SHOT Update

Key points from the 2012 report

Paula Bolton-Maggs
SHOT Medical Director

SHOT Symposium, July 2013
SHOT Report 2012

• Participation excellent
  – 99.5% NHS hospitals registered
  – 98.7% submitting reports

• Total reports submitted n=3545
  – Incomplete 31 Dec 2012 n=198
  – Reports withdrawn n=914
Breakdown of numbers

3545 reports

- 163 completed after cut-off
  - 2 incomplete

- 914 withdrawn
  - Mild ATR 169
  - HSE 38 due to tx <5hr
  - Others

- 2466 plus 172 from 2011
  - 2638

With multiple patients 2767

1645 incidents

Near miss 980
RBRP 142
All errors

Errors 1026
62.4%

Pathological reactions 619
37.6%

Errors 77.6%
# Deaths and major morbidity

<table>
<thead>
<tr>
<th></th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deaths</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Major morbidity</td>
<td>117</td>
<td>134</td>
</tr>
</tbody>
</table>

Deaths in 2012
- Transfusion-associated graft versus host disease 1
- Haemolytic transfusion reactions 2
- Transfusion-associated circulatory overload 6
Transfusion-associated graft versus host disease

Omission of irradiation in 877 patients at risk
Fetus transfused with maternal blood at 21 weeks for parvovirus-induced anaemia.
Delivered at 32/40, pancytopenia, died at 3 months of pneumonitis with confirmed GvHD.
Staff did not contact haematologist or Blood Service as they believed IUT blood could not be provided for 24h.

RISK FACTORS:
- Not irradiated
- Not leucodepleted
- Related (HLA homozygous)

Communication

TA-GvHD
## Major morbidity in 2012

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute transfusion reactions</td>
<td>68</td>
<td>18.3</td>
</tr>
<tr>
<td>Transfusion-associated circulatory overload</td>
<td>29</td>
<td>35.4</td>
</tr>
<tr>
<td>Incorrect blood component transfused</td>
<td>11</td>
<td>4.4</td>
</tr>
<tr>
<td>Development of anti K</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Haemolytic transfusion reactions (missed antibodies)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>ABO incompatibility (one stem cell transplant patient)</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Haemolytic transfusion reactions</td>
<td>9</td>
<td>21.4</td>
</tr>
<tr>
<td>Transfusion-related acute lung injury</td>
<td>8</td>
<td>72.7</td>
</tr>
<tr>
<td>Transfusion-transmitted infections (viral)</td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td>Avoidable, delayed or undertransfusion</td>
<td>2</td>
<td>1.4</td>
</tr>
<tr>
<td>Development of Anti-D after omission or delay in prophylaxis</td>
<td>4</td>
<td>1.3</td>
</tr>
</tbody>
</table>
Human errors

Errors with potential for harm 1026
- Handling and storage 316
- Anti-D Ig 313
- Avoidable, delayed or undertransfusion 145
- Wrong component transfused 76
- Specific requirements not met 176

Errors with no harm 1122
- Near miss 980
- Right blood right patient 142
Cumulative data 1996/7 to 2012  \( n=11570 \)

- Pathological reactions which may not be preventable
- Possibly or probably preventable by improved practice and monitoring
- Adverse events due to errors
Near Miss – sample errors and wrong blood in tube

- Near miss reports are about 30% of the total reports
- Sample errors are about 50% of the near misses
- Wrong blood in tube (WBIT) are >90% of the sample errors

<table>
<thead>
<tr>
<th></th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total SHOT reports analysed</td>
<td>2464</td>
<td>3038</td>
<td>2466</td>
</tr>
<tr>
<td>Near misses</td>
<td>863</td>
<td>1080</td>
<td>980</td>
</tr>
<tr>
<td>Sample errors</td>
<td>409</td>
<td>508</td>
<td>534</td>
</tr>
<tr>
<td>Wrong blood in tube</td>
<td>386</td>
<td>469</td>
<td>505</td>
</tr>
</tbody>
</table>
## How do wrong samples occur?

