20. Transfusion-Transmitted Infection (TTI)

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Definition

A report was classified as a transfusion-transmitted infection if, following investigation:

- **the recipient had evidence of infection following transfusion with blood components 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.**

DATA SUMMARY Total number of cases: 0
There were no proven cases of TTIs reported in 2011

Reports of suspected TTIs

Most reports of suspected viral and bacterial TTIs are received and investigated by the UK Blood Services and then reported to the NHS Blood and Transplant (NHSBT)/Health Protection Agency (HPA) Epidemiology Unit. From here, data are included in the SHOT report. A number of reports are also received from the SHOT online reporting system and the Medicines and Healthcare products Regulatory Agency (MHRA)'s online reporting system for Serious Adverse Blood Reactions and Events (SABRE). Incidents are included for the year in which they were reported, even if the investigation is not yet complete, as the investigation into suspected viral TTIs can take several months.

During 2011, 41 suspected TTI incidents were reported by Blood Services and hospitals throughout the UK. Zero incidents were confirmed as TTIs according to the above definition. Twenty-eight bacterial incidents were concluded as not TTI (a further 77 investigations into reports of suspected bacterial incidents found no evidence of bacteria in either the recipient or the pack and were reclassified as possible transfusion reactions). Eleven investigations of viral infections concluded as not TTI, included 1 cytomegalovirus (CMV) incident, 1 hepatitis B virus (HBV), 6 hepatitis C virus (HCV), 1 hepatitis E virus (HEV) and 2 human immunodeficiency virus (HIV) incidents. One HBV incident reported in December 2011 is pending complete investigation.

There was 1 undetermined bacterial TTI investigation in 2011. A child was receiving an apheresis platelet transfusion due to a low platelet count. Towards the end of the transfusion the patient's blood pressure, pulse and temperature all dropped. Symptoms of breathlessness, nausea/vomiting and a rash also developed. The patient was not on any antibiotics at the time of the transfusion and was not given any as a result of the reaction. Patient blood cultures were not taken. The empty pack was returned to the Blood Service with one open unsealed port causing some leaking of the pack remnants. Nevertheless the pack was washed out with saline and *Lactococcus lactis ssp.lactis* was isolated. This organism, formerly known as *Streptococcus lactis*, is primarily associated with food and vegetation, although

it has been isolated from clinical specimens and blood cultures. It is also thought to form part of the normal flora of the alimentary tract. This case was difficult to conclude as although the recipient had had previous minor reactions following transfusions no confirmatory tests could be carried out due to lack of sample. However, it was unlikely to be a TTI. A second pack from this donation was transfused with no adverse reaction to a patient who was on antibiotics at the time of the transfusion.

Confirmed incidents

There were no confirmed TTIs reported in 2011.

Other incidents

Near miss

There were no near miss incidents reported in 2011.

Investigations reported as pending or undetermined in 2010

There were 6 investigations reported as pending in 2010 (1 CMV, 1 HBV, 2 HCV, 1 HIV and 1 bacterial case). All have been confirmed as not TTIs.

