21 Transfusion-Transmitted Infections (TTI) n=4 (2 confirmed, 2 probable)

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Definition:

Included as a TTI if, following investigation, the recipient had evidence of infection post transfusion, 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 infection.

Or at least one component received by the infected recipient was shown to contain the agent of infection. These may be identified because of infection in the recipient where transfusion is the suspected source, and a post-transfusion infection reported to the Blood Services.

Alternatively, an infection in a recipient may be identified from lookback investigations which are initiated when a donation from a repeat donor is identified as having markers of infection. Archive samples are retrieved for retrospective testing, which may find a previous donation to also be positive but with markers of infection below the detection level of routine screening. In this case further work will be carried out to identify recipients.

Note that for the purposes of the European Union legislation, serious adverse reactions (SAR) are defined as any reactions in patients that are 'life-threatening, disabling or incapacitating, or which result in, or prolongs, hospitalisation or morbidity'. These must be reported to the Medicines and Healthcare products Regulatory Agency (a legal requirement). This includes all confirmed transfusion-transmitted infections.

Abbreviations used in this chapter

AABB	Association for the Advancement of Blood and Biotherapies
ALT	Alanine aminotransferase test
anti-HBc	Antibodies to hepatitis B core antigen
anti-HBs	Antibodies to hepatitis B surface antigen
BSH	British Society for Haematology
CJD	Creutzfeldt Jakob disease
CMV	Cytomegalovirus
DNA	Deoxyribonucleic acid
EBV	Epstein-Barr virus
EIAR	Emerging Infectious Agents Report
FDA	Food and Drug Administration
FFP	Fresh frozen plasma
IU/L	International units per litre
JPAC	Joint United Kingdom (UK) Blood Transfusion and Tissue Transplantation Services
NAT	Nucleic acid testing
NHSBT	National Health Service Blood and Transplant
NIBTS	Northern Ireland Blood Transfusion Service
OBI	Occult hepatitis B virus (HBV) infection
RNA	Ribonucleic acid
SaBTO	Advisory Committee on the Safety of Blood, Tissues and Organs
SACTTI	Standing Advisory Committee on Transfusion Transmitted Infection

HAIRS	Human Animal Infections and Risk Surveillance group
HAV	Hepatitis A virus
HBV	Hepatitis B virus
HCV	Hepatitis C virus
HEV	Hepatitis E virus
HIV	Human immunodeficiency virus
HSV	Herpes simplex virus
HTLV	Human T-cell lymphotropic virus
IgG	Immunoglobulin G antibody
IgM	Immunoglobulin M antibody
SAR	Serious adverse reactions
SARS-CoV-2	Severe acute respiratory syndrome coronavirus 2
SNBTS	Scottish National Blood Transfusion Service
TMER	Transfusion Medicine Epidemiological Review
TTI	Transfusion-transmitted infections
UK	United Kingdom
UKHSA	United Kingdom Health Security Agency
vCJD	Variant Creutzfeldt Jakob disease
WBS	Welsh Blood Service
WNV	West Nile virus

Key SHOT messages

- It is important that any suspected TTI is reported to allow investigation, however, it should be noted that confirmed or probable TTI are rare
- Suspected TTI should be discussed with the consultant microbiologist, virologist and/or other infection diseases expert to confirm the diagnosis and following that, reported to the appropriate UK Blood Service for further investigations
- The UK Blood Services store a sample from every blood donation for at least three years. Testing can be done on these samples during this time if a TTI is suspected
- It is important that all healthcare professionals consenting patients for blood transfusion have up-to-date knowledge of blood donation testing, and the extremely small but potential risk of routine testing not detecting an infection in a donor that may enter the blood supply. For acute HBV, HCV, and HIV infections this has been estimated to be less than 1 in 1 million donations tested and confirmed and probable transmissions remain rare with very few numbers each year
- The UK Blood Services continue to monitor rates of infection in donors to sustain a safe supply of blood components
- SHOT data is used to inform policy and change it when necessary. Additional hepatitis B anti-core testing has been introduced to reduce the risk of hepatitis B transmission from donors with occult hepatitis B where viral levels may be below the level of detection by the previous routine screening assays

