Update from SHOT Mini Symposium at BBTS Conference 2016

Lunchtime Lecture Manchester, Thursday 03 November 2016

Alison Watt – SHOT Operations Manager
SHOT BBTS mini symposium contents

1. Why do we make mistakes? Human factors in transfusion practice - Alison Watt & Paula Bolton-Maggs
2. Transplantation and transfusion slip-ups - Paula Bolton-Maggs
3. Information technology, when it is not your friend! - Megan Rowley
4. Immune anti-D detected for the first time in pregnancy: preliminary results of cases reported to SHOT from 2012-2015 - Paula Bolton-Maggs
5. Multiple laboratory errors resulting in transfusion of incorrect blood components - Hema Mistry
Why do we make mistakes?
Human factors in transfusion practice
Alison Watt & Paula Bolton-Maggs
To err is human  (Pope)

‘Human Factors is using what we know about people to design safe, effective and efficient systems.’ Beverley Norris, Human Factors Lead, NPSA

‘Every system, process, machine, tool or act that a human devises, uses or does is prone to error and failure. The study of and the learning from this simple truth is the basis of Human Factors.’ Chris Seal, Airline and Military Pilot and Human Factors Consultant
The greatest risk from transfusion is that somebody will make a mistake

In first Annual SHOT Report (1996-7) 48% cases were errors

In the last three Annual SHOT Reports 78% cases were errors

- Are things getting worse?
- Or are more errors reported?
- The error rate is definitely not improving
Not just in transfusion
Being set up to fail, an accident waiting to happen
Errors have been made in theatre with point-of-care testing
Lethal intrathecal vincristine 2001

- 18 yr old in complete remission from acute leukaemia died 4 weeks after event
- 14 separate factors
- Swiss cheese model

- Communication and hierarchy problems
- Assumptions and ‘newcomer syndrome’
- Physician and pharmacy error in 69% of 55 cases 1968-2006
An unexpected death

29 March 2005, Elaine Bromiley, a 37-year-old mother of two had routine minor surgery

**Failure of situational awareness**

Anaesthetist’s perception of elapsed-time failed while trying to intubate

Nurse tried to intervene, but failed, partly due to issues of theatre hierarchy

This contributed to the introduction of the WHO Surgical Safety Checklist, 2009

(28 years after air industry’s Crew Resource Management in 1981)
Quotation from Independent Report into death of Elaine Bromiley

“So that others may learn, and even more may live.”

Martin Bromiley, husband of Elaine, airline pilot and founder of Clinical Human Factors Group (CHFG – www.chfg.org)
Sherlock Holmes - The curious incident of the dog in the night time ... it didn’t bark

Noticing when things do not go as anticipated
Case Study: Situation awareness and persistence prevents incorrect transfusion

- Major haemorrhage, so porter was sent to get the emergency O D-negative blood
- Instead of the emergency O D-negative, he took 2 units O D-negative that were cross matched for a patient
- However, porter noticed the labels on the blood with a different name, so questioned this on arrival to patient
- Doctor said it was ok and started to run the blood through the giving set
- The porter was still concerned and went to the sister in charge and highlighted that the blood had someone else's name on it
- Sister stopped the doctor proceeding with the transfusion before the unit was connected to the patient
Key Recommendation from Annual SHOT Report 2013

Process redesign

Annual SHOT data consistently demonstrate errors to be the largest cause of adverse transfusion incidents.

In line with human factors and ergonomics research it may be better to redesign the transfusion process by process mapping and audit at local and national level, to design out the medical errors.
SHOT investigating a different approach

- **Safety-I** Situations where nothing goes wrong and responses are **reactive** – responding to adverse events when they happen: fire-fighting

- **Safety-II** Working environment where things go right. It is **proactive** – adjustments to performance so that risky situations do not occur
Study One - Retrospective analysis of reports to SHOT

- What went wrong in actual SHOT incidents (Safety I)

- What went right to stop an incident so that it therefore became a near miss, with no patient harm (Safety II)
Study Two - Prospective analysis of reports to SHOT

- Development of a Human Factors Investigation Tool (HFIT) for use by transfusion incident investigators to rank incidents by the relevant human factors

