HIGHLIGHTS FROM 7th SHOT REPORT – TAKING SHOT RECOMMENDATIONS FORWARD

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Increases in reporting year by year

Initial Reports

Questionnaires


Report counts:
- Initial Reports: 169, 196, 255, 293, 315, 363, 480, 482, 480
- Questionnaires: 142, 188, 246, 289, 283, 378, 457, 478, 457
Comparison of initial reports of incidents since reporting began in 1996
HOSPITAL PARTICIPATION 2003

- 351/415 (85%) hospitals returned cards stating they participated in the scheme
- 195 stated that they reported incidents

Therefore:

- Level of active participation is 47%
Overview of 457 cases for which fully completed questionnaires were received

- IBCT (348)
- ATR (39)
- PTP (1)
- TRALI (36)
- DTR (25)
- TTI (8)
MAJOR MORBIDITY – DEFINITION

- Intensive care admission and / or ventilation
- Dialysis and / or renal dysfunction
- Major haemorrhage from transfusion-induced coagulopathy
- Intravascular haemolysis
- Potential RhD sensitisation in a female of child-bearing potential
- Persistent viral infection
- Acute symptomatic confirmed infection (viral, bacterial or protozoal)
2003: TRANSFUSION RELATED MORTALITY / MORBIDITY IN 457 COMPLETED QUESTIONNAIRES

- Minor or no morbidity (81.6%)
- Major morbidity (10.7%)
- Death due to underlying condition (5%)
- Death possibly due to transfusion (2%)
- Death probably due to transfusion (0.2%)
- Death definitely due to transfusion (0.4%)
## 2003: Transfusion related mortality/morbidity according to the type of hazard reported

<table>
<thead>
<tr>
<th>Category</th>
<th>Total</th>
<th>IBCT</th>
<th>ATR</th>
<th>DTR</th>
<th>PTP</th>
<th>TRALI</th>
<th>TTI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death definitely attributed to transfusion</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Death probably attributed to transfusion</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Death possibly attributed to transfusion</td>
<td>9</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Death due to underlying condition</td>
<td>23</td>
<td>16</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Major morbidity</td>
<td>49</td>
<td>16</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>22</td>
<td>5</td>
</tr>
<tr>
<td>Minor or no morbidity</td>
<td>373</td>
<td>315</td>
<td>32</td>
<td>19</td>
<td>0</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Totals</td>
<td>457</td>
<td>348</td>
<td>39</td>
<td>25</td>
<td>1</td>
<td>36</td>
<td>8</td>
</tr>
</tbody>
</table>
INCORRECT BLOOD COMPONENT TRANSFUSED

ALL REPORTED EPISODES WHERE A PATIENT WAS TRANSFUSED WITH A BLOOD COMPONENT OR PLASMA PRODUCT WHICH DID NOT MEET THE APPROPRIATE REQUIREMENTS OR WHICH WAS INTENDED FOR ANOTHER PATIENT
MULTIPLE ERRORS CONTINUE TO CONTRIBUTE TO MANY “WRONG BLOOD” TRANSFUSIONS
(total cases = 348; total errors = 588)
DISTRIBUTION OF ERRORS ACCORDING TO THE MAIN REPORTING CATEGORIES (n=588)

Failure of pretransfusion check 156/588

- Blood Centre 10 (2%)
- Prescription, sampling, request 161 (27%)
- Hospital Blood Bank 183 (31%)
- Collection, administration 232 (40%)
- Other 2 (<1%)
SITE OF TRANSFUSION WHEN ERROR OCCURRED IN A CLINICAL AREA (n=345)

- Ward (62.9%)
- Theatre including recovery (10.7%)
- Out-patient/day unit (10.1%)
- ICU (9.9%)
- A&E (4.9%)
- Other (1.4%)
LABORATORY ERRORS

Among errors likely to result in incompatible transfusion:

- 8/9 ABO grouping errors and
- 7/15 antibody identification errors

were related to out-of-hours or urgent work
29 patients were unnecessarily transfused or over-transfused as a result of:

- **Sample errors**
  - dilute samples taken from “drip arms” or samples allowed to settle in syringe (11); lab reported possible dilute sample but clinical staff transfused patient (2)

- **Analytical errors**
  - Wrong Hb (2); wrong fibrinogen (1); spurious low plts. (3)

- **Haematology results wrongly documented or misinterpreted (7)**
  - white cell count was taken to be the haemoglobin level (3)
FAILURES IN COMMUNICATION

Continued failure to communicate special transfusion Requirements (107)

- 88/107 - errors at request stage
- 81/107 - failure to provide irradiated components most commonly in patients prescribed purine analogues
- 39/107 - lab error; 22/39 – irradiated components