Cumulative data

Bacterial TTIs

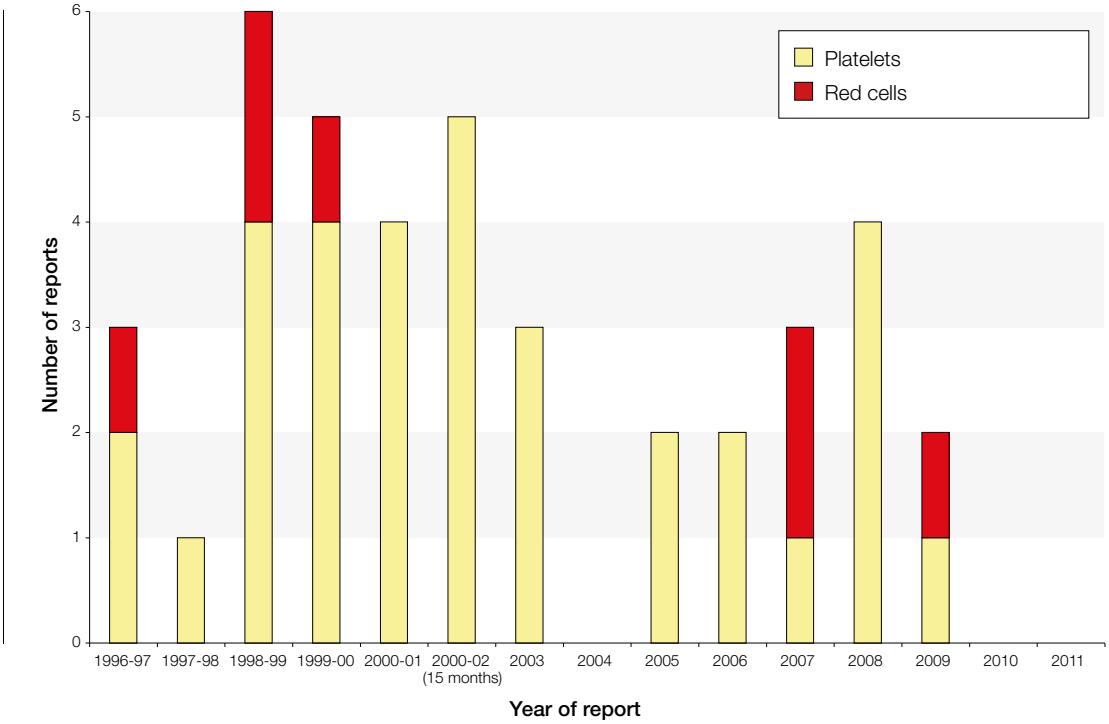
Since 1996, 40 bacterial TTI incidents have been confirmed, involving a total of 43 recipients (see Figure 20.1 and Table 20.1), 11 of whom died (death due to infection or in which transfusion reaction was implicated). A total of 33 incidents have related to the transfusion of platelets, whereas only 7 have related to the transfusion of red cells.

In Figure 20.1:

The histogram shows the number of incidents, not infected recipients identified. A total of 6 recipients were infected in 2008 and 3 in 2009.

In 2004 there was a further incident (not included in Figure 20.1) involving the contamination of a pooled platelet pack with *S. epidermidis*. This incident did not meet the TTI definition as transmission to the recipient, although likely, could not be confirmed.

Figure 20.1 Number of bacterial TTI incidents, by year of report and type of unit transfused (Scotland included from 10/1998)



Viral and parasitic TTIs

Since 1996, 22 confirmed incidents of transfusion-transmitted viral and parasitic infections have been reported, involving a total of 25 recipients (see Figure 20.2 and Table 20.1); 1 incident resulted in a fatal transfusion reaction (malarial transmission). There have been no confirmed transfusion-transmitted viral or parasitic infections in recent years – the last confirmed incident was in 2005. Three of the incidents were related to the transfusion of platelets, including the 2005 hepatitis A virus (HAV) incident, while the remaining 19 incidents were related to the transfusion of red cells.

