Transfusion-transmitted infections: an update

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NHSBT/HPA
Overview

• What is a transfusion-transmissable infection (TTI)?
• What is reported?
• How many infections are real?
• Previous cases
• Risk-reduction measures
What makes a good non-bacterial TTI?

– Potential for transfusion transmission
  • Asymptomatic carriage
  • Survival in blood components
  • Infectious by IV route
  • Susceptible population

- hepatitis A
- hepatitis B
- HIV
Transfusion-transmitted infections

- **Prions**
  - vCJD

- **Viral**
  - Those we test for routinely e.g. hepatitis B
  - Those we don’t e.g. hepatitis A
  - Emerging infections e.g. HIV in 1980s ?hepatitis E now

- **Parasites**
  - e.g. malaria

- **Bacteria**
  - Red cells e.g. *Pseudomonas spp.*
  - Platelets e.g. Staphylococci
What constitutes a TTI: SHOT definition

• A report is classified as TTI if, following investigation:
  – The recipient had evidence of infection post-transfusion, and there was no evidence of infection prior to transfusion and no evidence of an alternative source of infection;

  **and either:**
  – At least one component received by the infected recipient was donated by a donor who had evidence of the same transmissible infection,

  **or:**
  – At least one component received by the infected recipient was shown to contain the agent of infection.
# Potential non-bacterial TTIs reported to NHSBT for investigation

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Confirmed TTIs reported to the NHSBT/HPA Epidemiology Unit between 1/10/1995-31/12/2010 by year of transfusion and infection

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<td>69 (75)</td>
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The number of incidents is shown with the total number of infected recipients identified in brackets*
Strategies to reduce risk of transfusion transmitted infections

- DONOR SELECTION
- PROCESSING, QUALITY CONTROL
- SCREENING TESTS
- STORAGE, PATHOGEN INACTIVATION
- BETTER BLOOD TRANSFUSION
- TRACING SURVEILLANCE

vCJD

- Has had major impact on blood safety measures in UK

- Donor deferral
  - Transfused donors
  - Donors who have resided in UK (for other Blood Services outside UK)

- Active surveillance

- Other measures
  - UK plasma no longer used for fractionation
  - Importation of FFP for certain groups
  - Reduce donor exposures
  - Leucodepletion
Transmissions of vCJD infection linked to known infected donors

- 1996 (reported 2003)- clinical symptoms (at 6.5 years)
- 1999 (reported 2004)- no symptoms, incidental finding at post-mortem (at 5 years)

- 1997- two recipients (reported 2005 and 2006), both clinical symptoms, linked to one donor
  - in late 1997 non-leucodepleted red cells transfused, donor developed symptoms approximately 20 months later. Donor’s previous red cell donation also transfused.
  - recipients developed symptoms 7.5 years post-transfusion and 8.5 yrs post-transfusion

6 other cases with transfusion history and no known infected donor
Leucodepletion

- Reduction of white cells as vCJD risk-reduction measure

- BUT in addition possible impact on other cell-associated viruses e.g. CMV, HTLV

- <5 X 10^6 white cells per unit (‘CMV-safe’) but does not eliminate risk
CMV

- Currently some recipients receive CMV negative transfusions

- SaBTO position statement issued in March 2012

- Considered evidence: was there sufficient evidence to replace CMV-negative components by leucodepleted components?

- Others sources of infection include tissue, stem cell and organ transplants and vertical transmission
CMV

- Was sufficient evidence to recommend some groups require leucodepleted but not CMV neg components

- CMV negative components for specific patient groups including
  - Intra-uterine transfusion + neonates (up to 28 days)
  - Elective transfusions during pregnancy Immunodeficient patients- leucodepleted

- Continue to monitor any reports of TTIs

- Continue to test some donors for CMV
Importance of Testing

Timeline of introduction of microbiological tests for blood donations, UK

HBV Window Period 38 days
HCV Window Period 4 days
HIV Window Period 9 days
(HTLV 1 Window Period 45 days but ? relevance)
Generalised course of infection

Marker

Genome

Antibody

Antigen

Time of infection

Time (months/years)

NHS Blood and Transplant
Estimates of the risk of HBV, HCV, HIV or HTLV I infectious donations entering the blood supply, UK

<table>
<thead>
<tr>
<th></th>
<th>HBV</th>
<th>HCV</th>
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<tr>
<td><strong>Window Period donation 2007</strong></td>
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<tr>
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<td>0.02</td>
<td>0.19</td>
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<td>1 per X million</td>
<td>0.9</td>
<td>55.37</td>
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<td><strong>Window Period donation 2010</strong></td>
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<tr>
<td>Per million</td>
<td>0.94</td>
<td>0.01</td>
<td>0.16</td>
<td>0.13</td>
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<tr>
<td>1 per X million</td>
<td>1.06</td>
<td>72.50</td>
<td>6.18</td>
<td>7.89</td>
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Donor selection

- Importance of donor information and reporting post-donation information

- Importance of donor selection criteria
  - Window period infections
  - Infections we do not test for
  - Travel and behavioural risks
HAV case

- Donor reported symptoms of hepatitis A eight days post-donation
- Red cells were discarded but plasma transfused
- Hepatitis A identified in archive sample by PCR
- Recipient given active and passive immunisations and developed sub-clinical infection with no sequelae.

Prompt action due to post-donation information
Malaria

– TTI rare in non-endemic countries
– 5 cases between mid 1980s to 2011, last 2003
– Donor selection and antibody testing
– Cases to date
  • Two donors did not give complete information
  • Error- red cells released
  • Two donors with history of residency, >3 years since travel, no test.
Bacterial TTIs

- Approximately 100 suspected reported each year
- Investigation of pack/recipient and occasionally the donor
- Last confirmed reported bacterial TTI in 2009
- Arm cleansing and diversion strategy
- Improved infection prevention and control measures
- Additional bacterial screening for platelets
- NO screening for red cells
Bacterial screening to end February 2012 number and (percentage): NHSBT

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<td>Apheresis platelets</td>
<td>204,714</td>
<td>1309 (0.64)</td>
<td>36 (0.02)</td>
<td>103 (0.05)</td>
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<td>Pooled platelets</td>
<td>37,468</td>
<td>160 (0.43)</td>
<td>27 (0.07)</td>
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<td>Total</td>
<td>242,182</td>
<td>1469 (0.61)</td>
<td>63 (0.03)</td>
<td>132 (0.05)</td>
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Bacterial screening

- NHSBT sample after overnight hold
- Aerobic and anaerobic culture
- Majority of isolates anaerobic skin flora

- Has prevented transmission of potentially nasty bacteria to recipient
Current TTI risk

- Number of TTIs remains low
- Current infectious disease epidemiology and……
- Risk reduction measures in place
  - Donor selection
  - Screening tests
  - Processing and administration
  - Better Blood Transfusion
  - SHOT
The source of infection is probably not the blood but if in doubt check!
Acknowledgments

- NHSBT/HPA Epidemiology Unit members past and present
- Dr Patricia Hewitt