Annual SHOT Report
2017

The Muppet Show?
Eight Types Team Dynamics – Key Skills or Attributes

- Determination
- Monitoring
- Discipline

- Results focus
- Decisive
- Assertive

- Planning
- Organisation
- Time Management

- Listens
- Loyal
- Team Approach

- Flexible & Helps Others, Shares ideas

- Drive
- Enthusiasm
- Positive Thinking

- Persuasive
- Creative
- People Skills
Donor incidents
Serious adverse events in donation 2017

(No events reported from Northern Ireland)

- Arm pain >12/12 post donation: NHSBT 16, SNBTS 1, WBS 1
- Fracture: NHSBT 13, SNBTS 2
- Hospital admission within 24 hours of donation: NHSBT 12, SNBTS 1
- Acute coronary syndrome: NHSBT 2
- Donor death <7/7 of donation: NHSBT 1
- Road traffic accident <24 hours of donation: NHSBT 1
- Other: NHSBT 1

NHSBT = National Health Service Blood & Transplant; SNBTS = Scottish National Blood Transfusion Service; WBS = Welsh Blood Service;
Trend in whole blood and apheresis donations in the UK 2015 to 2017

- **2015**
  - Whole blood donations: 1,935,957
  - Apheresis/component donations: 190,851

- **2016**
  - Whole blood donations: 1,901,491
  - Apheresis/component donations: 103,159

- **2017**
  - Whole blood donations: 1,820,847
  - Apheresis/component donations: 92,803
Nine steps: a team?
We need to work better together
Transfusion process is very complex

1 REQUEST
2* SAMPLE
3 SAMPLE RECEIPT
4 TESTING
5 COMPONENT SELECTION
6 LABELLING
7 COLLECTION
8 PRESCRIPTION
9* ADMINISTRATION

* Critical points where positive patient identification is essential
Errors account for the majority of SHOT reports in 2017: 2760/3230
Cumulative data for all SHOT categories 1996 to 2017
n=19815

- UCT: Unclassifiable complications of transfusion
- PTP: Post-transfusion purpura
- TTI: Transfusion-transmitted infection
- CS: Cell salvage
- FAHR: Febrile, allergic and hypotensive reactions
- TAD: Transfusion-associated dyspnoea
- TRALI: Transfusion-related acute lung injury
- TACO: Transfusion-associated circulatory overload
- TAGvHD: Transfusion-associated graft-vs-host disease
- Allo: Alloimmunisation
- HTR: Haemolytic transfusion reactions
- ADU: Over or undertransfusion and PCC
  - ADU: Delayed transfusion
  - ADU: Avoidable transfusion
  - HSE: Handling and storage errors
  - Anti-D: Anti-D immunoglobulin errors
  - IBCT: Incorrect blood component transfused

Adverse incidents due to mistakes

Transfusion reactions which may not be preventable
Possibly or probably preventable by improved practice and monitoring
Summary data for 2017 all categories ranked by number n=3230: no change in the pattern

- NM: Near miss
- Anti-D: Anti-D immunoglobulin errors
- IEBT: Incorrect blood component transfused
- FAHR: Febrile, allergic and hypotensive reactions
- HSE: Handling and storage errors
- RBRP: Right blood right patient
- ADU: Avoidable transfusion
- ADU: Delayed transfusion
- TACO: Transfusion-associated circulatory overload
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Error: 1350
Not preventable: 426
Possibly preventable: 307
Preventable: 284
243
200
101
95
92
42
29
20
17
11
3
1
0
0

42.1%
The bedside check is vital in preventing transfusion error. Staff should be vigilant in checking identification details of the component against those of the patient. Every hospital should have a policy for formally checking the identity of the patient against the blood component label at the bedside. Nursing observations during transfusion also show wide variation. National guidelines for the administration and monitoring of transfusion are being developed by the British Committee for Standards in Haematology (BCSH) on behalf of the British Society for Haematology (BSH).
Analysis of incorrect blood component transfused:
Multiple errors
70% clinical area
Failure of bedside check