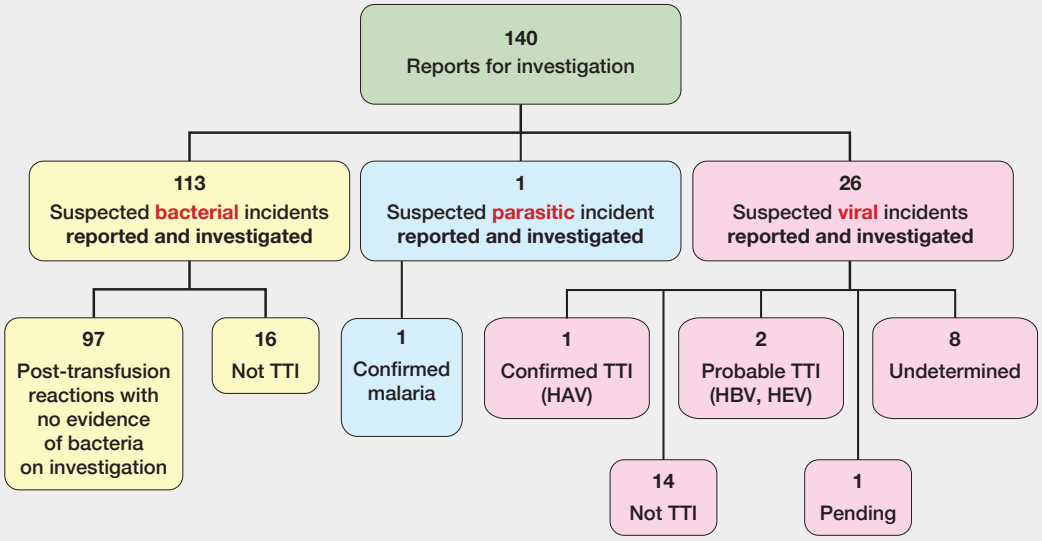
Introduction

This chapter describes suspected TTI incidents investigated by the UK Blood Services and reported to the UKHSA and NHSBT's joint Epidemiology Unit's surveillance scheme in 2023. Additionally, we report on investigations where the UK Blood Services identify infection in a repeat donor and lookback to their previous donation(s) for evidence of transmissions to recipients.

Summary of investigations in 2023

During 2023, the UK Blood Services investigated 113 suspected bacterial incidents, 1 suspected parasitic incident and 26 suspected viral incidents (Figure 21.1).

Figure 21.1: Outcomes of suspected TTI reported to NHSBT/UKHSA Epidemiology Unit and investigated in 2023 in England, Northern Ireland, Scotland, and Wales



TTI=transfusion-transmitted infection; HBV=hepatitis B virus

Please note:

A confirmed TTI is as per the definition with evidence that the virus/bacterium is indistinguishable on molecular typing between patient and donor/donation.

- *A probable TTI is as per the definition, but where molecular typing cannot be carried out to confirm this.*
- *A possible TTI is as per the definition, but where prior infection or an alternative source could not be completely excluded.*
- *Not a TTI is defined as an investigation that concluded the infection in the recipient was NOT caused by transfusion, either as all indicated donors were traced and none of them were shown to be infected; or there was no evidence of infection in the recipient; or they were shown to be infected already prior to transfusion.*
- *A near miss is defined as either an infection was identified in the unit due to be transfused however the unit was NOT transfused (e.g., bacterial growth seen in unit and returned to the bacteriology laboratory prior to transfusion for investigation) or an infected donor calls post donation, and the unit is recalled, and infection found in unit before it is transfused.*
- *An undetermined conclusion is when the investigation has been completed as far as possible, however it is not possible to confirm or refute blood transfusion as cause of infection in recipient.*

Deaths related to transfusion n=0

None of the patients with confirmed TTI investigated in 2023 were reported to have died.

Major morbidity n=4

There were 4 cases with major morbidity following investigations in 2023, as detailed below.

Case 21.1 - Confirmed HAV, cleared the infection

Case 21.2 - Probable HEV, cleared the infection with treatment

Case 21.3 - Probable HBV, chronic HBV infection, likely lifelong treatment

Case 21.5 - Confirmed malaria, clearing the infection after treatment

Near misses n=0

There were no near misses reported in 2023.

Bacterial TTI reports in 2023

In 2023, no reported suspected bacterial TTI investigations were concluded to be confirmed, probable or possible.

Since 2011, all four UK Blood Services have used the BacT/ALERT system for bacterial screening which has been successful in reducing the risk of bacterial TTI, together with diversion and arm cleansing (McDonald, et al., 2017). The details are described in Table 21.1.

