ERROR REPORTS: Human Factors

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In the Annual SHOT Report for events in 2014 we drew attention to the role of 'human factors' in medical errors. Again in 2015, 77.7% of all reported incidents resulted from errors, often multiple, and similar data emerge in the reports to the Medicines Healthcare Products Regulatory Agency (MHRA), where 96.7% of serious adverse events were attributable to error.

There is increased recognition of the importance of speaking up when things go wrong (Dalton and Williams 2014; Francis 2016). The recommendations from these reports and the establishment of an independent patient safety investigation service with a healthcare safety investigation branch (HSIB) expert advisory group will contribute to a better reporting culture and improved patient safety (Public Administration Select Committee 2015). Recently Health Education England (HEE) published its report on education and training for patient safety (HEE 2016). Twelve recommendations are made, the first of which is to 'ensure learning from patient safety data and good practice'. This emphasises the importance of participation in reporting to confidential enquiries such as SHOT. Recommendation 5, 'supporting the duty of candour..', notes the importance of a 'culture of openness and transparency'. Recommendation 11 notes that 'principles of human factors and professionalism must be embedded across education and training'. The findings of the 2015 NHS Staff Survey reported that 25% of staff reported witnessing an error or incident that could have harmed patients or service users but many did not feel their organisation treated staff involved in such incidents fairly, only 23% felt action was taken to stop this happening again, and only 19% reported adequate feedback (NHS Staff Survey 2015).

SHOT-reported incidents were probably among the 49,000 incidents of moderate harm and 4,500 of severe harm reported to the NHS in 2013/14. Half of patient safety incidents are thought to be avoidable, and SHOT data show that for transfusion more than three quarters of incidents result from errors. Is reporting complete? Almost certainly not and overall may be as low as 5% (Yu et al. 2016, Shojania 2008). Multiple errors contribute to many events, as we have recorded with incidents of incorrect blood component transfused over the past 3 years. The case below illustrates several points but it is notable that it was not reported to SHOT as a transfusion-related death. Indeed there may be a reluctance to report the most serious events, but it is recognised that it is essential to do so in order to learn.

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

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. 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.

Comment: There were at least 10 different errors and missed opportunities across two pregnancies. The incident review noted task factors, individual staff and several communication factors (wrong assumptions, failure to pass on messages, shift changes, misinterpretations). It concludes 'the lack of a robust system led to the mother and baby not being managed appropriately'.

This case demonstrates how 'patient safety incidents…are mostly a result of a complex interaction of human factors and system or organisational problems' (HEE 2016). Similar features are present in the following cases:

- Case 2 below
- Case 7.1 in Chapter 7, Avoidable, Delayed or Undertransfusion (ADU), delayed transfusion resulting in death
- Case 6.1 in Chapter 6, Incorrect Blood Component Transfused (IBCT), an ABO-incompatible transfusion to a patient with sickle cell disease due to a combination of biomedical scientist error, a computer system that had not been set up properly and compounded by poor clinical care
- Case 16.1 in Chapter 16, Paediatric Summary, describes severe deterioration (with survival) after neonatal exchange transfusion (for severe HDFN) performed using an incorrect component

Dismissing staff or taking cases through the adversarial legal system are unlikely to foster confidence and a good reporting culture (Dekker 2012). Dekker notes that 'a nurse was criminally convicted for a medication error of a kind that was reported to the regulator more than 300 times in that year alone'. Note also that '..a lack of transparency around mistakes and a culture of victimisation undermine patient and staff wellbeing. Eradicating the current blame culture is key to improving transparency' (HEE 2016). Despite this and the need for transparency and our duty of candour over untoward incidents, Vaughan notes an increasing trend for criminal investigation into 'potentially avoidable patient deaths' with 10 instances of health professionals facing criminal charges over a 12 month period (December 2014 to December 2015); two were convicted of manslaughter by gross negligence, one acquitted and the others not yet concluded (Vaughan 2016).

Human factors is defined simply as 'anything that affects an individual's performance' (HEE 2016) and includes the working environment, layout, staffing, team working and many other aspects including the individual's sense of value in the work being undertaken. Human error can be seen as a symptom rather than a cause. This approach is the opposite of the tendency to amplify the individual's role while shrinking the role of other contributors and context (although this does not exclude individual accountability). Health service staff are under increasing pressure exacerbated by understaffing and low morale (e.g. 2 in 5 consultant physician posts not filled in 2015, gaps in trainee rotas (Dacre 2016) and a third of general practitioner training posts unfilled; there is also evidence from the United Kingdom Transfusion Laboratory Collaborative (UKTLC) survey of transfusion laboratory staff 2015). Under these circumstances errors are more likely and those who make mistakes need support and the confidence to share what happened and to learn from it. Much can be learned from 'patient stories' and the case vignettes in the Annual SHOT Reports are a much valued source of educational material. A recent publication looks forward to consider how patient safety can be improved in future (Yu et al. 2016) at a time when overall patients are older with more complex needs and an increasing number of comorbidities. This report summarises a safety strategy which has four pillars:

1. A systems approach

2. Improving the culture ('Culture counts') through 'an inspiring vision and positive reinforcement, not through blame and punishment'

3. Patients as true partners

4. Bias towards action

The following chapters of this 2015 Annual SHOT Report (5 to 10) are all concerned with errors in transfusion practice, some resulting in death of the patient or serious harm. The working environment plays an important part in transfusion safety. Staff take short cuts and do not follow the safe procedures. This was evidenced by the case described below (Case 6.3 in Chapter 6, an ABO-incompatible transfusion).

