2021 Annual SHOT Report – Supplementary information

Chapter 11: Avoidable, Delayed or Under/Overtransfusion (ADU)

Additional analysis not included in the main 2021 Annual SHOT Report.

Problems with MHP activations n=51

There were 51 cases with reported activation of the MHP (25 of these occurred out-of-hours)

- 28 delays (2 deaths possibly related)
- 17 avoidable use of O D-negative red cells
- 2 undertransfusion
- 4 overtransfusion

In reporting the answer to the human factors question 'To what extent did poor written, or verbal communication worsen the situation?' 22/51 cases reported 'a lot', 'fully' (together 13/22, 59.1%) or 'some' (9). The majority of these were associated with delay (17/22, 77.3%). Communication issues can occur at several different points and delays accumulate.

Case 11.1: Poor communication and lack of training put patient at risk

A patient in the ICU with multiorgan failure (complications from COVID-19 including sepsis and renal failure) developed major gastrointestinal haemorrhage overnight. The patient had received recent transfusion and so a new grouping sample was required. Two hours later the patient deteriorated and the MHP was activated. The patient received 1800mL red cells, 1000mL plasma and tranexamic acid. The patient died but the delay in transfusion was not considered contributory.

Several communication issues were identified:

- The request for a repeat sample was disregarded by the clinical team
- The BMS did not indicate that emergency blood could be released without a repeat sample if the need was urgent
- The clinical staff did not know how to activate the MHP
- The clinical staff did not inform the laboratory that the MHP was activated so when the porter arrived, the BMS was not prepared
- ICU phones were repeatedly busy when BMS tried to contact them.

Several actions resulted including revision of the activation pathway and training for staff in ICU.

Case 11.2: Poor communication leads to avoidable use of group D-negative red cells

The MHP was activated for a patient with gastrointestinal bleeding but without adequate information. The BMS could not contact the very busy ED on the telephone to find out the patient's age and sex so issued O D-negative units. The patient was an adult male who could have received group O D-positive.

As a result of this case a new mobile telephone was provided and alternative telephone numbers for use in ED for emergency communications.

Case 11.3: Overtransfusion in the ED

A woman in her 60s with a very low Hb of 26g/L received eight units of emergency O D-negative units within an hour (post-transfusion Hb 139g/L) in the ED, and three units of FFP prescribed by a consultant. She was admitted with reduced conscious level. She had no evidence of active bleeding and a known history of iron deficiency anaemia.

Better communication would have identified that group D-positive could be used. Reassessment after two or three units would also have been appropriate. As a result of this case the MHP was modified to include a pre-activation stage that would permit limited release of 2-4 units in the first instance.

Learning points

- Major haemorrhage protocols need to be easy to locate and should be followed
- Streamlined communication helps reduce delays
- Emergency group O D-positive red cells should be used for women over 50 years of age, and men over 18 years of age (unless regularly transfused)

Conclusion

Patients are at risk of death from major haemorrhage, and this is exacerbated by poor communication and delays. Staffing shortages must be escalated and addressed by good capacity planning. There is a need to improve education of medical staff at all grades about anaemia due to haematinic deficiency so that transfusion is not given unnecessarily.

Chapter 11a: Delayed Transfusions

Additional analysis and case studies not included in the main 2021 Annual SHOT Report.

Additional reports of deaths due to delay

Case 11a.21: Severely anaemic infant with failed resuscitation

A baby was born prematurely in poor condition with severe anaemia - Hb 50g/L (probable fetomaternal haemorrhage). A call was made for emergency blood but did not reach the laboratory. Although the call for blood was received by switchboard it was not followed by response from the laboratory before attempts at resuscitation were abandoned.

Case 11a.22: Urgent blood delayed by attempt to collect additional crossmatched units

A man in his 60s suffered variceal bleeding in the ICU. There was delay in making the major haemorrhage call, and in receiving blood from the laboratory due to confusion and delay by the porters. The porter (blood runner) should only go between the transfusion laboratory and the clinicians (not remote refrigerators to collect additional units).

Case 11a.23: Failure to recognise ongoing bleeding in an elderly woman after surgery

A woman in her 90s had a fractured neck of femur. Hb on admission was 120g/L but surgery was delayed for 2 days when the Hb had reduced to 88g/L. This was not communicated to the surgical team. She became hypotensive and unresponsive in the 5 hours after return from theatre, Hb 66g/L. Then she was transfused one unit. The delay and onset of hypovolaemia contributed to her death.