- Draft v1 live since Jan 2016 in SHOT Database ask for score out of ten for:
  - Staff
  - Environmental
  - Organisational
  - Government
Study Two – Prospective analysis of the transfusion process (in partnership with National Comparative Audit)

- To define the critical control points of the transfusion process within healthcare establishments

- To make Human Factors recommendations for improved practice
Resilience

- The intrinsic ability of a system to adjust its functioning before, during or after changes and disturbances, so that it can sustain required operations under both expected and unexpected conditions.
- Requires the abilities to anticipate, to monitor and respond, and to learn.
Demonstration of resilience

When you walk through a crowd like this, how often do you make minor adjustments to avoid bumping into people?
Incident investigation and feedback is very important

- Why did it happen?
- What can be learned from it?
- Corrective and preventative actions to reduce likelihood of recurrence
Learning from what goes wrong

- Concept of a ‘just culture’
- Incident reporting more likely if non-punitive – trust is critical
  - Avoid ‘omerta’ the code of silence
- Accountability
  - Looking backwards for a scapegoat to blame
  - Looking forwards to see what can be learned and changed to avoid recurrence

Just culture: Sidney Dekker 2nd ed. Ashgate 2012
Thursday May 29th 2014

Local newspaper - Front page headline:

HOSPITAL STAFF SACKED OVER BLOOD BLUNDER

Two workers dismissed for putting patient’s life at risk

What message does this give to staff?
The behavioural range: Incident Decision Tree guides decisions in the grey area

10% Culpable
- Sabotage
- Substance abuse
- Reckless violations
- etc.

90% Blameless
- System-induced violations
- System-induced errors
- ‘Honest’ errors
- etc.

(James Reason, 2004)
Shared learning

“Learn from the mistakes of others. You can’t live long enough to make them all yourself.”

Eleanor Roosevelt
Transplantation and transfusion slip-ups
Paula Bolton-Maggs
Alison Watt
Debbi Poles
Transfusion risks in transplantation

- Patients receiving transplants, solid organ or haemopoietic stem cell transplants (HSCT) need careful attention in provision of blood component support, especially when donor and recipient are ABO or D nonidentical.
## Compatibility of ABO groups

<table>
<thead>
<tr>
<th>Major</th>
<th>Minor</th>
<th>Major plus minor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recipient plasma contains antibodies which react with donor red cells</td>
<td>Presence of antibodies in donor plasma which react with recipient red cells</td>
<td>Bidirectional incompatibility</td>
</tr>
<tr>
<td>Donor group A, recipient group O</td>
<td>Donor group O, recipient group A</td>
<td>Donor group A, recipient group B</td>
</tr>
</tbody>
</table>
Transfusion is complicated!

Figure 1: Strategy for the provision of blood components in ABO mismatched HSCT

- **Major ABO incompatibility**
  - Red cells
  - Plasma/platelets

- **Minor ABO incompatibility**
  - Red cells
  - Plasma/platelets

- **Major and minor ABO incompatibility**
  - Red cells
  - Plasma/platelets

1. HSCT
2. ABO antibodies to donor RBC not detected. Direct antiglobulin test negative
3. RBC of recipient group no longer detected

*Or recipient-type red cells. Modified from Practical Transfusion Medicine with permission (Figure 27.3, page 138). Practical Transfusion Medicine (Third Edition) Murphy MF, Pamphilon D, Wiley-Blackwell Publishers 2009; 138
Haemovigilance data

- An analysis was undertaken of 6 years of SHOT incident reports that related to transfusion of patients undergoing transplantation 2010-2015
Total transplant transfusion errors
2010-2015 n=284

212 HSCT, 72 Solid organ
What were the errors in HSCT?

<table>
<thead>
<tr>
<th>Classification of errors</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific requirements not met</td>
<td>62</td>
</tr>
<tr>
<td>Incorrect ABO group given (12 platelets)</td>
<td>52</td>
</tr>
<tr>
<td>Incorrect D group given</td>
<td>21</td>
</tr>
<tr>
<td>Near misses, error discovered before transfusion</td>
<td>74</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>212</strong></td>
</tr>
</tbody>
</table>
ABO/D HSCT errors 2010-2015