- the use of purine analogues is increasing
- gamma-irradiation remains the only proven method of prevention of TA-GVHD
## Categories of IBCT Reported (n=348)

<table>
<thead>
<tr>
<th>Category</th>
<th>No. of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major ABO incompatibility</td>
<td>33</td>
</tr>
<tr>
<td>RhD incompatible</td>
<td>22</td>
</tr>
<tr>
<td>ABO/RhD compatible</td>
<td>49</td>
</tr>
<tr>
<td>Other red cell incompatibility</td>
<td>22</td>
</tr>
<tr>
<td>Inappropriate transfusion</td>
<td>36</td>
</tr>
<tr>
<td>Special requirements not met</td>
<td>107</td>
</tr>
<tr>
<td>Anti-D</td>
<td>24</td>
</tr>
<tr>
<td>Other</td>
<td>55</td>
</tr>
</tbody>
</table>
DISTRIBUTION OF ERRORS in ABO INCOMPATIBLE TRANSFUSIONS 1999-2003: 221 ERRORS IN 130 CASES

- Collection / Admin (59%)
- Other (1%)
- Blood Bank (29%)
- Presc, sample, request (9%)
- Blood Centre (2%)
### OUTCOME OF CASES OF IBCT FOLLOWING MAJOR ABO INCOMPATIBILITY (n=33)

<table>
<thead>
<tr>
<th>Category</th>
<th>No. of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survived with no ill effects</td>
<td>19</td>
</tr>
<tr>
<td>Major morbidity</td>
<td>8</td>
</tr>
<tr>
<td>Died unrelated to transfusion</td>
<td>5</td>
</tr>
<tr>
<td>Died possibly related to transfusion</td>
<td>1</td>
</tr>
<tr>
<td>Died probably related to transfusion</td>
<td>0</td>
</tr>
<tr>
<td>Died definitely related to transfusion</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>33</strong></td>
</tr>
</tbody>
</table>
ABO INCOMPATIBLE TRANSFUSIONS SINCE 1996

Graph showing the number of incompatible transfusions and reports from 1996/97 to 2003. The graph includes a peak in 1997/98 and a decline in 1999/00, followed by a steady increase in 2000/01 and 2001/02, and another peak in 2003.
“NEAR MISS” EVENTS 2003 (n=906)

- Sample errors (542)
- Laboratory component selection handling, storage & issue errors (97)
- Laboratory sample handling &/or testing errors (86)
- Component collection, transportation, ward handling & administration errors (100)
- Request errors (81)
IMMUNE COMPLICATIONS OF TRANSFUSION

Acute transfusion reactions

Delayed transfusion reactions

Transfusion-related acute lung injury

Post-transfusion Purpura

Transfusion-Associated Graft-versus-host Disease
ACUTE TRANSFUSION REACTIONS

44 VALID INITIAL REPORTS RECEIVED

39 COMPLETED QUESTIONNAIRES
   (including 4 from the previous year)

30/39 cases due to FFP (17) or platelets (13)
## ACUTE TRANSFUSION REACTIONS

<table>
<thead>
<tr>
<th>Year</th>
<th>RBC</th>
<th>FFP</th>
<th>Platelets</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996-03</td>
<td>18.4</td>
<td>2.7</td>
<td>1.9 million</td>
</tr>
<tr>
<td>No. ATR</td>
<td>94</td>
<td>71</td>
<td>63</td>
</tr>
<tr>
<td>Frequency</td>
<td>1:195,744</td>
<td>1:38,028</td>
<td>1:30,158</td>
</tr>
</tbody>
</table>

1996-03: Reactions to FFP *5 times* and to platelets *6.5 times* more frequent than those due to red cells.
ACUTE TRANSFUSION REACTIONS

- At least 5/17 FFP transfusions NOT indicated
  - non-urgent warfarin reversal in the absence of bleeding - 3
  - liver disease in the absence of haemorrhage or intervention - 1
  - enoxaparin (LMWH) reversal on account of bleeding at site of injections - 1

- Haematologists are not frequently involved in the management or investigations of suspected acute transfusion reactions which can lead to inappropriate diagnosis and treatment
32 INITIAL REPORTS RECEIVED
(2 FROM PREVIOUS YEAR)

25 COMPLETED QUESTIONNAIRES
A marked reduction from last year’s 47 – are DTRs under-recognised?
2003: TRALI

Initial reports received

42

Analysed for TRALI (after 5 withdrawn, 1 written off)


- Highly likely: 20
- Probable: 2
- Possible: 6
- Unlikely: 8
Proven incompatibility