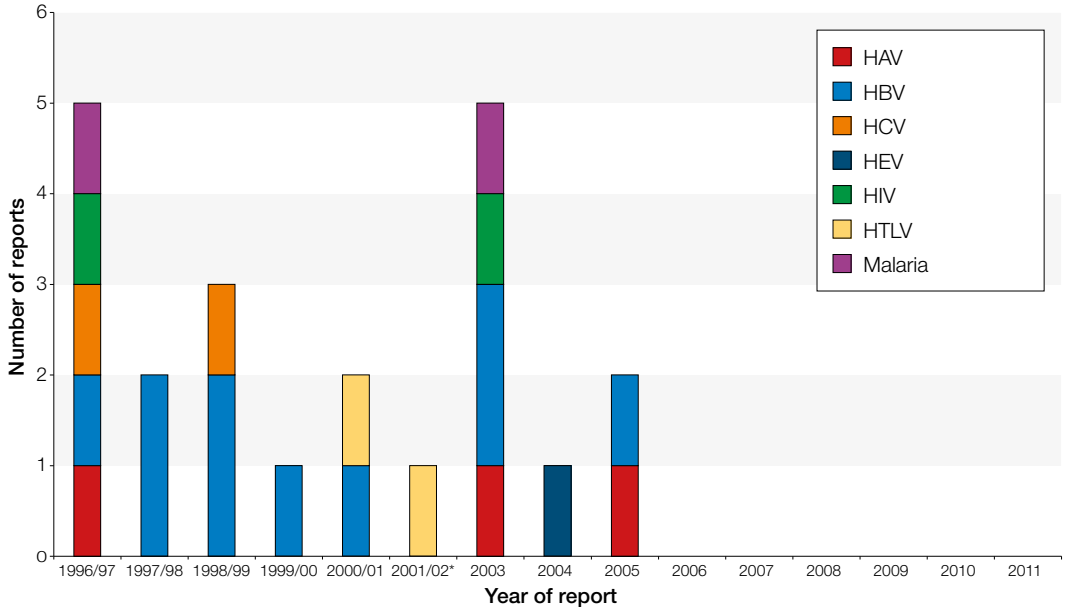
In Figure 20.2:

The year of transfusion may have been many years prior to the year in which the case is investigated and reported in SHOT because of the chronic nature of some viral infections. The figure shows the number of incidents, not infected recipients identified. For 1 incident in 1996–97 (HIV) and 1 in 1999–2000 (HBV), 3 and 2 recipients were identified, respectively.

The 2 HIV incidents were associated with anti-HIV negative/HIV ribonucleic acid (RNA) positive donations, i.e. window period donations. A third window period donation in 2002 was transfused to an elderly patient, who died soon after surgery. The recipient's HIV status was therefore not determined and not included in Figure 20.2.

No screening was in place for the following TTIs at the time of transfusion: HAV, HEV and Human T-cell Lymphotropic Virus (HTLV).

Figure 20.2 Number of viral and parasitic TTI incidents, by year of report and infection type (Scotland included from 10/1998)



Variant Creutzfeld-Jakob Disease (vCJD)

There were no vCJD investigations in 2011.

To date there have been 4 transmissions of vCJD/prion infection via red cell transfusion from 3 donors. These donors later developed vCJD. Three of the 4 recipients developed clinical vCJD some years after transfusion; one donor was common to the second and third of these cases. In the fourth case, relating to a different donor, the recipient was found to have abnormal prion in tissues at post-mortem after dying of an unconnected condition. The cases reported were among a small group of recipients who were under active surveillance because they had received non-leucodepleted red blood cells (RBCs) between 1996 and 1999 from blood donors later diagnosed with vCJD. A small number of other cases have been investigated, where a blood transfusion recipient has developed clinical vCJD, but where none of the relevant donors has developed the disease. In these cases, it remains possible that one of the donors is a carrier, but unaffected, and would not be detected as infected in the absence of a blood screening test. These known "at risk" donors have been removed from the donor pool. Work to develop a test for vCJD is at a very early stage of development. The UK Blood Services are involved in the work to develop further a possible test. However, there is currently no screening test for vCJD available for use in blood donors.

Since 1997, the UK Blood Services have introduced a number of precautionary measures[65]:

- Leucodepletion of all blood components (1999).
- Use of methylene-blue virally inactivated fresh frozen plasma (FFP) (MB-FFP) obtained outside the UK for children born on or after 01/01/1996 (2002).
- Importation of plasma for fractionation (1998).
- Imported solvent detergent treated FFP (SD-FFP) for adult patients with TTP (2006).
- Exclusion of donors who have received a blood transfusion in the UK since 1980 (2004).