NM = near miss
Types of laboratory error

‘Flags’ means patient warnings added to the laboratory information system.
Case Study - Potential HSCT donor group entered into the recipient’s record in the lab

- Group B D-positive had been entered into the patient’s record, but the current specimen from the patient (5 days later) was found to be A D-positive.
- Investigation identified a transcription error: the original specimen was from the planned HSCT donor for the patient.
- This was grouped as B D-positive and entered against the patient’s record and not the donor’s.
- Both donor and recipient groups were checked on new samples.
Types of clinical error

- Communication
- Lack of knowledge / understanding
- Identity
- Decision making
Case Study - Haemolytic transfusion reaction

- A 48 year old woman with AML, originally blood group A, received allograft from donor of blood group O
- 10 days post transplant she received 4 units of group A and developed intravascular haemolysis with jaundice
- The laboratory system had not been updated with transplant information
# Reasons for errors

<table>
<thead>
<tr>
<th>Causes of errors</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor communication</td>
<td>113</td>
</tr>
<tr>
<td>Flags on laboratory information management system (LIMS) not updated or heeded</td>
<td>73</td>
</tr>
<tr>
<td>Lack of knowledge</td>
<td>20</td>
</tr>
<tr>
<td>Other</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>212</td>
</tr>
</tbody>
</table>
Surprisingly poor communication

Lack of communication n=113/212 (53.3%)
- Between the clinical team and the transfusion laboratory
- Between different clinical teams for patients receiving shared care between the transplant centre and their local hospital

- 53 cases with failure to inform the laboratory that a HSCT was taking place with ABO group change
Incorrect ABO blood group transfused due to lack of communication

- A staff nurse noticed a patient was being transfused with group A red cells, but knew the patient had received HSCT from his sister (blood group O) 7 days previously.

- The staff nurse contacted the transfusion laboratory, but there was no indication on the laboratory information management system that the patient had received an ABO-incompatible transplant.

- The BMS confirmed that group O units should have been issued to the patient and the transfusion was stopped when the patient was receiving the second unit of group A red cells.
Case study part 1  **Unacceptable failing**

- A patient was incidentally noted at a laboratory meeting to have had an allo HSCT
- No information had been supplied about ABO group change or specific requirements
- 2nd case identified within a month due to a mixed field reaction in the group
- Subsequent retrospective review (8 month period) found 17 HSCT had taken place that were not known to the laboratory
Case study part 2 *Poor communication puts patients at risk*

- 6/17 HSCT were allografts (others autografts)
- 4/6 had received incorrect blood group components issued by electronic issue and not IAT crossmatch
- Fortunately only 1 received ABO incompatible components but had no reaction
  B D-pos recipient, A D-neg stem cell donor
Case study part 3 Root cause analysis

- The transplant unit had moved in 2014 with some changes in team structure
- Turnover of staff, 5 temporary BMT administrators and 4 different doctors as BMT co-ordinators, so lack of continuity
- Failure to complete procedures correctly in several different ways: a complete breakdown in established protocols

‘Human Factors’
SHOT recommendations 2012

- A written transplant programme detailing key dates and blood group information
- Send to lab with confirmation of receipt
- Ensure any shared care hospital including its laboratory is informed
- Guidelines should be developed to cover communication procedures
Information technology, when it is not your friend!
Megan Rowley
IT is our friend, obviously!

- We couldn’t run a modern transfusion laboratory without IT.
- IT supports healthcare systems by reducing/replacing manual processes.
- IT provides an accessible, permanent record.
Dependence on IT

- We have learned that we can’t manage without well designed, fully functional IT systems

- Does transfusion IT get a perfect score?
IT can be a ‘foe’ sometimes

1. We don’t always get the IT systems we need
   – IT providers don’t listen to what we need
   – We can’t afford the systems we want
   – Excellent IT systems are no good to us if they don’t ‘join up’ with each other

2. Humans still have to operate IT systems
   – We need training, we make mistakes, we get angry

3. Data is no good to us unless it becomes information that we can use (easily)
What has SHOT said about IT errors?

Defined as cases identified where IT systems:

- may have **caused** (or contributed) to the errors reported
- have been **used incorrectly** resulting in an error
- **could have prevented** errors but were not used or available
Reason for increase in 2012?
Mainly RBRP and SRNM
IT errors

Information Technology

We will also consider the training of software...er software sho...n (LIMS) re...l laboratory computer...e cell was weakly positive...