Died
Recovered

Number of cases

0 2 4 6 8 10 12 14 16 18

Proven incompatibility
Compatible
Testing incomplete

4 16
2 6
3 5
<table>
<thead>
<tr>
<th>Relevant antibody specificity</th>
<th>Number of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>HLA Class I</td>
<td>1</td>
</tr>
<tr>
<td>HLA Class II</td>
<td>11</td>
</tr>
<tr>
<td>HLA Class I and II</td>
<td>4</td>
</tr>
<tr>
<td>Granulocyte</td>
<td>4</td>
</tr>
<tr>
<td>Granulocyte and lymphocyte</td>
<td>1</td>
</tr>
<tr>
<td>None relevant found</td>
<td>9</td>
</tr>
<tr>
<td>In progress or incomplete</td>
<td>6</td>
</tr>
</tbody>
</table>
Cases with leucocyte incompatibility

Leucocyte incompatibility not proven

Number of cases

- FFP: 8 cases, 6 with leucocyte incompatibility
- FFP+other: 2 cases, 1 with leucocyte incompatibility
- Platelets: 8 cases, 2 with leucocyte incompatibility
- Cryoprecipitate: 1 case
- Whole blood: 1 case
- Buffy coats: 1 case
- RBC plasma reduced or in OA solution: 5 cases
2003: TRALI

- Plasma-rich components in 20/21 cases with proven leucocyte incompatibility
- 2003: Risk of TRALI
  - FFP: 1 case per 27,000 FFP units issued
  - Platelets: 1 case per 25,000 platelet units issued
  - Red cells: 1 case per 529,000 red cell units issued

- Avoid unnecessary FFP and platelets
- Continued awareness and continued education
- Early evaluation by consultants, a team approach – and early liaison with local Blood Centre
2003: POST TRANSFUSION PURPURA

POST-TRANSFUSION PURPURA

- 2003: Only 1 report meeting SHOT definition of PTP

- The drop in numbers of suspected cases of PTP since the introduction of universal leucodepletion has been maintained

- The antibody identified this year was anti HPA 1a. This has been the most commonly implicated platelet antibody; it was identified in 34 of 41 (83%) cases of antibody-proven PTP reported to SHOT since 1996
TRANSFUSION-ASSOCIATED GRAFT-VERUS-HOST DISEASE

NO NEW CASES WERE REPORTED DURING 2003
NUMBER OF CASES OF TA-GVHD REPORTED TO SHOT EACH YEAR

- 2003: 0
- 2001-2002: 0
- 2000-2001: 1
- 1999-2000: 0
- 1998-1999: 4
- 1997-1998: 4
- 1996-1997: 4

Number of cases
THIS PATIENT IS AT RISK OF TRANSFUSION-ASSOCIATED GRAFT-VERSUS-HOST DISEASE
If this patient needs to have a blood transfusion, cellular blood components (Red Cells and Platelets) must be GAMMA-IRRADIATED.

Please inform your blood transfusion laboratory.

Name ________________________________
d.o.b ___/___/___ Consultant _____________________________
Hospital/NHS number ________________________________
Hospital for enquiries ________________________________
Reason for irradiated blood ________________________________
Irradiated blood needed indefinitely or until ___/___/___
Date of issue of card ___/___/___
TRANSFUSION-TRANSMITTED INFECTIONS BY REPORT YEAR (including Scotland from 10/98 onwards)
• 2 x Hepatitis B virus
• 1 x Human immunodeficiency virus
• 1 x Hepatitis A virus
• 1 x malaria
• 3 x bacterial contaminations of platelets
  • 1 x *E. coli* infection, 42 year old male - 2 day old unit of apheresis platelets - died 15 hours post transfusion
  • 1 x *S. aureus* infection, 60 year old female - 4 day old unit of apheresis platelets - fever and diarrhoea - recovered after antibiotic treatment
  • 1 x *S. epidermidis* infection, 61 year old male - 5 day old unit of pooled platelets - hypotension, breathlessness, fever and rigors
• 1 x possible transfusion-transmitted vCJD
TRANSFUSION-TRANSMITTED BACTERIAL CONTAMINATION

Remains an avoidable cause of death and major morbidity

- 29 cases 1995-2003
- 25 from platelets
- 19/25: platelets 3 or more days old
- Resulted in 9 deaths

Increased efforts are needed to prevent bacterial contamination of blood components
SHOT EVENTS REPORTED IN PATIENTS LESS THAN 18 YEARS OF AGE