	Time of sampling (hour)	Volume sampled (mL)	Apheresis sample	Time at release (hour)	Length of screening
NHSBT	≥36	2 x 8	Post-split	6	Day 7
NIBTS	≥36	16	Pre-split	6	Day 7
SNBTS	≥36	2 x 8	Pre-split	6	Day 7
WBS	≥36	2 x 8	Post-split	12	Day 7

Table 21.1: Bacterial screening methods used by the UK Blood Services

Bacterial TTI 1996-2023

Screening of platelet components cannot guarantee the absence of bacterial contamination. Packs are released for issue as 'negative-to-date', which can be before bacteria have multiplied sufficiently to trigger detection on screening. There have been 9 such near misses, all but one in platelet components, reported between 2011 and 2023. Overall, of 37 incidents of bacterial transfusion-transmissions to individual recipients, 30 have been caused by the transfusion of platelets, 7 by red cells and 1 by FFP (Table 21.6) since reporting began in 1996. The introduction of bacterial screening of platelets, most recently by England in 2011, has had a significant impact in the numbers of bacterial TTI.

Current BSH guidance recommends that patients are advised to report any symptoms that occur within 24 hours of transfusion although patients with confirmed bacterial TTI generally become unwell very rapidly, often during transfusion (Soutar, et al., 2023). Clinical teams are reminded that any suspected bacterial TTI should be discussed with the relevant blood service so that, if appropriate, packs can be returned for culture and any other associated packs recalled.

Viral TTI reports in 2023

The number of viral TTI investigated in 2023 includes 2 reports where blood not tested for CMV was used in an emergency where normally CMV negative blood should have been requested, hence retrospective CMV testing was completed. These investigations are not further examined in the text of this chapter due to them not fulfilling the definition of a TTI. They are instead described in Chapter 10, Incorrect Blood Component Transfused (IBCT) of this Annual SHOT Report.

Case 21.1: Confirmed HAV transmission

Post-donation information prompted this lookback investigation. A regular donor developed symptoms of acute hepatitis within two weeks of their most recent blood donation and was subsequently diagnosed with a HAV infection. Both HAV IgM antibodies and RNA were detected in their blood sample. The recipient was identified and followed up for HAV testing. The patient was asymptomatic at the time of diagnosis of their HAV infection, they subsequently developed significant transaminitis with a peak ALT of 730 IU/L. Donor and recipient virus sequences were identical, a rare 1B subgenotype, confirming that this HAV infection was acquired via a red blood cell blood transfusion. The implicated donor was deferred from donation for 6 months, but will be eligible to donate, as HAV (like HEV) does not cause a chronic infection in healthy individuals. HAV infection is generally very rare in the UK and hence blood donations are not routinely screened for this virus. Testing for HAV (together with human parvovirus B19) will be undertaken by Blood Services in England and Scotland from Spring 2024 to facilitate collection of plasma for fractionation.

Case 21.2: Probable HEV transmission

A renal transplant recipient was diagnosed with HEV infection following abnormal liver function tests. HEV infection of the transplanted organ had been excluded, hence it was considered whether they might have acquired it via the plasma exchange or blood transfusions received during 2022. A total of 86 donor exposures (2 reds cell units and 84 FFP units) were identified for investigations. Archive samples from two of these donors tested positive for HEV RNA, but due to very low viral loads, sequencing of donor viruses was not successful. HEV genotype 3c was identified in the stored sample from the recipient. Due to a lack of sequence confirmation, this case is reported as a probable transmission. Both donors have now resolved their infection and are eligible to return to donation.

Case 21.3: Probable HBV transmission

An older person was diagnosed with acute HBV infection during their hospital admission in December 2022. Blood transfusion was considered as the most likely source of their HBV infection. They had received multiple transfusions six months prior to diagnosis of HBV; 33 donor exposures were investigated. The archive samples obtained from two donors subsequently tested positive for anti-HBc antibodies (note these donations were collected before the full implementation of anti-HBc screening in England), one donor (donor 1) had evidence of past HBV infection with high levels of anti-HBs antibodies (999 IU/ml) whereas another donor had HBV infection with low levels of anti-HBs antibodies (donor 2). HBV DNA was not detected in either donor. It is probable that the recipient acquired the hepatitis B infection via the blood transfusion from donor 2. Transmission could not be confirmed but circumstantial evidence of this donor originating from the region where recombinant genotype D/E is prevalent, the same genotype as that identified in the patient, further supports transmission. The two anti-HBc positive donors have been removed from the donor panel.