Computerised systems have been conducted at a few...
Timeline summary - early years

1998 - Access to records should be available at all times

1999 - Called for increased resources to develop electronic “positive identification” systems + SHOT Workshop on bedside technology

2000 - IT systems should communicate effectively and work in collaboration

2001 - Highlighted lab IT flags being overridden Automation and computerisation are not infallible

2002 - An ABO incompatible transfusion was prevented by the use of an electronic barcode reader
2003 onwards — guidelines and development
<table>
<thead>
<tr>
<th>Error</th>
<th>No. of reports</th>
<th>Non-irradiated unit transfused</th>
<th>Antigen positive unit transfused</th>
<th>Non-CMV Neg unit transfused</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Records not merged</td>
<td>6</td>
<td>2</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Computer system ‘down’</td>
<td>6</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1 (transcription error)</td>
</tr>
<tr>
<td>Historical record not consulted</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Protocols for searching previous records insufficiently flexible</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Ignored warning flag</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Data not transferred from old system</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1 (ABO mismatch)</td>
</tr>
<tr>
<td>Failure to update warning flags</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1 (MB-FFP for a child)</td>
</tr>
<tr>
<td>Inappropriate electronic issue</td>
<td>6</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>2 Protocol violations</td>
</tr>
</tbody>
</table>
2009 – UKTLC recommendations

UK Transfusion Lab Collaborative (UKTLC) IT recommendations

It is expected that:

1. All laboratories will have complete walk-away automation which is in use 24/7, with bidirectional interfaces to the LIMS. In the absence of complete automation, documented measures must be taken in order to mitigate procedural laboratory errors.

2. The Electronic Issue of red cells will be introduced when the laboratory infrastructure is robust and supports this procedure.

3. Where remote issue of components is being considered as part of service delivery, consideration will also be given to installing complete blood tracking (vein to vein) as an integral feature of this development.

Original UKTLC minimum standards
In 2015, of those laboratories who responded (n=279):

- **100%** have a LIMS
- **11%** (31/279) have no automation for Group & Screen during core hours
- **2%** (4/248) have no interface between the LIMS and automated analysers
Promoting the current positives

- The LIMS is configured to ensure patient safety
  - Prevent issue of ABO-incompatible blood
  - Use computer algorithms to permit electronic issue
  - Alerts, warnings and logic rules ensure specific requirements are met

- National standardised specifications
  - Compliance with regulations, guidelines and emerging clinical requirements
  - Structure the dialogue between suppliers & customers
Developing IT systems

Electronic blood management systems
- ‘vein-to-vein’
- giving the ‘right blood’ to the ‘right patient’
- Supported by NICE – model business case from Oxford

Joined-up IT systems
- Use of NHS (or CHI) number throughout
- Electronic transfer of information
- Access to information on patients with complex transfusion requirements
  - NHSBT SP-ICE
Human Factors

- People circumvent the barriers and prompts put in place
  - Override or ignore error messages for ABO-incompatible blood or specific requirements
  - Use other people’s ID badges (or logon details) to gain unauthorised access

- Unable to issue/access blood because of unfamiliarity with IT systems
  - Can result in delay
  - Hit the emergency button!
Case study - Systematic Misuse of ‘Emergency’ Bedside Check

- A hospital audit noted that 273 units were transfused by 105 different staff bypassing the final bedside check because a beside tracking system had been set up to suit local preferences rather than as the manufacturer intended.

- Following year, using the same system, 162 units were transfused by 58 staff in the same (incorrect) way because the corrective action had not yet been implemented.
Validation

- SHOT has repeatedly shown that incompletely validated systems can put patients at risk
- Applies to new systems and when existing systems are upgraded
  - Use a broad range of scenarios covering the whole spectrum of transfusion practice
  - Costly and time consuming but essential
Training

- Explain the purpose of flags, alerts and warnings
  - designed to protect patients from human error
  - important to use systems correctly and as intended
- Cover routine and emergency situations
  - IT systems support both safe and timely blood supply
Is IT a friend or foe?