Case 11a.24: Delayed transfusion due to communication failure

A man in his 60s was admitted with a Hb of 32g/L, very unstable and unwell, and was thought to have sepsis. The MHP was activated, two units transfused, and he stabilised. Later he deteriorated again and repeat MHP was called. There was a failure to follow the correct procedures and a 20-minute delay in obtaining emergency blood. Multiple communication issues were identified but the review concluded that the delay likely had minimal impact on the outcome.

Case 11a.25: Transfusion delay with failure to communicate urgency

Following revision of an above-knee amputation the patient (in his 60s) was anaemic Hb 56g/L with renal failure and needed transfusion. The patient had been previously transfused and there was a group anomaly which delayed provision of red cells. The clinical staff had not informed the laboratory staff that the transfusion was urgent. By the time that the blood was available 2 hours from the request, the patient had arrested and died.

Additional case studies

Case 11a.26: Confusion about MHP activation resulting in delay

A young pregnant woman presented at term on Christmas eve with a deceased fetus and sepsis. Emergency caesarean section was undertaken. There was confusion over MHP activation. In this hospital the staff had to contact both the transfusion laboratory and the porters separately. There was only an 11-minute delay.

Case 11a.27: Surgery delayed by 24 hours due to logistics

Logistical problems sending blood samples by air to a transfusion laboratory for crossmatch and receiving the supply of red cells in a patient with autoimmune haemolytic anaemia led to the patient's surgery being postponed for 24 hours.

Case 11a.28: Transcription error causes delay for an IUT

Blood was requested for an IUT. There was a transcription error on the handwritten label accompanying the IUT unit issued from the Blood Service detailing the haematocrit and Hb of the unit. This had a one-digit mismatch for the unit donation number. The mother was already sedated. All details were rechecked, and transfusion proceeded once confirmation was received from Blood Service. This resulted in a delay of 50 minutes.

Investigation established that the correct checking procedure had not been followed when issuing the unit from the Blood Service using a two-person independent check. The SOP has been updated.

Case 11a.29: Delayed provision of platelets requested urgently

Request for an urgent platelet transfusion was delayed. The Blood Centre BMS could not find the emailed order as they were confused by too many email addresses at their laboratory. There was then an additional problem with getting platelets accepted onto a flight at the airport due to changes in procedure. This resulted in a 4-day delay due to the holiday period and restricted flights in the COVID-19 pandemic.

Human factors

Review of answers to the human factors questions are shown in Table 11a.1. Communication failures were identified in 48.0% as a continuing problem leading to or compounding delay. Failures in team function contributed to some extent in 50.3%, and workload issues are also identified in a third of reports. Individual patient factors were much less likely to contribute.

Table 11a.1: Human factors identified in reports of delayed transfusion

Human factors question	Some	A lot	Fully	Total (% of 179)
To what extent did poor written, or verbal communication worsen the situation?	7	61/86 (70.9%)	18	86 (48.0%)
To what extent is the cause of this incident due to any failures in team function?	41/90 (45.6%)	36	13	90 (50.3%)
To what extent was there a mismatch between workload and staff provision around the time of the incident?	23	26/56 (46.4%)	7	56 (31.3%)
To what extent were there reasons that this incident was more likely to occur to this particular patient?	16/30 (53.3%)	11	3	30 (16.8%)

Chapter 11b: Avoidable Transfusions

Additional analysis and case studies not included in the main 2021 Annual SHOT Report.

Additional case studies

Case 11b.8: (ACE) Avoidable platelet transfusion due to a wrong blood in tube sample – drift into poor practice

A man in his 50s was transferred from hospital A, then to hospital B and eventually to a third hospital C for management of a subdural haemorrhage. His admission blood tests at Hospital C, taken in the ED out-of-hours, were significantly different compared to those taken before or afterwards:

Day 1 Hospital A - Hb 138g/L, Plt 348x10^9/L, INR 1.0
Day 11 Hospital B - Hb 154g/L, Plt 433x10^9/L, INR 1.3, Cr 78
Day 12 01.00 Hospital C - Hb 90g/L, Plt 44x10^9/L, INR 2.0, Cr 121 (request stated 'GI bleed')
Day 12 9 hours later - Hb 142g/L, Plt 420x10^9/L, INR 1.2, Cr 64
Day 12 13 hours later - Hb 148g/L, Plt 501x10^9/L

The patient received three units of platelets as a result of the apparent low platelet count. This inconsistency in results was identified 5 days later when blood results before and after showed the discrepancy. The blood group results were consistent with previous ones, but the haematology and biochemistry results suggested they were from a different patient.