Update on Viral TTI investigation reports from 2022

There were nine additional investigations from 2022 which were not reported in the 2022 report but have since been finalised. These include 1 CMV, 2 HBV, 2 HCV, 2 HEV, 1 HSV and 1 toxoplasmosis investigation, which were concluded as possible (n=1), not TTI (n=6) or undetermined (n=2).

Case 21.4: possible HCV transmission – result pending in the 2022 Annual SHOT Report

A recipient with transfusion dependent beta thalassaemia regularly transfused in the UK was noted to have abnormal liver function tests in September 2021. Although it was initially considered to be due to transfusion related iron overload, subsequent diagnosis of past HCV infection was made. The patient had never been reported as HCV RNA positive, but antibody testing was suggestive of past HCV infection. However, it is difficult to estimate when they actually acquired HCV infection as the infection is known to remain asymptomatic for years, if not decades.

As this recipient had not been tested for HCV antibodies prior to 2021 and was not known to have ever been HCV RNA positive, it is difficult to estimate when they acquired their HCV infection. Based on their transfusion history over many decades, it is worth noting that the risk of acquiring HCV via blood transfusion in the UK was highest before the screening for HCV antibodies was introduced in 1991 and for HCV RNA in 1999. The residual risk of testing not detecting HCV has significantly reduced since the screening was implemented, and the latest (2020-2022) estimates of residual risk of HCV in the UK is approximately 1 in 64 million blood donations tested (JPAC, 2023). Testing all previous donations was not possible as the archive samples no longer existed for the donations taken prior to the implementation of screening. It is therefore possible that this individual acquired the HCV infection via blood transfusion.

Confirmed viral TTI 1996-2023

The year of transfusion may be many years before the year in which the incident is investigated and/or reported to SHOT due to the chronic nature, and possible late recognition, of some viral infections. Since 1996, 33 confirmed transfusion-transmitted viral infections have been documented in the UK. Among these, HBV (n=11) and HEV (n=12) were the most reported proven viral TTI. For HBV, this is

partly because the 'window period', where an infectious donation from a recently infected donor cannot be detected by the screening tests, is longer than for HCV or HIV, despite NAT screening of blood donations. Since 2022, anti-core screening has been undertaken to reduce the risk of HBV transmission from donors with occult HBV.

All except two of the 12 HEV transmissions were reported before the HEV RNA testing was introduced in April 2017 in the UK (Harvala, et al., 2022), which has identified and removed 2932 HEV RNA positive blood donations from the UK blood supply to end of 2023. The rate of HEV RNA detected among donors is greater than other viral infections because it is generally acquired through food, and there is no specific donor selection to minimise donations from those infected.

Parasitic TTI

In 2023, there was one parasitic TTI investigation for malaria. This was concluded to be a confirmed transmission.

Case 21.5: Confirmed malaria

A malaria diagnosis in a recipient of multiple red cell transfusions with no overseas travel or other likely risk initiated an investigation into the likely source of this infection. Testing of archive samples from donations identified between February and September 2023 were shown to be negative on routine screening for malaria antibodies. Despite negative initial screening results, samples from six donors were subjected to further testing based on their clinical history, one of whom was identified with Plasmodium malariae DNA in their blood sample and identified as the likely source of transmission. Further work is ongoing to type the malaria found in the donor and recipient, but the donor has been removed from the donor panel and appropriate medical review arranged. A lookback has been initiated into previous donations given by this donor. To date the approach of discretionary malaria antibody testing of donors based on travel history has been effective in preventing transfusion transmission of malaria, the last reported transmission in the UK was in 2003. However, following this transmission, current policies and procedures are being reviewed to see if any further mitigations are required. The patient has received treatment and is clearing their infection.

Lookback investigations

Lookback investigations are initiated in England when regular donors are found to be newly positive for a marker of infection, either seroconversion, post-donation information or introduction of a new test. In 2022 a new test for anti-HBc was introduced, and lookback investigations were initiated. During 2023, NHSBT initiated investigations prompted by 20 donors with newly detected markers of infection known to have previously donated (15 of those investigations are detailed below and shown in Table 21.2). Archive samples were available for testing for 11 donors (3 HEV [2 from TTI investigation of Case 21.2], 4 OBI and 4 syphilis) but for 4 donors the most recent negative donation had been given more than three years ago and therefore no archive was available for testing (1 EBV and 3 syphilis). Investigations involved 30 previous donations, with 40 of 45 components issued known to be transfused.