<table>
<thead>
<tr>
<th>Practices leading to WBIT</th>
<th>Number in 2011</th>
<th>%</th>
<th>Number in 2012</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient not identified correctly</td>
<td>174</td>
<td>37.1%</td>
<td>170</td>
<td>33.7%</td>
</tr>
<tr>
<td>Sample not labelled at bedside</td>
<td>174</td>
<td>37.1%</td>
<td>232</td>
<td>45.9%</td>
</tr>
<tr>
<td>Sample not labelled by person taking blood</td>
<td>23</td>
<td>4.9%</td>
<td>15</td>
<td>3.0%</td>
</tr>
<tr>
<td>Pre-labelled sample tube used</td>
<td>10</td>
<td>2.1%</td>
<td>3</td>
<td>0.6%</td>
</tr>
<tr>
<td>Maternal and baby samples transposed</td>
<td>88</td>
<td>18.8%</td>
<td>53.0</td>
<td>10.5%</td>
</tr>
<tr>
<td>Other/Unknown</td>
<td>88</td>
<td>18.8%</td>
<td>53.0</td>
<td>10.5%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>469</strong></td>
<td><strong>100%</strong></td>
<td><strong>505</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>
### Staff groups responsible for WBIT

<table>
<thead>
<tr>
<th>Staff Group</th>
<th>2010 (% total 386 errors)</th>
<th>2011 (% total 469 errors)</th>
<th>2012 (% total 505 errors)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctor</td>
<td>44.0%</td>
<td>37.5%</td>
<td>44.2%</td>
</tr>
<tr>
<td>Nurse</td>
<td>19.4%</td>
<td>18.8%</td>
<td>18.0%</td>
</tr>
<tr>
<td>Midwife</td>
<td>14.2%</td>
<td>16.7%</td>
<td>18.8%</td>
</tr>
<tr>
<td>Healthcare Assistant</td>
<td>4.2%</td>
<td>5.3%</td>
<td>6.7%</td>
</tr>
<tr>
<td>Phlebotomist</td>
<td>3.4%</td>
<td>6.8%</td>
<td>4.0%</td>
</tr>
<tr>
<td>Medical student</td>
<td>0.5%</td>
<td>0.2%</td>
<td>0.2%</td>
</tr>
<tr>
<td>Unknown/not stated</td>
<td>14.3%</td>
<td>14.7%</td>
<td>8.1%</td>
</tr>
</tbody>
</table>
Near miss potential outcomes

SHOT Category

- IBCT-WCT: 688 (70.2%)
- ADU: 3 (0.3%)
- Anti-D: 36 (3.7%)
- IBCT-SRNM: 73 (7.4%)
- RBRP: 90 (9.2%)
- HSE: 90 (9.2%)

SERIOUS HAZARDS OF TRANSFUSION

SHOT
Transfusion-associated Circulatory Overload
24 deaths and
88 cases of major morbidity
2007-2012

Includes 4 deaths and 5 cases of major morbidity due to unnecessary transfusions

SERIOUS HAZARDS OF TRANSFUSION
New features in the 2012 Report

- Incident investigation and root cause analysis – please DO IT

- Problems with transplant cases – failure in communication
Error reporting – example

- A child with beta thalassaemia major, blood group O, receives 3 mL of an incompatible unit of blood group A
- Recognised early, stopped, no harm done, but kept in hospital overnight for observation
- Blame culture – dreadful deed, sack the nurse
- No-blame culture- understand the circumstances which led to this and take action to prevent recurrence
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)
Likelihood multiplied by the consequence gives a RISK SCORE

<table>
<thead>
<tr>
<th>LIKELIHOOD</th>
<th>1 None/Insignificant</th>
<th>2 Minor</th>
<th>3 Moderate</th>
<th>4 Major</th>
<th>5 Catastrophic</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 Almost Certain</td>
<td>5</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td>4 Likely</td>
<td>4</td>
<td>8</td>
<td>12</td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td>3 Possible</td>
<td>3</td>
<td>6</td>
<td>9</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>2 Unlikely</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>1 Rare</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

Low 1-5 | Medium 8-15 | High 16-25
Likelihood multiplied by the consequence gives a RISK SCORE.

She did not intend to make this mistake but it could have resulted in death, and was very likely to happen again, so was treated as a very serious incident with a high risk score.

Likelihood multiplied by the consequence gives a RISK SCORE.
Investigation – several issues

- The nurse was working alone in the day unit
- Three people needed transfusions – she collected all three units at the same time
- She borrowed a nurse from the next ward to check all three, putting each down on a table beside the patient
- She was using aseptic technique to access the portacath, and the second nurse handed her the wrong unit which was not checked again at the bedside
- Incident recognised when next unit put up with bedside check
The nurse was working alone in the day unit. Three people needed transfusions, and she collected all three units at the same time. She borrowed a nurse from the next ward to check all three, putting each down on a table beside the patient. She was using aseptic technique to access the portacath, and the second nurse handed her the wrong unit which was not checked again at the bedside. The incident was recognised when the next unit was put up with no bedside check.