Investigation and outcome: This incident of 'wrong blood in tube' was thoroughly investigated and revealed drift into poor practice of phlebotomy in the ED. The TP mapped the blood collection process in the ED and found that the restrictions imposed by COVID-19 had made it difficult and staff were taking the samples away from the bedside to label remotely at a label printer.
The TP, consultant, ED educational lead and link nurse team for transfusion worked together to raise awareness around wrong blood in tube. A governance email was sent out to the entire team to remind them of the importance of complying with the organisations policy for phlebotomy. All staff will now challenge anyone moving away from the patient to label remotely and will ask them to complete the samples in the cubicle with the patient. Educational packages have been put together and further training is planned.

Near miss cases

Case 11b.9: Red cell transfusion in a man with B12 deficiency was avoided

A man in his 40s was admitted with anaemia, with a Hb of 61g/L. He had a documented B12 and folate deficiency. A consultant physician in the medical admissions unit prescribed two units of red cells. This was challenged by the BMS, and transfusion was avoided after discussion with the TP and consultant haematologist. The consultant physician commented 'I have taken on board the feedback from the laboratory and the haematology consultant. At the time I felt the patient's symptoms related to the anaemia warranted a transfusion, but it was made clear to me by the haematology consultant that the risk versus benefit of a transfusion in these cases meant the patient would have to be in a much more dire clinical situation for them to even consider a transfusion'.

The actions included additional education for all acute medical physicians - this is being facilitated by a medical registrar who has a particular interest in restrictive transfusion regimes and alternatives to transfusion in conjunction with the transfusion practitioner. The lead consultant for acute medicine will 'encourage conversations' with haematology relating to transfusion and haematinic deficiencies.

Case 11b.10: Cryoprecipitate ordered based on faulty fibrinogen result

An elderly man had cryoprecipitate ordered on the basis of a wrong result. A low Clauss fibrinogen result was incorrectly reported due to equipment failure following human error on the coagulation analyser. The diluent had accidentally been replaced with bleach and the member of staff did not follow the procedures to perform QC after a change of reagent. This caused false low Clauss fibrinogens. The wrong result was recognised, and transfusion avoided.

Case 11b.11: An elderly lady was prescribed red cells on basis of erroneous Hb result but recognised and not transfused

A blood sample was sent at 04:00. The Hb had dropped to 78g/L (previously 155g/L). Two units of red cells were requested for transfusion. The reason for request was that the patient was bleeding and had a low Hb. Units were available at 05:00. One unit was taken from the transfusion laboratory at 05:39. However a check prior to administration showed a Hb of 158g/L. The red cell unit was returned to the transfusion laboratory. It was thought the low result was caused by a diluted sample.

Case 11b.12: Transfusion of red cells avoided in an infant

Blood was requested for an infant thought to have a Hb of 59g/L during a normal busy morning ward round. The BMS queried the request as the latest Hb of 97g/L for the child suggested this was not necessary. The doctor involved indicated that they may have had verbal notification of the result of Hb 59g/L from a nurse who had confused this with another patient. The result was not checked on the computer system before requesting.

There was confusion between the patients on the ward with a similar name. The actual result of Hb 59g/L triggering the transfusion request was for another patient with a different name (and was also inaccurate due to partial clotting in the sample).

The request was cancelled a few minutes after submission, but the doctor was not aware that he needed also to contact the blood transfusion laboratory. The laboratory does not use the same IT system so there is no electronic system in place to inform the laboratory of the cancelled request. The doctor is now aware that all cancelled blood transfusion requests must be followed by a call to the laboratory.

It has been reinforced that staff must check the patient ID and latest blood results before authorising a transfusion. Clinical staff should contact the blood transfusion laboratory by telephone to cancel requests. The Transfusion Practitioner team will explore possible electronic solutions.

Chapter 11c: Under or Overtransfusion

Additional analysis and case studies not included in the main 2021 Annual SHOT Report.