Of the 40 recipients identified, 19 were alive and 17 were tested with none found to have evidence of transmission. In lookback investigations, test results confirming negative recipient status include anti-HBc negativity 6 months post transfusion for HBV, no treponemal antibodies detected for syphilis or no RNA and IgG/IgM antibodies at 6 months post transfusion for HEV. In addition, lookback was commenced for two donors with HTLV infection with a history of donating in the 1990's, prior to leucodepletion and before anti-HTLV screening was implemented. Although NHSBT were able to identify which hospital these units had been issued to, hospitals have not been able to identify the possible recipients despite their best efforts to date (Hewitt, et al., 2013). In addition, there were two malaria and one HIV lookbacks initiated, information from these investigations is awaited.

Table 21.2: Summary of lookback investigations in England, 2023

	EBV	HEV	OBI	Syphilis	Total
Donors with a previous donation identified as positive in retrospective testing	1	3	4	7	15
Archive samples available for testing	0	3	4	4	11
Donations by these donors considered here	1	3	19	7	30
Total components from these donations	**1**	**4**	**26**	**14**	**45**
FFP	0	0	5	2	7
Plasma for medicine	0	0	1	0	1
Platelets	0	2	1	6	9
Red cells	1	2	19	6	28
Not known	0	0	0	0	0
Components reported as transfused (recipients transfused)	**1**	**4**	**24**	**11**	**40**
Recipient identified but deceased	0	3	10	7	20
Recipient identified and alive	1	1	13	4	19
Recipient status unknown	0	0	1	0	1
Recipients tested	**1**	**1**	**13**	**2**	**17**
Recipient tested positive	1*	0	0	0	1*
Recipients tested negative	0	1	12	2	15
Recipient test pending	0	0	1	0	1

** The recipient was IgG positive, which was not unexpected given their age so evidence of past EBV but unlikely due to the transfusion*

In 2023, lookback data was only reported for England.

Other reports

Not all reports proceed to a full investigation if transmission can be ruled out, as in some examples below.

- If a recipient only tests positive for antibodies to infection, it is possible that passive transfer of antibodies has occurred due to receipt of intravenous immunoglobulin. If passive transfer is suspected, repeat testing should be carried out 4-6 weeks after the transfusion date. If it is the passive transfer of antibodies, then reactivity should have resolved within this time, and the recipient will not have any evidence of infection
- In recipients where only IgM antibodies are detected, reactivity for RNA/DNA and seroconversion (e.g., IgG) would also need to be confirmed before TTI investigations commenced. This is because IgM assays are often cross-reactive and non-specific, so isolated IgM reactivity is not usually diagnostic
- In recipients with evidence of a chronic infection, previous negative results are desired. This is to evidence transfusion as being the most likely source of infection
- For older cases of possible TTI, year of transfusion should be provided for the implicated transfusions in addition to the unit numbers to enable effective investigation by the Blood Services

Residual risk of HBV, HCV, or HIV

The chance, or residual risk, of a potentially infectious HBV, HCV or HIV window period donation not being detected on testing in the UK are estimated to be very low at less than 1 per million donations

tested (Table 21.3) (JPAC, 2023). The window period is the time very early in the course of infection when tests in use do not detect the virus but there may be a sufficient amount for transmission. The calculations are made annually, but for HBV only consider the risk of non-detection of acute infections and not the risk of non-detection of an OBI. The residual risk of HEV is not routinely calculated but has been previously estimated to be considerably higher than for HBV, HCV, or HIV. However, while HEV is a blood borne virus, the main route of transmission is zoonotic with humans generally exposed through diet (Harvala, et al., 2022).

	HBV	HCV	HIV
Number per million donations	0.63	0.02	0.03
95% confidence interval	*(0.46-1.61)*	*(0.00-0.09)*	*(0.00-0.08)*
At 1.9 million donations per year, testing will miss a potentially infectious window period donation every:	1 year	34 years	17 years

Table 21.3: The estimated residual risk (and 95% confidence interval) that a donation entering the UK blood supply is a potentially infectious HBV, HCV, or HIV window period donation: 2020-2022

Far fewer TTI are observed in practice than the estimated risks in Table 21.3 indicate, partly because the estimates have wide uncertainty and the model used to calculate risk is based on the risk in all donations tested. The model does not incorporate pack non-use, recipient susceptibility to infection, or under-ascertainment/under-reporting, for example due to recipients dying from an underlying medical condition before a chronic asymptomatic viral condition is identified, or, in the case of HBV, an asymptomatic acute infection.