Table 20.1 Number of confirmed TTI incidents, infected recipients and outcomes (death, major morbidity, minor morbidity) in the UK between October 1996 and December 2011 (Scotland included from October 1998) NB No screening in place for the following TTIs at the time of transfusion: HAV, HEV, HTLV, vCJD/prion

Infection	Number of incidents	Number of infected recipients	Death due to, or contributed to, by TTI	Major morbidity	Minor morbidity
Bacteria	40	43	11	28	4
HAV	3	3	0	2	1
HBV	10	11	0	11	0
HCV	2	2	0	2	0
HEV	1	1	0	0	1
HIV	2	4	0	4	0
HTLV I	2	2	0	2	0
Malaria	2	2	1	1	0
Prion	1	1	0	1	0
vCJD	3	4	3	0	0
Total	**66**	**73**	**15**	**51**	**6**

COMMENTARY

2011 was the second consecutive year with no proven reports of TTI. This reflects the continuing high working standards and improvements based on the learning outcomes from previous investigations into contamination incidents. The investigation of possible TTIs forms part of the quality and governance framework.

There were no near miss incidents reported in 2011. In recent years near miss incidents, where staff noted visual abnormalities in the packs (usually platelets) and prevented their use, have occasionally occurred. It is thought that bacterial screening quickly detects fast-growing organisms thus pre-empting such near misses.

Bacterial screening for platelet donations was rolled out in NHSBT during 2011. The other UK Blood Services were already screening platelet donations for bacterial contamination. Bacterial screening is proving to be an additional effective risk reduction measure.

It should be noted that bacterial screening is unlikely to prevent all transmissions and the current high standards of collection, processing and vigilance should be maintained[66]. Strategies to reduce the bacterial contamination of blood components are under continual review.

One bacterial case in 2011 was undetermined partly because the pack had not been sealed before being sent to the Blood Services for testing therefore environmental contamination could not be ruled out. There was also insufficient material for confirmatory testing. Other investigations not described here were compromised because of possible contamination during local sampling of the pack post-transfusion. Attention should be paid to the sampling and storage of implicated units or their residues to avoid contamination of the pack.

The numbers of suspected and proven viral TTIs are much smaller than for bacterial TTIs. The current estimated risks of transmission of HBV, HCV, and HIV via blood transfusion are low (0.94 per million donations for HBV, 0.01 per million for HCV, and 0.16 for HIV)[67].

One report in 2011 involved a multi-transfused immunosuppressed recipient who developed chronic HEV infection. Investigation of implicated blood donors revealed no evidence that any donor could have been the source of infection. There has been one proven case of HEV transmission by red cells in 2004, which was detected by lookback when the donor reported hepatitis following blood donation. The platelet recipient did not become infected. Although more work is required, it is becoming apparent that HEV infection is more common in the UK than previously believed[68], and that HEV infection can lead to chronic liver disease in immunosuppressed individuals, therefore HEV could be more important as a TTI than previously thought.

Box 20.1: Initiating an investigation into a suspected TTI

Guidance on initiating an investigation and the required reporting forms for suspected transfusion-transmitted infections (TTIs) for hospitals served by NHSBT can be found on the Requests for Investigation of Adverse Events & Reactions page at http://www.blood.co.uk/hospitals/library/request_forms/aer/

For other Blood Services please contact the local blood supply centre.

Reporting a suspected bacterial TTI

If bacterial contamination is suspected, please report the incident to the Blood Service as soon as possible in order to facilitate the return of implicated packs and the recall of any associated units.

Do not sample the pack locally unless clinically indicated. The Blood Services provide comprehensive bacterial testing and where isolates are available from the recipient will arrange typing of strains.

If no bacteria are detected in recipient or pack, the reporter should either amend or place an initial report to SHOT based on findings of the investigations so that the transfusion reaction can be classified in another hazard category eg ATR.

Reporting a suspected viral or non-bacterial TTI

If viral or non-bacterial contamination is suspected please report to the Blood Service. Investigations by NHSBT will not be initiated without completed notification forms.

Before reporting, staff should attempt to ensure that the infection is confirmed and was not present prior to the transfusion.

As the number of TTIs is so low, other identified possible sources of infection should be investigated without waiting for the outcome of the Blood Service investigation.

Recommendations

There are no new recommendations. The 2010 recommendations are still active.

For active recommendations from previous years and an update on their progress, please refer to the SHOT website