Additional case study

Case 11c.5: Transfused cell salvage blood leading to a high Hb

A man in his 50s was admitted with severe abdominal pain and was taken straight to theatre. The MHP was activated when ultrasound examination confirmed the diagnosis of ruptured abdominal aortic aneurysm, (within an hour of admission). Surgery was complex with massive haemorrhage and haemodynamic instability. He received 10L of crystalloid, 14 units of red cells, three platelet concentrates, and fibrinogen concentrate. The Hb prior to reinfusion of cell salvage was 133g/L at 22:54: he then received 1022mL cell salvage. The resulting Hb was 209g/L (at 04:07) and he was venesected 500mL at 12:00.

A similar case had occurred at this hospital in 2020 and was also reviewed. The review noted that cell salvage infusion may not have been required, and Hb was not monitored while it was given. Although initially it was thought that the death was possibly related to the transfusion, the final case review concluded that the overtransfusion did not contribute to the patient's death.

Who authorised the transfusions?

7/12 overtransfusions in children were authorised by paediatric staff, 3 by haematologists and 1 by a gynaecologist (1 not specified). Where specified these were speciality registrars in 6, consultants in 2 and a FY2 and a registered nurse in 1 case each.

Case 11c.6: Calculation error that illustrates the pitfalls but also safety mechanisms that worked

Overtransfusion of paediatric patient. The Hb was 68g/L and there was an error in calculating the required dose (mL) of red cells. The registrar used g/L (68) to calculate the volume rather than g/dL still in use in this department (6.8). The intended amount therefore was a tenfold error (432mL rather than 43.2mL). A safety net on the formula states a maximum transfusion volume of 20mL/kg (170mL) therefore this is how much was prescribed. The nurses checking prescription both stated they did not check the formula themselves. After handover a new nurse realised patient had received 110mL (12mL/kg) and paused the pump as it is unusual to give more than 10mL/kg to a patient with liver disease. Repeat testing showed Hb was 96g/L.

The outcome of this episode was to revise the formula for blood transfusion to reflect g/L and no longer use g/dL.

Case 11c.7: Excessive transfusion related to use of wrong calculation

A young child with malignant disease had Hb 56g/L, weight 7.5kg was transfused two adult units of red cells resulting in Hb 216g/L. The child required venesection. The error was similar to the case above. The doctor used calculation designed for Hb g/dL but put in Hb in g/L so the volume was a factor of 10 out.

Case 11c.8: Absence of sense-check

A paediatric patient (<5 years of age) had an incorrect amount of blood prescribed; the patient was prescribed as if they were 46kg instead of actual weight of 13kg (and at the rate of 150mL/hour instead of 65mL/hour). Hb was 122g/L pre transfusion, Hb 184g/L post transfusion.

Near miss cases

Case 11c.9: Inappropriate rate of transfusion avoided

An elderly patient with renal and cardiac impairment was prescribed four units each over 2 hours prior to surgery with a target Hb of 100g/L. A nurse raised the possible risk of TACO and this was changed to two units over 3 hours each. The doctor had not received any transfusion training.

Case 11c.10: Patient nearly given a second unit that was not indicated

A single red cell unit was ordered for a regularly transfused patient. The crossmatch was done at the Blood Service and as a precaution a second unit was also issued. In error, both units were collected and placed in the day case blood refrigerator. The second unit was taken to the bedside but not transfused as the bedside check found that it was not prescribed. It was returned to the blood transfusion laboratory.

Case 11c.11: Nearly transfused on a wrong Hb result

A woman suffered abruption of the placenta at term with estimated blood loss of 1322mL. Her Hb post-delivery was 88g/L and she was transfused three units of red cells. A Hb taken 6 hours later was reported as 58g/L but this was an error. The patient was stable, and the correct result was 88g/L and further transfusion was avoided. The laboratory staff member who telephoned the low result noted that there was no time recorded on the sample or form.

Case 11c.12: Overprescribing for an infant

An infant <24 months of age had an adult unit prescribed (275mL) but only required 196mL. Fortunately, this was recognised during transfusion and corrected.

Case 11c.13: Weight wrongly recorded in a child

A child (<10 years of age) was prescribed an inappropriate volume of red cells as the weight was wrongly recorded as 33kg when it was 27.4kg, but the transfusion was not given.