2003: 59/449 (13%) ANALYSABLE REPORTS INVOLVED PATIENTS LESS THAN 18 YEARS OF AGE

1996-2002: 141 VALIDATED CASES (8.65% OF ALL ANALYSABLE REPORTS)
PATIENTS LESS THAN 18 YEARS OF AGE: NOTABLE FINDINGS

- 25/53 IBCT cases related to a failure to request or issue the blood or blood components of the correct specification; 7 cases of failure to issue MB FFP

- Lack of awareness amongst laboratory, nursing and medical staff of the special needs of paediatric recipients of blood and blood components

- 3 cases where group O platelets or FFP caused haemolysis in group A individuals. UKTS should be encouraged to ensure that sufficient group A platelets are always available for group A neonates and older children
PATIENTS LESS THAN 18 YEARS OF AGE: OUTCOME IN 59 CASES

NO DEATHS DUE TO TRANSFUSION RELATED EVENTS

4 DEATHS FROM UNRELATED CAUSES

9 PATIENTS SUFFERED SIGNIFICANT MORBIDITY OR ARE AT RISK OF FUTURE PROBLEMS DUE TO RhD SENSITISATION

5 cases of haemolysis from ABO incompatible components
2 cases of RhD negative females who received RhD positive blood
1 child (18 months) was significantly over transfused
1 neonate was exchange transfused with blood prepared for an intrauterine transfusion
Cumulative data

1996-2003
QUESTIONNAIRES BY INCIDENT
1996 - 2003 (n=2087)

IBCT (66.7%)
ATR (11.2%)
DTR (10.2%)
PTP (2.1%)
TRALI (6.7%)
TA-GVHD (0.6%)
TTI (2.2%)
Unclassified (0.3%)
MORBIDITY AND MORTALITY
1996 - 2003 (n=2087)

- Minor or no morbidity (76%)
- Major morbidity (12%)
- Death due to underlying condition (7%)
- Death definitely due to transfusion (2%)
- Death possibly due to transfusion (2%)
- Outcome unstated (0.8%)
- Death probably due to transfusion (0.4%)
1996-2003 total components issued: ~23 million

<table>
<thead>
<tr>
<th>Risk of serious hazard</th>
<th>2087</th>
<th>1 in 11,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk of major morbidity</td>
<td>249</td>
<td>1 in 92,000</td>
</tr>
<tr>
<td>Risk of death</td>
<td>90</td>
<td>1 in 255,500</td>
</tr>
<tr>
<td>Risk of IBCT (all categories)</td>
<td>1393</td>
<td>1 in 16,500</td>
</tr>
<tr>
<td>Risk of ABO incompatible</td>
<td>226</td>
<td>1 in 102,000</td>
</tr>
<tr>
<td>Risk of TRALI</td>
<td>139</td>
<td>1 in 165,000</td>
</tr>
</tbody>
</table>
The most important contribution which could now be made to the safety of blood transfusion would be an initiative to improve the safety of the bedside pretransfusion checking procedure. Will require investment in:

- Education and audit
- Evaluation and implementation of suitable IT
  Co-ordinated initiative - NPSA/NBTC/SHOT
SHOT RECOMMENDATION

Active participation

REPORTING TO SHOT
- Errors
- Adverse events

IMPLEMENTING
- Safety improvements
HOW TO MAKE IT HAPPEN - I

NEED CLEAR DECISION MAKING PATHWAYS FOR USING SHOT DATA TO INFLUENCE BLOOD SAFETY POLICY AND PRIORITISATION OF RESOURCE ALLOCATION

PROACTIVE LEAD BY CMO’S NBTC IN ENGLAND AND ITS COUNTERPARTS IN SCOTLAND, WALES AND NORTHERN IRELAND

EXTEND PARTNERSHIP BETWEEN UKTS/Hospitals/NBTC

- RTC, facilitated by the blood services
  - forum for debate and sharing of problems and solutions in a supportive environment with expert clinical input.
  - SHOT reports should be a standing agenda item for regional BMS forums and SPOT meetings
  - RTC - support translation of guidelines into local practice

- Develop structured approach to investigation and management of immunological reactions
A national body is needed to evaluate and prioritise blood safety initiatives

Extend remit and membership of MSBT? (MSBT = DH Advisory Committee on the Microbiological Safety of Blood and Tissues for Transplantation)
- empower it to take on this role.

Initiative to address resource needs and procurement
ACKNOWLEDGMENTS

• All reporting hospitals!
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  – Dorothy Stainsby
  – Katy Davison (Health Protection Agency CDSC)
• SHOT office
  – Hilary Jones (scheme manager), Aysha Boncinelli
• Standing Working Group / Writing Group
• Steering Group
• Lorna Williamson, Elizabeth Love
• Paul Ashford
• UK Transfusion Services