Serious Hazards of Transfusion:
A Decade of Hemovigilance in the UK

Dorothy Stainsby, Hilary Jones, Deborah Asher, Claire Atterbury, Aysha Boncinelli, Lisa Brant,
Catherine E. Chapman, Katy Davison, Rebecca Gerrard, Alexandra Gray, Susan Knowles,
Elizabeth M. Love, Clare Milkine, D. Brian L. McClelland, Derek R. Norfolk, Kate Soldan, Clare Taylor,
John Revill, Lorna M. Williamson, and Hannah Cohen, on behalf of the SHOT Steering Group

Transfusion Medicine Reviews, Vol 20, No 4 (October), 2006, pp 273-282

So nothing new..
Key recommendation last year

be like a pilot – use a bedside checklist as standard of care. It will prevent administration errors and is the final opportunity to detect errors made earlier

This is a rule, endorsed by the Chief Medical Officer
It is not a guideline

The bedside check will not detect a wrong blood in tube at sampling
2016 key recommendation 1

A checklist must be used at the patient's side as a final administration check prior to transfusion as standard of care

January 2018: 160 responses from a total of 222 organisations (72%)

No plans to implement

Not yet implemented but planning to implement

Implementation in progress

Fully implemented

Jayne Addison
2016 key recommendation 1

Whatever bedside system is currently in place (including electronic systems) it should be assessed and include a validation step where someone has to sign to say that all steps have been followed.

No plans to implement

‘We expect that by signing the "administered by" column on the script the staff member is signing that they have done all the checks’

Plans in progress to include a validation step

Validation step included

No plans to implement

No plans to implement

Plans in progress to include a validation step

Validation step included

No plans to implement

No plans to implement

Plans in progress to include a validation step

Validation step included
What else did we learn in 2017?
Error rate varies with department
Deaths related to transfusion in 2017 n=21

- HTR: 1 (Definite)
- Under and overtransfusion: 1 (Definite), 1 (Probable)
- TAD: 5 (Possible)
- Delays: 1 (Definite), 3 (Probable), 2 (Possible)
- TACO: 2 (Definite), 4 (Probable), 1 (Possible)

Preventable deaths n=14/21 (66.7%)

HTR = haemolytic transfusion reaction; TAD = transfusion-associated dyspnoea; TACO = transfusion-associated circulatory overload

21 YEARS
SERIOUS HAZARDS OF TRANSFUSION
SHOT
Transfusion-related deaths 2010 to 2017 n=136

HTR = Haemolytic transfusion reactions; TACO = Transfusion-associated circulatory overload; TRALI = Transfusion-related acute lung injury; TAD = Transfusion-associated dyspnoea.

*Other* includes 1 each for transfusion-transmitted infection, post-transfusion purpura, transfusion-associated graft-versus-host disease and anti-D related; there were 5 in the avoidable, over or undertransfusion category and 7 deaths related to other unclassified reactions.
Approximate risks of transfusion complications compared with other risks, UK data

Sources of data: Many of these are found online in the UK office for national statistics. Red outline indicates SHOT data, blue outline indicates data from other sources. ISTARE is the International Haemovigilance Network database for the surveillance of adverse reactions and events in donor and recipients. Viral transmissions denote risk of infection, not deaths. HCV=hepatitis C virus; HIV=human immunodeficiency virus; HBV=hepatitis B virus. A full list of sources is available in supplementary information on the SHOT website www.shotuk.org.
Total patients who have missed irradiated components since 1999 is 1397

Estimated risks for red cell units exceeding

- $>5 \times 10^6$ leucocytes/unit is 1:1000
- $>1 \times 10^6$ leucocytes/unit is 1:200

30-35 million components transfused

One patient with a history of Hodgkin lymphoma had received 486 non-irradiated components