Blood donation testing and surveillance

Every blood donation in the UK is tested for markers of HBV, HCV, HEV, HIV, HTLV (for new donors and non-leucodepleted products for NHSBT and SNBTS and testing of all donors for NIBTS and WBS) and syphilis, with some donations also tested for malaria, *Trypanosoma cruzi* and WNV, depending on donor history. Information about donations tested and donors found positive is carefully monitored to help assure safety for recipients (NHSBT and the UKHSA Epidemiology Unit, 2023).

Anti-HBc screening for blood donations was rolled out as part of routine screening across the UK in 2022 in response to a review carried out by SaBTO (SaBTO, 2023). This has already had an impact on increased detection of potentially transmissible HBV from donors with OBI, which have been removed from the blood supply. Lookback investigations involving the testing of archive samples from donors with OBI continues and lookback investigations into the archive samples of hepatitis B core antibody positive donors began in the UK in 2023. The WBS changed to individual HEV NAT screening for apheresis donations during November 2022 and SNBTS are due to change to individual HEV NAT screening for apheresis donors from April 2024. Testing of plasma for medicine donations for HAV and B19 is anticipated to start in April 2024 in Scotland and England.

The HEV screening process is currently under review by SaBTO (SaBTO, 2024), the report is expected to be published in 2024.

Emerging infections

The EIAR produced by the NHSBT/UKHSA Epidemiology Unit is distributed monthly. This is reviewed by the SACTTI Horizon Scanning Team and may lead to further risk assessment and changes to the donor selection guidelines, or other blood safety measures, where necessary (JPAC, 2023).

In 2023, arbovirus (dengue and WNV) outbreaks and spread, particularly within Europe continued to be monitored carefully. WNV testing for travellers returning from France and Spain had to be extended northwards to newly affected regions while blood donors returning from France and Italy are now subject to either WNV testing or a 28-day deferral for dengue depending on the areas visited, increasing complexity on donation sessions. In the UK, Usutu virus is being carefully monitored after spread in birds was detected (UKHSA on behalf of the joint HAIRS, 2023).

There were no known cases of transfusion-transmitted SARS-CoV-2 infections reported to the Blood Services in 2023 and there is still no evidence that SARS-CoV-2 is a TTI (Gates, et al., 2023).

vCJD 2023

There were no vCJD investigations in 2023.

vCJD 1996-2023

Three vCJD incidents took place prior to the introduction of leucodepletion and other measures taken by the UK Blood Services to reduce the risk of vCJD transmission by blood, plasma, and tissue products. All these measures have been reviewed and endorsed by SaBTO (Department of Health and Social Care, 2013).

Surveillance continues to look for any evidence that vCJD or CJD could still be transmitted via the blood supply with no case of vCJD being identified for investigation since 2016 and no evidence of sporadic CJD being transmitted by the blood supply (NCJDRSU, 2023). In 2022 both the FDA in the United States and the Australian Red Cross Lifeblood announced the removal of their blood donor deferral for people who had spent time in the UK between 1980 and 1996 (AABB, 2022) with the FDA also removing the deferral for people who have received a transfusion in the UK since 1980. Further review of CJD safety measures in the UK is planned (SaBTO, 2024).

Table 21.4: Number of confirmed TTI incidents, by infection in the UK, reported to SHOT, with transfusions between October 1996 and December 2023 (Scotland included from October 1998

Year of transfusion	Bacteria	HAV	HBV	HCV	HEV	HIV	Malaria	Parvovirus (B19)	vCJD or prion	Total
1996	1	1	1	1	0	1(3)	0	0	1	6 (8)
1997	3	0	1	1	0	0	1	0	2	8
1998	3	0	1	0	0	0	0	0	0	4
1999	4	0	2 (3)	0	0	0	0	0	0 (1)	6 (8)
2000	6	1	1	0	0	0	0	0	0	8
2001	5	0	0	0	0	0	0	0	0	5
2002	1	0	1	0	0	1	0	0	0	3
2003	2	0	1	0	0	0	1	0	0	4
2004	0	0	0	0	1	0	0	0	0	1
2005	1	1	1	0	0	0	0	0	0	3
2006	2	0	0	0	0	0	0	0	0	2
2007	2	0	0	0	0	0	0	0	0	2
2008	4 (6)	0	0	0	0	0	0	0	0	4 (6)
2009	2 (3)	0	0	0	0	0	0	0	0	2 (3)
2010	0	0	0	0	0	0	0	0	0	0
2011	0	0	1 (2)	0	1 (2)	0	0	0	0	2 (4)
2012	0	0	0	0	2	0	0	1	0	3
2013	0	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	1 (2)	0	0	0	0	1 (2)
2015	1	0	0	0	5 (6)	0	0	0	0	6 (7)
2016	0	0	0	0	0	0	0	0	0	0
2017	0	1	0	0	0	0	0	0	0	1
2018	0	0	0	0	1	0	0	0	0	1
2019	0	0	0	0	1	0	0	0	0	1
2020	0	0	0	0	0	0	0	0	0	0
2021	0	0	1 (2)	0	0	0	0	0	0	1 (2)
2022	0	0	0	0	0	0	0	0	0	0
2023	0	1	0	0	0	0	1	0	0	2
Total number of incidents (recipients)	**37 (40)**	**5**	**11 (14)**	**2**	**12 (15)**	**2 (4)**	**3**	**1**	**3 (4)**	**76 (88)**