The staff were accepting a culture of chronic understaffing – audit showed solo working 75% of the time and a poor record (42%) of correct observations during transfusion. As a result of this investigation, an additional member of staff was employed.

The transfusion training of both nurses was out of date, and she forgot that collection of more than one unit at a time was against policy.

She was using aseptic technique to access the portacath, and the second nurse handed her the wrong unit which was not checked again at the bedside.

The RCA resulted in several SOLUTIONS to improve safety:

- The layout of the day unit was reviewed and changed.
- The bedside check was improved.
- The transfusion training of both nurses was updated.
- Additional staff were employed.
Incorrect ABO group transfused due to lack of communication

- A staff nurse noticed a patient was being transfused with group A red cells, but knew that the patient had received HSCT from his sister, group O, 7 days before.
- The nurse contacted the transfusion laboratory who had no record of the transplant.
- The transfusion was stopped during the second unit.
## Transplant problems 37 cases

<table>
<thead>
<tr>
<th>Type of transplant</th>
<th>ABO/Rh errors</th>
<th>Specific requirements missed</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSCT</td>
<td>16</td>
<td>11</td>
<td>27</td>
</tr>
<tr>
<td>Renal</td>
<td>2</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Other/multiple</td>
<td>0</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>18</strong></td>
<td><strong>19</strong></td>
<td><strong>37</strong></td>
</tr>
</tbody>
</table>

13 ABO, 5 RhD, 13 failure to request irradiated units

Communication, communication, communication

There are many kinds of standards and guidelines about stem cell harvest and transplant, but none about communication with the transfusion laboratory.
Laboratory errors and IT

- 182/430 handling and storage errors
- Grouping errors associated with manual interventions
- IT – warning flags not in place or not heeded
- Avoidable transfusion due to wrong lab results
Transfusion laboratory collaborative update

- Laboratory errors not reduced: why?
  - Surveys 2011 (50% response) and 2013 (62%)
    - Ideal staffing reduced from 81 to 72%
    - Education funding reduced in 42% since 2011
    - Non-permanent transfusion staff training updates within last 12 month fell from 75% to 60%
    - Automation interfaced to LIMS fell from 83% to 79%
- Report and updated standards in preparation

Thanks to Bill Chaffe and Hema Mistry
Communication failures and multiple errors

- Transfusion of patients with religious objections
- Consultant ownership – who is in charge?
- Gaps in transfusion training
  - Radiology
  - Paediatrics
Whose responsibility?

- A patient 35.1kg with chronic GI bleeding/anaemia
- Under both haematology and gastroenterology
- 6 red cell transfusions in 3 months
- Over-transfused on at least 6 occasions. Hb 134g/L, Hb 158g/L, Hb 182g/L...
- Hb 222g/L – required venesection
- Renal impairment with long term morbidity.
A 1 year old child 10 kg thought to have major haemorrhage Hb 98g/L

Blood prescribed in whole units, received 4 emergency O negs, 3 in first hour

Taken to theatre, no serious bleeding point found, but Hb 270g/L

Full recovery

Poor practice due to lack of knowledge
Key recommendations

• **Confirmation of identity** at every stage of the transfusion process and good communication are essential to prevent errors
  – Zero tolerance for labelling of all pathology specimens
• **Communication and handover** at all points
• Near miss reporting is important as many valuable lessons can be learned
• Do a root cause analysis and feedback
Acknowledgements

- Steering Group and Working Expert Group
- Dr Dafydd Thomas, Steering Group Chair
- Alison Watt, Operations Manager
- Debbi Poles, Research Analyst
- Tony Davies, SHOT Patient Blood Management Practitioner
- Julie Ball and Hema Mistry, Incident Specialists
- UK Forum for funding
- Hospitals for reporting cases to SHOT
Deaths definitely attributed to transfusion
1996/97 - 2012

- total no. of reports analysed
- death definitely attributed to transfusion

Year of report

Number of reports

Number of deaths
What is the normal practice?

• Survey of all 16 fetal medicine centres*
• IUT units issued per centre 4 to 38 in 12 months
• Index centre used maternal blood more than 20 times over 5 years in about 400 IUT total without adverse events
• 1 other centre once in 5 years
• Alternatives: non-IUT exchange, irradiated or non-irradiated paedipacks

*With thanks to Professor Mark Kilby, President of the British Maternal and Fetal Medicine Society, London