IUT = intrauterine transfusion.
Key SHOT messages

**Do not assume, verify:** At each step in the transfusion process, do not assume that no errors have been made in previous steps; verify each step, particularly patient identification

**Human factors:** Failure of communication, distractions, interruptions, wrong assumptions, poor handovers and overriding alerts in the laboratory information systems are all important contributory factors
**Key SHOT messages**

**Do not assume, verify:** At each step in the transfusion process, do not assume that no errors have been made in previous steps; verify each step, particularly patient identification

**Human factors:** Failure of communication, distractions, interruptions, wrong assumptions, poor handovers and overriding alerts in the laboratory information systems are all important contributory factors

**What went wrong?** Thorough root cause analyses are essential and must identify attributable system-related and human factors so that appropriate actions can be instituted

**Is your staffing adequate?** Inadequate staffing, lack of training and poor supervision are all likely to be associated with an increased risk of error
Teamwork

• Team accountability reinforces the message that safety is not an individual responsibility

Guy Hirst, former BA pilot SHOT symposium 2014
Key SHOT messages

Do not delay: Emergency transfusion saves lives. Do not let the patient bleed to death or die from anaemia.

Guidelines or rules? Guidelines must not be translated into inflexible rules which may put patients at risk. Proportionate application of knowledge and experience may lead to a different course of action in individual circumstances. However, the final bedside check is a rule and must be completed in full.

TACO alert: Patients who develop respiratory distress during or up to 24 hours after transfusion where transfusion is suspected to be the cause must be reported to SHOT. The national comparative audit of TACO in 2017 demonstrated that risk factors are being missed.

It is the clinician’s responsibility to know the patient’s specific transfusion requirements.
TACO risk assessment remains a Key Recommendation

<table>
<thead>
<tr>
<th>TACO Checklist</th>
<th>Red cell transfusion for non-bleeding patients</th>
<th>If ‘yes’ to any of these questions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Heart</strong></td>
<td>Does the patient have a diagnosis of ‘heart failure’ congestive cardiac failure (CCF), severe aortic stenosis, or moderate to severe left ventricular dysfunction? Is the patient on a regular diuretic?</td>
<td>1. Review the need for transfusion (do the benefits outweigh the risks)?</td>
</tr>
<tr>
<td><strong>Lungs</strong></td>
<td>Is the patient known to have pulmonary oedema? Does the patient have respiratory symptoms of undiagnosed cause?</td>
<td>2. Can the transfusion be safely deferred until the issue can be investigated, treated or resolved?</td>
</tr>
<tr>
<td><strong>Fluid</strong></td>
<td>Is the fluid balance clinically significantly positive? Is the patient on concomitant fluids (or has been in the past 24 hours)? Is there any peripheral oedema? Does the patient have hypoalbuminaemia? Does the patient have significant renal impairment?</td>
<td>3. Consider body weight dosing for red cells (especially if low body weight) Transfuse one unit (red cells) and review symptoms of anaemia Measure the fluid balance Consider giving a prophylactic diuretic Monitor the vital signs closely, including oxygen saturation</td>
</tr>
</tbody>
</table>

Due to the differences in adult and neonatal physiology, babies may have a different risk for TACO. Calculate the dose by weight and observe the notes above.
Laboratory incidents
Laboratory errors (n=409) showing at which stage the error occurred and the outcome

- Sample receipt and registration:
  - WCT: 7
  - SRNM: 18
  - HSE: 18
  - RBRP: 6
  - Avoidable: 2
  - Delayed: 24

- Testing:
  - WCT: 10
  - SRNM: 63
  - HSE: 8
  - RBRP: 9
  - Avoidable: 19

- Component selection:
  - WCT: 24
  - SRNM: 21
  - HSE: 8

- Component labelling:
  - WCT: 0
  - SRNM: 72
  - HSE: 58
  - RBRP: 12
  - Avoidable: 6

