 units of packed red cells, 2 pools of cryoprecipitate, 3 units of fresh frozen plasma and an adult unit of platelets
- She underwent hysterectomy for Couvelaire syndrome (haemorrhage that penetrates into the uterine myometrium forcing its way into the peritoneal cavity)

New or Unclassifiable Complications of Transfusion

NEC resulting in death, transfusion contributory

- A male 24 day old twin born at 27 weeks weighing 1090g developed NEC within 24 hours of top-up transfusion for symptomatic anaemia of prematurity
- The baby had no symptoms prior to transfusion
- The baby died within 48 hours and the transfusion was considered contributory

NEC resulting in death, transfusion not contributory

- A 1 month old baby (28.4 days preterm) had additional risk factors for NEC (surfactant lung disease and growth retardation)
- The baby developed NEC after transfusion, but had signs prior to transfusion and had received paedipacks from the same donation prior to this
- The baby died but transfusion was not thought to contribute

NEC and intraventricular haemorrhage

- A 1 month old baby (26.6 days preterm) with surfactant lung disease and bilateral intraventricular haemorrhage developed NEC within 3 hours of transfusion
- The consultant could not assess whether the transfusion had played a role; the baby recovered

NEC where transfusion contributed to death

- A 1 month old baby (born at 28 weeks, 830g) developed an episode of suspected NEC on day 4 and recovered with conservative management
- On day 37, now established on enteral feeds, she developed confirmed NEC again 2 hours post transfusion
- The child died 2 days later and the transfusion was considered to be contributory

NEC where transfusion contributed to death

- A 1 month old baby (preterm 23 weeks) had a confirmed episode of NEC at about 2 weeks, then while stable and ventilated, developed another episode 3 weeks later on the same day as transfusion and died within 24 hours with fulminant NEC
- The transfusion was considered to be contributory

NEC post transfusion and recovered

- A 1 month old baby (27 week twin) received a transfusion on day 32
- The baby had respiratory distress prior to transfusion but deteriorated during transfusion requiring cardiopulmonary resuscitation
- Noted to have distended abdomen and was transferred to tertiary care with suspected NEC
- The baby survived

Reaction to intravenous immunoglobulin (IVIg)

- A reminder that IVIg can be associated with serious life-threatening events
- A 56 year old woman with serious autoimmune disease and multiorgan dysfunction suffered respiratory arrest necessitating admission to the intensive therapy unit

Reaction to administration of granulocytes

- A 35 year old with relapsed chronic myeloid leukaemia and fungal infection received granulocytes prepared 'in house' which had not been crossmatched, and developed a rigor with a temperature increase from 36.8 to 39.6°C and tachycardia
- This was a procedural failure associated with a serious adverse reaction
- Granulocytes should undergo the same compatibility testing as red cells, and be ABO-, D- and crossmatch-compatible with any red cell antibodies in the recipient

Unexplained death during transfusion

- A 6 year old girl with scoliosis and a complex medical history arrested and died during a postoperative transfusion
- Although a potassium level done on a point-of-care machine was elevated, the unit of blood was tested for potassium content and was not implicated
- The cause of death was not thought to be related to the transfusion

A reminder to de-activate access to the blood refrigerator when a member of staff is on sick leave long term

- A 57 year old staff member reported to the community psychiatric nurse that she had taken a unit of blood from the laboratory and infused it into herself as part of self-harm
- Her swipe card access to the system at midnight during her admission was confirmed and a unit of blood (group A D-positive) was found to be missing
- The patient's group is O D-positive
- It was not confirmed whether this unit had been self-infused but no reaction was reported
- The security policy was reviewed and changed as a result of this incident

Information Technology (IT)

Electronic prescribing system in paediatric intensive care defaults to adult units

- A 2 month-old child was prescribed 65mL of red cells over 2 hours in a paediatric intensive care unit.
- The electronic prescribing system (for intensive care) automatically defaulted to one adult unit over 2 hours so the child received 141mL before the error was recognised but suffered no ill effects

Donor Haemovigilance

Donor death within seven days post donation but not directly linked to donation

- The donor death reported last year was a 65 year old regular whole blood donor who died suddenly five days after donation
- The donor had not reported any diagnoses of iron deficiency, had no visit to the doctor for heart problems, attendance at hospital for any new illnesses and did not report symptoms associated with iron deficiency
- This donor's general practitioner has confirmed that his death was a sudden and unexpected event in a 65 year old man with moderately well controlled hypertension and no other known significant medical problems
- The cause of death was a large myocardial infarction
- Root cause analysis was undertaken
- It was concluded that it was unlikely that giving a donation of blood was a contributory factor in this man's death

Delayed vasovagal reaction in a regular blood donor resulting in injury/fracture within 24 hours post donation

- This was a 55 year old female donor who had given 45 previous uneventful whole blood donations
- The donor was in good health and reported no active problems. The donation was uneventful
- The donor had received her post-donation drink and had been informed of the applied muscle tension (AMT) exercises
- No bruise was recorded and the donor felt well before leaving the session
- The donor woke up the morning after donation, fainted in the bathroom and fractured her fibula. She was taken to hospital, reviewed by the orthopaedic team and had her leg put in plaster
- The injury in this case was secondary to the delayed faint which is an unpredictable complication of donation. The donor reported that she did not take much fluid after donation, possibly contributing to this
- A root cause analysis confirmed that that there was nothing further that could have been done by session staff on the day to prevent this SAED from occurring
- All standard NHSBT procedures were followed

Venepuncture-related persistent arm pain more than 1 year post donation

- A 56 year old male whole blood donor had donated eight times in the past without event
- In this instance, the donor complained of immediate severe pain on needle insertion described as a shooting/stabbing pain radiating down his forearm coupled with an immediate warm and burning sensation around the wrist area of left arm
- The donor had reported this to staff at the session but the donation was allowed to complete, contrary to standard procedures
- Following donation, he complained of an extremely painful left arm with loss of sensation over the forearm with weakness
- He had no local bruising or swelling and no overt problems with perfusion
- Although the symptoms have gradually improved, the donor continues to experience occasional shooting pains