The Significance of Antibodies and Appropriate Blood Selection

Nurse Authorisation
10th June 2013
Blood Transfusion - What’s the worst that can happen?

Death!
The Transfusion Process

**Good Documentation**
- Informing the patient
- Sampling
- Testing
- Reason for tx
- Collection
- Pre-administration
- Administration

Right blood, right patient, right time. RCN 2005

Guidelines for pre-transfusion Compatibility procedures
In blood transfusion laboratories
BCSH 2012
The Patient

- Wrong Blood in Tube (WBIT)
  - How should it be prevented?
  - How can it be managed?

*It has been estimated that 1:2000 samples is from the wrong patient.*
*Dzik et al 2003 and Murphy et al 2004*
The Patient

What information do you want on the:

- **The request form**
  - Core identifiers
  - Gender
  - *Address*
  - Diagnosis and condition
  - Reason for request
  - When and where
  - Tx history
  - Which component
  - Number of units
  - Special requirements
    - Eg blood warmer, irradiated etc

- **The sample tube**
  - Core identifiers
  - Date of sample
  - Time sample taken
  - Ward
  - Identity of person taking the sample

BCSH Guideline on the Administration of Blood Components 2009
BCSH Guidelines for pre-transfusion compatibility procedures in blood transfusion laboratories 2012.

- Appendix 7 Requirement for two samples for ABO/D grouping prior to the issue of red cells
- 72 hour rule may apply to facilitate patient management
- Based on BEST studies and SHOT reports including the current 2011
The aim of pre-transfusion testing

• To provide blood that is safe for transfusion

• To have advance notice of transfusion requirements

• Utilise group and save process:
Group & Save Request

ABO-Single most important test
- Rh D
- Antibody screen
- Automated systems essential with results downloaded into LIM

• If antibody screen is negative:
  Blood can be selected for electronic crossmatch, if the historic results in the LIM are comparable to the current results

• If antibody screen is positive:
  Identification of the antibody is required before the date of transfusion
D group

- What would happen to > 30% of D-ve people transfused with D+ blood?
- Stimulated to make anti-D
- Because the D antigen is very immunogenic
- Anti-D could cause problems in pregnancy
- Also, would need to be crossmatched serologically once the antibody has been formed
- Recommendation
  - Do not give a D negative person D positive blood
Antibody screen/identification

- Early detection leads to early identification
- Identify potential delay in the supply of blood
- Manual Crossmatch procedure required
- Complex patients may have to be referred to NHSBT for investigation
Serological Crossmatch

- Patient plasma (antibody location)
- Donor cells (antigen location)
- Incubate together
- Record results
- If positive?
- If negative?
Selection of Blood

• What do you want?
  – ABO and D identical (wherever possible)

• The transfusion of ABO incompatible blood is now classed as a “never event” (DH 2011)

• LIM systems should not allow selection of ABO incompatible red cells
If ABO identical red cells are not available?

<table>
<thead>
<tr>
<th>Patient’s ABO</th>
<th>Other group options for red cells</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Group O</td>
</tr>
<tr>
<td>B</td>
<td>Group O</td>
</tr>
<tr>
<td>AB</td>
<td>Group A, Group B or Group O</td>
</tr>
<tr>
<td>O</td>
<td></td>
</tr>
</tbody>
</table>
What if D identical is not available?

<table>
<thead>
<tr>
<th>Patient’s D type</th>
<th>Available D typed red cells</th>
</tr>
</thead>
<tbody>
<tr>
<td>D Positive</td>
<td>Give D negative</td>
</tr>
<tr>
<td>D Negative</td>
<td>Need a good reason to give D positive</td>
</tr>
</tbody>
</table>

What about women of child bearing age?  
**D neg ladies always need D neg red cells**

15% of the UK population are Rh D negative, but  
O neg ~7%  B neg ~2%  A neg ~7%
Antibodies

Definition of a clinically significant antibody

- Any antibody that can cause accelerated destruction of transfused red cells
- Which antibodies mustn’t I forget?
- Is there a list?
- Appendix 6 Table 7, Guidelines for pre-transfusion compatibility procedures in blood transfusion laboratories
## Antibodies present?

<table>
<thead>
<tr>
<th>Antibodies</th>
<th>Clinically significant?</th>
<th>Blood selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rh(D,C,E,c,e)</td>
<td>✓</td>
<td>Selected antigen negative units required</td>
</tr>
<tr>
<td>Kell(K)/Cellano(k)</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Kidd(Jka/Jkb)</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>MSs</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Duffy(Fya/Fyb)</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Lua, P1, Cw, Kpa, N, Lewis</td>
<td></td>
<td>Selected antigen negative units not required issue compatible units</td>
</tr>
</tbody>
</table>
What about....

- Patients with
  - Autoimmune haemolytic anaemia
  - Sickle cell disease / Thalassaemia
  - Transfusion dependant
- Minimum requirement ABO and Rh and K matched units
- Massive blood transfusion
  - Loss of 1 blood volume within a 24 hour period, or 50% blood loss within 3 hours
  - If group O has been given initially recommendation to switch to own ABO and D types as quickly as possible
Special Requirements

- Irradiated
- CMV negative
- HbS negative
- Units suitable for IUT/Exchange

The responsibility lies with the requester to ensure the request form is completed.
Red cells for IUT / Exchange – Special Requirements

1. Gp O and antigen neg for maternal antibodies
2. K neg
3. Negative for usual mandatory test
4. Donor has donated in the last 2 years
5. PANTS neg and High Titre anti-A, -B neg
6. HbS neg
7. CMV neg
8. Less than 5 days old
9. CPD not SAGM preservative
10. Hyperconcentrated (IUT >0.7, exchange 0.5-0.6)
11. Irradiated (24 hour expiry)
# PLT & FFP Selection

<table>
<thead>
<tr>
<th>Patient Group</th>
<th>Platelets</th>
<th>FFP/CRYO</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>*HT-</td>
<td>* HT-</td>
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<tr>
<td></td>
<td>1&lt;sup&gt;st&lt;/sup&gt;</td>
<td>1&lt;sup&gt;st&lt;/sup&gt;</td>
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<tr>
<td></td>
<td>2&lt;sup&gt;nd&lt;/sup&gt;</td>
<td>2&lt;sup&gt;nd&lt;/sup&gt;</td>
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<tr>
<td></td>
<td>3&lt;sup&gt;rd&lt;/sup&gt;</td>
<td>3&lt;sup&gt;rd&lt;/sup&gt;</td>
</tr>
<tr>
<td>O</td>
<td>O A B</td>
<td>O A B</td>
</tr>
<tr>
<td>A</td>
<td>A B O*</td>
<td>A AB B*</td>
</tr>
<tr>
<td>B</td>
<td>B A O*</td>
<td>B AB A*</td>
</tr>
<tr>
<td>AB</td>
<td>AB A B</td>
<td>AB A* B*</td>
</tr>
</tbody>
</table>
Visual Inspection
Does this always happen?

Clotted red cells, would you issue this?

Photo taken from Shot – Key Recommendations for Laboratory Staff 2008
Unfortunately all this does not prevent...

The wrong patient being bled

OR

The wrong patient being transfused
Acknowledgements

- Scientific & Clinical Development colleagues
- B.Taylor Sheffield Teaching Hospitals