- Collection:
  - WCT: 3

- Miscellaneous:
  - WCT: 3
  - SRNM: 8
  - HSE: 5

WCT = wrong component transfused; SRNM = specific requirements not met; HSE = handling and storage errors; RBRP = right blood right patient; Ig = immunoglobulin.
Incorrect blood components transfused
Incorrect blood component transfused n=307 (100%)

<table>
<thead>
<tr>
<th></th>
<th>Clinical</th>
<th>Laboratory</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>149 (48.5%)</td>
<td>158 (51.5%)</td>
</tr>
</tbody>
</table>

Wrong component transfused n=82

<table>
<thead>
<tr>
<th></th>
<th>Clinical</th>
<th>Laboratory</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>35 (42.7%)</td>
<td>47 (57.3%)</td>
</tr>
</tbody>
</table>

Specific requirements not met n=225

<table>
<thead>
<tr>
<th></th>
<th>Clinical</th>
<th>Laboratory</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>114 (50.7%)</td>
<td>111 (49.3%)</td>
</tr>
</tbody>
</table>
ABO-incompatible transfusions compared to near miss 2016 and 2017
Transfusion of ABO-incompatible components 2017

- FFP n=4
  - Patient group A+ Donor group O+
  - Sample receipt and registration
  - Case 10.8

- Patient group A+ Donor group O+
  - Testing
  - Case 10.5

- Patient group B+ Donor group O+
  - Component selection
  - Case 10.6

- Patient group A+ Donor group O+
  - Component selection

- Platelets n=2
  - Patient group B+ Donor group A-
    - WBIT
    - Case 10.3

- Patient group A Donor group O
  - Component selection
  - Case 10.4

- Red cells n=1
  - Patient group O+ Donor group A+
    - Administration
    - Case 10.2

WBIT = wrong blood in tube
Key recommendation 1

- Training in ABO and D blood group principles is essential for all laboratory and clinical staff with any responsibility for the transfusion process. This should form part of the competency assessments.

Action: Hospital Chief Executives and Medical Directors, National Blood Transfusion Committee, Hospital Transfusion Teams

Key recommendation 2

- All available information technology (IT) systems to support transfusion practice should be considered and these systems implemented to their full functionality. Electronic blood management systems should be considered in all clinical settings where transfusion takes place. This is no longer an innovative approach to safe transfusion practice, it is the standard that all should aim for.

Action: Hospital Chief Executives, Hospital Risk Managers and Hospital Transfusion Teams
Nine steps in the transfusion process

1 REQUEST
2 SAMPLE TAKING
3 SAMPLE RECEIPT
4 TESTING
5 COMPONENT SELECTION
6 COMPONENT LABELLING
7 COMPONENT COLLECTION
8 PRESCRIPTION
9 ADMINISTRATION

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 during the final stage.
Point in the process where the first mistake occurred leading to wrong component transfusion (WCT) or specific requirements not met (SRNM)

Laboratory steps

- Request
- Sample taking
- Sample receipt
- Testing
- Component selection
- Component labelling
- Collection
- Prescription
- Administration
- Miscellaneous
Clinical errors leading to specific requirements not being met \( n=114 \)

- **Blood warmer**: 2
- **Multiple missed requirements e.g. irradiated & HEV-screened**: 5
- **Incorrect phenotype**: 5
- **HEV-screened**: 18
- **CMV-screened**: 9
- **Irradiated**: 72

*HEV=hepatitis E virus; CMV=cytomegalovirus*
Laboratory errors resulting in wrong component transfused n=47