Case 2: 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.

Comment: Additional information from the staff statements gives a better picture of the circumstances that led to the error:

- A senior nurse was working with two newly qualified nurses and two healthcare assistants on a shift from 07:00 to 19:30. The staff statement noted that the correct staffing levels were in place
- The ward had 15 patients, a number of them with high dependency, and 8 were confused
- Nursing staff lacked confidence in a locum doctor, who had to be shown how to complete the form to request blood
- Blood samples were taken at approximately 12:30, but by 16:00 it was discovered the patient needed a second sample before crossmatching, so the blood for transfusion was not ready until 18:00
- When the blood was ready, collection was delayed as a bariatric patient was admitted to the ward requiring 6 staff for transfer
- The blood for transfusion was delivered at approximately 18:45, although staff were aware of the policy that transfusion should not be given overnight
- A night shift nurse arrived 15 minutes early and started her shift, because she had worked the previous night and knew the ward was busy with confused patients. She offered to help with the transfusion as day staff needed to do the shift handover
- When the transfusion was about to be started the telephone rang and was answered by one of the day nurses involved in checking the blood. She began talking about a different patient in 'bed three'
- While walking to the patient to begin the transfusion one of the nurses who had checked the component was needed to help an unsteady patient to the toilet and back to bed
- The night nurse incorrectly went to set up the transfusion on the patient in bed three (the wrong patient) and did not start patient identification checks, as she knew the patient from previous shifts
- The patient in bed two became agitated which distracted the night nurse from completing the wristband check on the patient in bed three, who then received an incorrect transfusion

The outcome of the review was to apportion blame solely to the staff involved and to require them to attend retraining and further education. That may improve the practice of those individuals, but it does nothing to change the environmental aspects associated with this case which were:

- An institutional acceptance of poor levels and mix of staff for the number of high dependency patients, e.g. newly qualified nursing staff, a locum doctor and the night nurse starting early

- A shift pattern of over 12 hours, so some staff involved were in their 12th hour of working when the incident happened
- Lack of communication between the laboratory and the ward about the need for a second sample, which led to delays and contributed to the transfusion being scheduled at an inconvenient time
- An acceptance by more than one member of staff that it was appropriate to amend standard procedures, e.g. two staff doing the 'bedside check' away from the patient, all staff prepared to transfuse overnight against their policy
- Multi-tasking and being distracted when involved in a critical task, e.g. answering the phone, dealing with agitated or dependent patients
- Insufficient time and resource to do a shift handover

Procedures may be in place but not followed when there are staff changes as evidenced in Case 3 below where several transplant patients were put at risk of wrong transfusions.

Case 3: 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.

The root cause analysis noted 'complete breakdown in the previously robust system for notifying the transfusion laboratory of prospective transplant patients'. The co-ordinating team consists of a clinical nurse specialist, an administrator and a middle-grade doctor. During this period the transplant unit had been relocated and there had been 5 temporary administrators and 4 different doctors. Several different errors were identified including admission checklists not completed, filing of transplant documentation not done and the medical and nursing staff were not sufficiently competent to identify the specific requirements for transplant patients. The investigation resulted in immediate changes in practice (total 17 actions) including a new standard operating procedure for notifying the transfusion laboratory and increased staffing for the transplant unit.

Errors categorised as near miss are no less serious than those that cause actual harm. Two examples are given below.

Case 4: 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.

This was discovered because of a grouping discrepancy, but could have led to a transfusion of group A red cells to a group O patient.

Case 5: 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.

Why don't people learn from mistakes?

The world is seen as a simple place

Humans have a tendency to construct stories around facts, which serves a purpose in making sense of the world that might otherwise be seen as too complicated. The natural instinct is to make patterns in order that the world is seen as a simple place, so a narrative is often constructed to explain the facts. Humans are hard-wired to try and turn chaos into order, so they can feel in control of their world. However, this can be termed 'narrative fallacy' (Taleb, 2007) because these rationalisations come after the effect and are not based on empirical data. Scientists are always warned to avoid hindsight bias, but humans have an innate tendency to such bias with the use of the narrative fallacy. By creating a story, the individual may feel comforted and safer, but they are not learning from the event.

Narrative fallacy means that against all logic, individuals often do not learn from adverse events. Instead of seeing the error as a learning opportunity, the event is rationalised in a more comforting way and the bias of the narrative fallacy means they convince themselves of a less personally threatening story or narrative, including blaming others or over-emphasising the rarity of the danger. Errors are more likely to continue if there is greater belief in the stories instead of a dispassionate examination of the facts and data.

Case 6: 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.*

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.

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.*

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