Year of transfusion	Cryoprecipitate	FFP	Platelet - apheresis	Platelets - pooled	Red blood cells	Total
1996	0	0	0	4	4	**8**
1997	0	0	1	1	6	**8**
1998	0	1	2	0	2	**5**
1999	0	0	1	2	5	**8**
2000	0	0	3	4	1	**8**
2001	0	0	1	4	0	**5**
2002	0	0	0	1	2	**3**
2003	0	0	1	2	1	**4**
2004	0	0	0	0	1	**1**
2005	0	0	0	2	1	**3**
2006	0	0	1	1	0	**2**
2007	0	0	0	0	2	**2**
2008	0	0	4	2	0	**6**
2009	0	0	2	0	1	**3**
2010	0	0	0	0	0	**0**
2011	0	4	0	0	0	**4**
2012	0	1	0	1	1	**3**
2013	0	0	0	0	0	**0**
2014	0	2	0	0	0	**2**
2015	1	3	0	2	1	**7**
2016	0	0	0	0	0	**0**
2017	0	0	1	0	0	**1**
2018	0	0	1	0	0	**1**
2019	0	0	1	0	0	**1**
2020	0	0	0	0	0	**0**
2021	0	1	0	0	0	**2**
2022	0	0	0	0	0	**0**
2023	0	0	0	0	2	**2**
Total number of implicated components	**1**	**13**	**19**	**26**	**30**	**89**

Table 21.5: Number and type of implicated components from confirmed TTI recipients in the UK, reported to SHOT, with transfusions between October 1996 and December 2023 (Scotland included from October 1998)

	Bacteria	HAV	HBV	HCV	HEV	HIV	Malaria	Parvovirus (B19)	vCJD or prion	Total number of incidents (total number of recipients)
Outcomes										
Death due to, or contributed to, by TTI	7 (8)	0	0	0	2	0	1	0	3 (4)	**13 (15)**
Major morbidity	5 (6)	2	5 (6)	0	8 (11)	2 (4)	2	1	0	**25 (32)**
Minor morbidity or not reported, or unkown	25 (26)	3	6 (8)	2	2	0	0	0	0	**38 (41)**
Implicated component types										
Cryoprecipitate	0	0	0	0	1	0	0	0	0	**1 (1)**
Fresh frozen plasma	0 (1)	0	2 (4)	0	5 (8)	0	0	0	0	**7 (13)**
Platelets	30 (33)	3	1 (2)	0	4	1 (3)	0	0	0	**39 (45)**
Red blood cells	7	2	8	2	2	1	3	1	3 (4)	**29 (30)**

Table 21.6: Outcome of confirmed TTI incidents and implicated components by infection in the UK, reported to SHOT, with transfusions between October 1996 and December 2023 (Scotland included from October 1998)

Accompanying notes for Tables 21.4, 21.5 and 21.6

- *Where applicable, number of recipients are included in brackets*
- *To the end of 2023, no routine blood donation screening has ever been in place for vCJD, HAV or parvovirus B19*
- *HTLV screening began in 2002*
- *HEV RNA screening began in April 2017 in the UK and was not in place at the time of the documented transmissions*
- *In the early malaria transmissions (1997, 2003), malaria antibody testing was not applicable at the time according to information supplied at donation*
- *HCV investigations where the transfusion was prior to screening are not included in the above table*
- *The year of transfusion may be prior to year of report to SHOT due to delay in recognition of chronic infection*
- *The 2 early HIV incidents (pre-1996 and in 1996) were associated with window period donations (anti-HIV negative/HIV RNA positive) before HIV NAT screening was in place. 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 2004 there was an incident involving contamination of a pooled platelet pack with Staphylococcus epidermidis, which did not meet the TTI definition because transmission to the recipient was not confirmed, but it would seem likely. This case was classified as 'not transfusion-transmitted'*
- *The vCJD case in 1999 was found to have the same blood donor as one of the 1997 transmissions and has therefore been counted as the same incident. Please note this was counted as two separate incidents in previous reports*
- *A further prion case died but transfusion was not implicated as the cause of death. The outcome was assigned to major morbidity instead because although there was post-mortem evidence of abnormal prion proteins in the spleen the patient had died of a condition unrelated to vCJD and had shown no symptoms of vCJD prior to death*
- *Data are checked regularly to ensure accuracy; however, these may be amended if new or additional information is received*