- ABO-incompatible platelets: 1
- ABO non-identical: 2
- Wrong patient: 1
- Wrong component: 11 (Sample receipt and registration: 1, Testing: 5, Component selection: 3, Collection: 1, Miscellaneous: 1)
- ABO-incompatible FFP: 1 (Sample receipt and registration: 1, Testing: 1, Component selection: 1, Collection: 0, Miscellaneous: 0)
- D-mismatch: 1 (Sample receipt and registration: 1, Testing: 5, Component selection: 6, Collection: 2, Miscellaneous: 0)
- Wrong ABO/D to HSCT patient: 5 (Sample receipt and registration: 1, Testing: 4, Component selection: 1, Collection: 0, Miscellaneous: 0)

FFP=fresh frozen plasma; HSCT=haemopoietic stem cell transplant
Laboratory errors leading to specific requirements not being met n=111

- Blood warmer
- Washed platelets
- K-negative
- HEV-screened
- Incorrect phenotype
- Methylene-blue treated
- Irradiated
- HLA-matched
- CMV-screened
- Apheresis platelets
- Sampling errors

Legend:
- Sample receipt and registration
- Testing
- Component selection
- Component labelling
- Miscellaneous

HEV = hepatitis E virus; HLA = human leucocyte antigen; CMV = cytomegalovirus
Most ‘near miss’ incorrect blood component transfused were wrong blood in tube errors.

- Request errors
- Laboratory errors
- Collection
- Administration
- Wrong blood in tube (WBIT)

WBIT 87.8%

789
Comparison of near miss and actual wrong blood in tube errors leading to incorrect blood components transfused
Point in the process where a wrong blood in tube incident was detected

This is why the group-check sample is so important
Delayed transfusion reports by year 2010-2017

Reports: 2, 12, 21, 34, 50, 94, 101, 95
Delayed transfusions 2017: urgency and location

**Urgency of delayed transfusions n=95**

- Urgent or emergency: 56
- Routine: 23
- Unknown: 16

**Location of emergency and urgent transfusions n=56**

- Theatres and ITU: 28
- Ward: 11
- ED/MAU: 11
- Obstetrics: 4
- Unknown: 2

*ED=emergency department; MAU=medical admissions unit; ITU=intensive therapy unit (all types)*
Potential hold-up points in the transfusion pathway

1. Recognition of bleeding
2. Communication between clinical area and laboratory
3. Laboratory – grouping, antibody screen, prepares and issues components
4. Components received and transfused – poor venous access

- Haemorrhage call
- Blood samples to laboratory
- Transport of components to patient

Logistics:
- Porter availability
- Distance
Number of reports of anti-D immunisation in pregnancy

Jane Keidan

Addition of online reporting form in 2016

Emerging questions for anti-D Ig:
Do obese women need higher doses?
Are extra doses needed for pregnancies that go beyond term?
Serious adverse reactions

Note change in name of category from acute transfusion reactions (ATR) to febrile and allergic or hypotensive reactions (FAHR)

Acute transfusion reactions are any that occur in the first 24 hours, and are not confined to FAHR
# Febrile and allergic reactions: targeted treatment

## Key SHOT messages

- For febrile reactions alone, give paracetamol.
- For allergic reactions give an antihistamine as first line; give adrenaline if anaphylaxis is suspected. The effect of steroids is delayed by several hours, will have no immediate effect, and should only be used to prevent a late recurrence. The use of steroids may further immunosuppress already immunocompromised patients and increase the risk of side effects such as infection.

<table>
<thead>
<tr>
<th>Reaction</th>
<th>Treatment</th>
<th>Prevention of recurrent reactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Febrile</td>
<td>Paracetamol</td>
<td>Paracetamol 60 minutes before anticipated time of reaction</td>
</tr>
<tr>
<td>Allergic</td>
<td>Antihistamine (steroid should not be used routinely) If anaphylaxis, adrenaline is essential</td>
<td>If previous reaction with apheresis platelets try pooled platelets in PAS If reactions continue, give pre-transfusion antihistamine If reactions continue, consider washed platelets/red cells; for fresh frozen plasma (FFP) try a pooled component e.g. solvent-detergent treated plasma</td>
</tr>
</tbody>
</table>
Percentage of reactions to apheresis and pooled platelets 2014 to 2017

a: Febrile type reactions

- Febrile reactions are more common with pooled platelets

b: Allergic reactions

- Allergic reactions have decreased since pooled platelets were suspended in platelet additive solution
Outcome of reports of suspected transfusion-transmitted infection in 2017