- In 2015, SHOT shows the **same pattern** of IT system errors
- The full benefit of IT systems has **not** been realised
- Healthcare staff need to understand the **limitations** of IT systems and the **consequences** of using them incorrectly
How can SHOT help?

**Resources**

- Cases from Annual SHOT Report 2015
  - View this resource

- Figures from Annual SHOT Report 2015
  - View this resource

- Key Messages 2015
  - View this resource

- Teaching Slide Set 2016
  - View this resource

**SHOT BITES for TRANFUSION IT**

- Messages for staff involved in transfusion

- Messages for Pathology IT and Hospital IT

- Messages for policy makers and IT suppliers
Immune anti-D detected for the first time in pregnancy: preliminary results of cases reported to SHOT from 2012-2015
Paula Bolton-Maggs
Julie Ball
Debbi Poles
Jane Keidan
Anti-D Ig Prophylaxis

- Post-delivery anti-D Ig prophylaxis began in the UK in 1969
- The programme has been a huge success
- Deaths due to haemolytic disease
  - 320/100,000 in the 1940s
  - 46/100,000 births pre-1969
  - <2/100,000 births by 1990

but D alloimmunisation continues to occur
Impact of anti-D immunoglobulin prophylaxis on neonatal deaths in the UK

2013 – 778,805 births and < 5 deaths
Antenatal prophylaxis

- Fetomaternal haemorrhage is common

<table>
<thead>
<tr>
<th>Trimester</th>
<th>% pregnancies with detectable fetal cells in the maternal circulations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7%</td>
</tr>
<tr>
<td>2</td>
<td>16%</td>
</tr>
<tr>
<td>3</td>
<td>29%</td>
</tr>
</tbody>
</table>

- Bowman 1978 reported that the incidence of D immunisation could be reduced 5-10 fold by antenatal administration at 28 and 34 weeks
Trend in Anti-D Ig reports

Year of report

Number of reports
0 50 100 150 200 250 300 350 400

87 77 63 137 186 241 249 313 354 359 350

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Lunchtime Lecture Manchester
03 Nov 2016
What are the errors?

Anti-D errors 2015

- Delay/omitted: 78%
- Inappropriate: 15%
- Wrong dose: 5%
- Storage: 2%

What happens to these women?
2012: A new survey of anti-D sensitisation discovered in pregnancy

- Although SHOT receives many reports of late or missed anti-D Ig prophylaxis, the long-term outcome was rarely reported, despite reminders.
- 2012 new questionnaire for reporting immune anti-D detected at booking or during pregnancy.
- What have we found?
Reports 2012-2015

Year reported:
- 2012
- 2013
- 2014
- 2015

Number of reports:
- Previous pregnancy
- No previous pregnancy

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Lunchtime Lecture Manchester
03 Nov 2016
Case study - Woman sensitised despite prophylaxis

- 29 year old woman, first pregnancy
- Received 1500iu anti-D Ig at 28 weeks
- Blood sample at 38 weeks showed anti-D level 5.9 IU/mL
- Result not available until after delivery
- Baby O D-pos, DAT* pos, bilirubin 318
- Treated with phototherapy

*DAT = direct antiglobulin test
Summary of immune Anti-D despite ‘ideal’ care n=23 cases

- Total 33 no previous pregnancy
  - 10/33 (30.3%) received ideal care and not overweight (therefore dose definitely ok)

- Total 84 who had a previous pregnancy
  - 13/41 (31.7%) women found to be immunised at booking had apparently ideal management in the previous pregnancy

- Still worth giving anti-D Ig >72h or >10 days after a sensitising event
Incomplete data

- Many cases are incomplete

- Reporters are asked to provide as much information as possible and complete the outcome of pregnancies
Alloimmune Resource (AIR) Study