For further information or alternative breakdown of data please contact the National Coordinator for Transfusion Transmitted Infections via the NHSBT/UKHSA Epidemiology Unit at epidemiology@nhsbt.nhs.uk

Conclusion

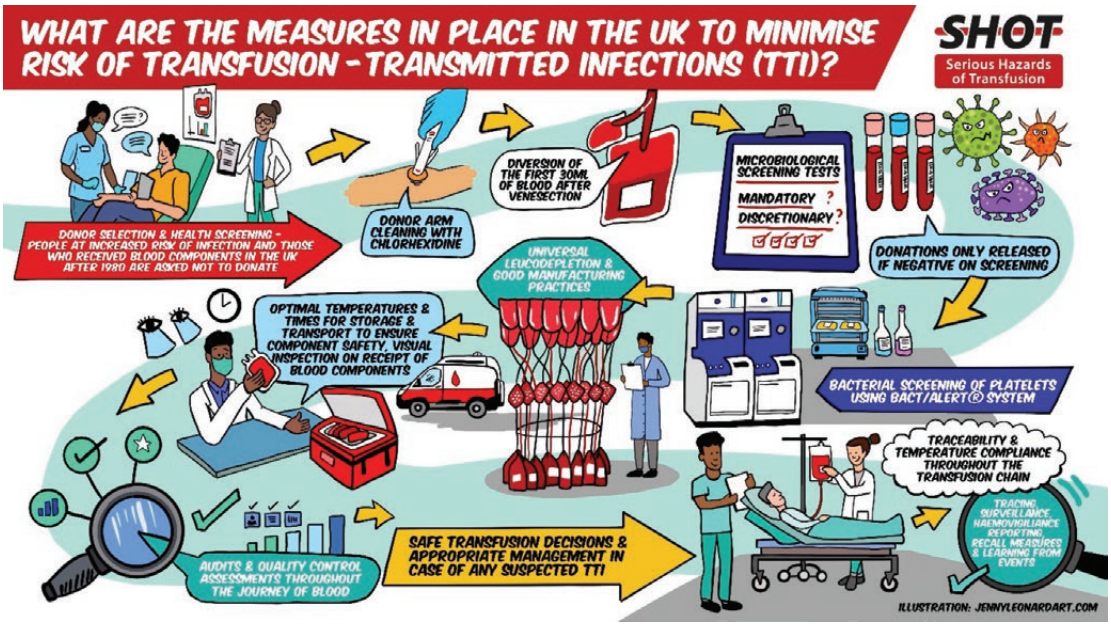
Investigations of 140 reports of possible TTI in 2023 resulted in the following: 1 confirmed malaria transmission, 1 confirmed HAV, 1 probable HBV and 1 probable HEV TTI. The last reported bacterial TTI was reported in 2015, the last HAV transmission was in 2017 and the last malaria transmission was in 2003.

These low numbers of transmissions provide assurance of the safety of the UK blood supply as a result of the effective methods and haemovigilance systems in place to reduce TTI. Policies and procedures are constantly reviewed to see if any further mitigations are required to reduce this further, most recently SaBTO have reviewed current testing for occult hepatitis B resulting in additional tests being introduced to further reduce the risk of transmission of hepatitis B (SaBTO, 2023). During 2024 HAV and B19 screening will start to be implemented by UK Blood Services to facilitate collection of plasma for fractionation.

Recommended resources

Safe supplies 2022: Monitoring safety in donors and recipients. Annual Review from the NHS Blood and Transplant and UK Health Security Agency Epidemiology Unit. London October 2023
https://hospital.blood.co.uk/diagnostic-services/microbiology-services/epidemiology/

SHOT Video: Monitoring the safety of blood supply in the UK
https://www.shotuk.org/resources/current-resources/videos/



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