114 reports for investigation

106 suspected bacterial incidents investigated
- 89 concluded post transfusion reactions with no evidence of bacteria on investigation
- 9 concluded NOT bacterial TTI
- 7 concluded indeterminate bacterial incidents**

7 suspected viral incidents reported and investigated
- 1 concluded POSSIBLE bacterial TTI

1 concluded PROBABLE viral TTI (1 HEV)
- 5 concluded NOT viral TTI (2 CMV, 3 HCV)
- 2 concluded viral TTI (1 HAV, 1 HEV)

*Hepatitis C virus (HCV) investigations where the transfusion was prior to screening are not included in the above figure (1 HCV incident reported in 2017, transfusion pre-1991)

**No packs to test but investigation based on information received indicates unlikely to reflect a TTI

TTI=transfusion-transmitted infection; CMV=cytomegalovirus; HEV=hepatitis E virus; HAV=hepatitis A virus
Paediatrics

Key SHOT messages

- Over and undertransfusion, largely due to mistakes in prescribing on a weight-basis, was a significant problem, with 13/19 (68.4%) of overtransfusion cases in paediatrics; this reflects the complexity of paediatric prescribing.

- In 6 cases adult emergency O D-negative units were given to neonates, an area for hospital focus in developing strategies to help staff correctly identify the age-specific emergency units.

- Most handling and storage errors (HSE) resulted from technical administration problems (12/16), including using incorrect pump settings; vigilance is required in the paediatric setting where pumps are so often used.

- There were 2 confirmed paediatric reports of transfusion-related acute lung injury (TRALI) and 1 of transfusion-associated circulatory overload (TACO); it is important for these pulmonary complications to be considered in neonates and paediatrics as in older patients.
Identify your neonatal emergency group O D-negative units

With permission from Rachel Moss
Recommendation

- Clinical staff who prescribe blood for paediatric patients should not do so unless they have been given training in weight-based prescribing of blood components. Additional resources that can support best practice include the ‘Bookmarks’ and ‘Blood Component App’ with key information from the British Society for Haematology (BSH) paediatric transfusion guidelines (New et al, 2016; see SHOT website https://www.shotuk.org/resources/current-resources/)

Action: Hospital Transfusion Teams, Hospital Paediatricians, Royal College of Paediatrics and Child Health
SABRE reports for 2017

Human errors are responsible for most reports
The inspectors have picked up poor practice and will increase inspections in 2018 with short notice

Statler and Waldorf, in the Muppets their role is to give constructive criticism to improve safety (the inspectors are nothing like this)
Serious adverse event reports to MHRA 2017

- Apheresis collection: 1
- Storage/HSE: 1
- Distribution/HSE: 8
- Testing of donations: 12
- Processing: 16
- Other: 26
- Whole blood collection: 41 (3 equipment failure, 41 human error, 3 product defect)
SABRE reports, human error 2017

Do it right first time, each step

- Inadequate supervision: 9
- Lapsed/no training: 25
- Incorrect procedure: 40
- Inadequate training: 46
- Inadequate QMS—staffing and workload: 80
- Ineffective training: 119
- Inadequate process: 211
- Procedural steps omitted/wrong procedure performed: 237
- Procedure performed incorrectly: 291

QMS=quality management system
Manchester will have more than 100 bees

Bee in the City

From July until September, Manchester will host one of its most spectacular public art events...
Acknowledgements

• SHOT team
• Working expert group
• Steering group
• Mark Bellamy
• UK Forum

And introducing Dr. Shruthi Narayan, Medical Director from September 1st