- NHSBT research study
- Aims to collect 2000 DNA samples from alloimmunised women to look for genes that may influence antibody production
- Pregnant women with alloantibodies identified in NHSBT labs will be invited to participate

Sarah.morley@nhsbt.nhs.uk
Multiple laboratory errors resulting in transfusion of incorrect blood components

Hema Mistry
Julie Ball, Peter Baker
Debbi Poles, Paula Bolton-Maggs
Critical points: Positive patient identification essential

Note: once a decision to transfuse is made, the authorisation or prescription may be written at variable times during this sequence, but must be checked at the final stage.
Serious harm associated with laboratory errors reports 2013-2015

- 16 instances of major morbidity
  - 1 ABO-incompatible transfusion reaction
  - 1 wrong component
  - 14 cases of sensitisation in women of childbearing potential (Anti-K=11, Anti-D=3)
- 6 ABO-incompatible red cell transfusions
  (5 no major morbidity)
- No deaths
Overview of laboratory cases where the wrong component was transfused 2013-2015

Total reports: 334

- Reports due to a breakdown in critical points in the transfusion process: 320
- Cases not due to a particular laboratory point in the transfusion process: 14
Steps in the process where a lab error was made or where an opportunity was missed to detect the primary lab error

**Bar Chart**

- **SRR**: sample receipt and registration
- **T**: testing
- **CS**: component selection
- **CL**: component labelling
- **C**: collection
- **P**: prescription
- **A**: administration

**Numbers**

- 544 laboratory errors
- 137 clinical errors
Case Study: Failure to heed request for irradiated units results in 4 errors including 3 opportunities to detect the error

The irradiated ‘red cells’ box was ticked on the request form.

Missed by both MLA at booking in and BMS issuing the red cells.

Not noticed by the clinical staff, resulting in the transfusion of one unit of non-irradiated red cells to a patient on fludarabine

1. Primary error: Sample receipt and registration – need for irradiated units was indicated on the request form, which was missed at booking in

2. Component selection: missed again when the BMS issuing the component did not notice the ticked box for irradiation on the request form either

3. Prescription: nursing staff did not check for specific requirements on the prescription

4. Administration: need for irradiated components was not noted at the bedside check and a non-irradiated component was administered
Number of steps where there was a critical breakdown in the transfusion process n=320

199/320 (62%) multiple errors

In 60/199 (30%) the most common combination of steps identified is:

Sample receipt and registration + Component selection
Main issues in Laboratory IBCT cases

- **199/320 (62%)** reports demonstrated multiple errors
- In **142/320 (44%)** reports the primary error was made in the sample receipt and registration step and not detected at subsequent steps prior to transfusion
- **80/320 (25%)** reports had combined laboratory and clinical errors which were not detected by either area

In **240/320 (75%)** reports, clinical staff could not have detected the errors made earlier by laboratory staff
Main causes of errors

- Not following Standard Operating Procedures
  - Warning alerts
  - Testing procedures
  - Not heeding patient historical records

- Communication failures
  - Effective handover

- Team work problems

- Failure to use Information Technology correctly
Conclusion

- Laboratory and clinical staff should work as one integrated team
- Many laboratory errors cannot be detected by clinical staff
- Laboratory staff need to fulfil their responsibilities carefully
- Safe transfusion depends on accuracy at every step

WARM

Work Accurately and Reduce Mistakes
Reasons we continue to fail...

- Competing priorities on resources: time, staff, money, targets
- Communication barriers
- Lack of knowledge: training, fatigue, etc

‘Human factors’
## Summary

We have looked at:

1. Human factors
2. Transplant transfusion errors
3. IT - friend or foe?
4. Immune anti-D and potential failures of prophylaxis
5. Multiple errors in the laboratory

Common themes:

- Communication
- Knowledge
- Training and education
- Validation (IT & SOPs)
- Human factors

**We need to redesign the transfusion process to improve safety**
Additional Information

Following documents available on website www.shotuk.org

- Teaching slide set
- SHOT cases
- SHOT reporting definitions
- Clinical lessons
- Laboratory lessons
- SHOT Bites

Also available:
- Previous SHOT reports
- SHOT summaries
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Harpenden, Hertfordshire, AL5 2JQ
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