Transfusion-Transmitted Infections (TTI) Case Studies

2020-2024

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Near miss (Staphylococcus aureus)

- *A platelet pack was returned to the Blood Service following the hospital transfusion laboratory noticing a large clump in the pack*
- *The affected pack was a day six apheresis pack; the associated pack was recalled but had already been transfused*
- *Routine bacterial screening remained negative at day seven*
- *Gram staining of the returned pack indicated Gram-positive cocci, organisms were cultured and were identified using matrix-assisted laser desorption/ionisation time-of-flight (MALDI ToF) as S. aureus*
- *The donor was followed up and no reason was identified that should have prevented them from donating, they volunteered to have nasal swabs taken*
- *S. aureus was isolated from the nasal swabs which were indistinguishable from the pack isolate*
- *Multi-locus sequence typing (MLST) and single nucleotide polymorphism (SNP) analysis using whole genome sequencing showed a single staphylococcus lineage (MLST 5) that is genetically closely related and belonged to the 10 SNP cluster*
- *The associated platelet pack had been transfused to a patient undergoing regular transfusion*
- *The clinical team followed up the patient who had not experienced any transfusion reaction and remained well seven days post transfusion*
- *The donor has been removed from the donor panel*

Near miss (Staphylococcus aureus)

- *During quality checking prior to issue, the Blood Service hospital services department noticed a visible clump of approximately 1cm in a pooled platelet pack*
- *This had not been detected by bacterial screening*
- *A sample from the pack was inoculated and Staphylococcus aureus flagged as positive on the BacT/ALERT Virtuo within 5 hours of loading*
- *The original day two sample remained negative on the BacT/ALERT at seven days and was terminally cultured with no growth observed*
- *The four associated red cell units were cultured but there was no growth so the bacteria could not be linked to a single donor*

Confirmed hepatitis A virus (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 ribonucleic acid (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 alanine aminotransferase test (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*

Probable hepatitis E virus (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 red cell units and 84 fresh frozen plasma units) were identified for investigations*
- *Archive samples from two of these donors tested positive for HEV ribonucleic acid (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*

Probable hepatitis B virus (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 deoxyribonucleic acid (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*

Possible hepatitis C virus (HCV) transmission – result pending in the 2022 Annual SHOT Report (1)

- *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 ribonucleic acid (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*

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Possible hepatitis C virus (HCV) transmission – result pending in the 2022 Annual SHOT Report (2)

- *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 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 deoxyribonucleic acid (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*

Near miss bacterial transfusion-transmitted infection (TTI) (*Staphylococcus aureus*)

- *An apheresis platelet pack was returned to the Blood Service before being transfused, following the observation of clumps within the pack by the hospital transfusion laboratory*
- *On return, small white flakes could be seen in the pack. Routine bacterial screening was reported as negative*
- *BacT/ALERT bottles were also returned for further culture and investigation*
- *Samples from the pack itself were positive for Staphylococcus aureus in both anaerobic and aerobic bottles on two occasions*
- *S. aureus was also isolated from a swab from the implicated donor*
- *Molecular typing confirmed the donor and pack isolates were a single strain*
- *The donor was informed and removed from the donor panel*

Confirmed hepatitis B virus (HBV) transmission from a donor with occult HBV infection - recipient 1

- *Recipient 1 (50-60 years) had progressive kidney disease*
- *They were diagnosed with an acute asymptomatic HBV infection in early 2022, four months post transfusion*
- *HBV testing was performed following a liver function screen which revealed an increased alanine transaminase*
- *Blood transfusion was considered the most likely source of infection*
- *They had received 28 units of fresh frozen plasma over 2 months in 2021*
- *Six of the 28 donors were non-returning donors and their implicated donations all tested negative for anti-HBc and HBV deoxyribonucleic acid (DNA)*
- *Of the returning donors, 21 of 22 tested negative for anti-HBc, and one donor tested positive with HBV DNA detected in their implicated donation on retesting by individual donation nucleic acid testing (NAT)*
- *Post-donation testing had returned negative by pooled NAT*

Confirmed hepatitis B virus (HBV) transmission from a donor with occult HBV infection - recipient 2

- *Subsequent lookback investigations into red cell components made from the donation in Case 20.2 identified a second HBV infected recipient*
- *Recipient 2 (70-80 years) had severe fibrosis due to non-alcoholic fatty liver disease*
- *Nine months post transfusion, the recipient was tested and found to be positive for HBsAg, HBeAg and anti-HBc*
- *HBV deoxyribonucleic acid (DNA) was also detected at a very high level*
- *They had tested negative for HBsAg in May 2017, and no other source or risk factors for HBV were identified*
- *Following their positive test, the patient was started on antiviral treatment*
- *Sequencing analysis showed high similarity between the virus obtained from the implicated donor and the two recipients, and confirmed transfusion as the source*

Probable Hepatitis B (HBV) TTI case: (Morbidity: 0; imputability: 2 probable) (1)

- *A male in his 50s was diagnosed with an acute HBV infection following a routine dialysis screening, which included testing for HBsAg*
- *The case was initially reported to Public Health England (PHE) by the renal team following the first HBsAg positive result*
- *Retrospective testing of patient samples found HBV DNA in a December 2019 sample; samples tested prior to that were negative for HBV including anti-HBc*
- *No other source or risk factors for HBV infection were identified, but it should be noted that the patient was born in a part of the world where HBV is endemic, and hence reactivation cannot be completely excluded*
- *Staff and patient screening were performed, and no obvious source was found. The patient had not been vaccinated against HBV and did not present with any symptoms*
- *Blood transfusions from the previous 6 months were identified; these included 11 donor exposures.*
- *A total of 10 returning donors tested negative for anti-HBc, the remaining blood donor tested positive for anti-HBc*

Probable Hepatitis B (HBV) TTI case: (Morbidity: 0; imputability: 2 probable) (2)

- *They had given three previous donations, and these were found positive for anti-HBc in retrospective testing*
- *HBV DNA was detected in the implicated red cell donation at 8.6IU/mL; lookback into FFP and two HBV DNA-negative donations are still on-going*
- *All three donations were HBsAg negative on screening, and no HBV DNA was detected at the time of donation*
- *This is in keeping with an Occult Hepatitis B infection (OBI) in the donor, who was born in an HBV endemic country. The donor has been informed that they have OBI and has been referred for specialist care. They can no longer donate blood*
- *A large volume follow-up sample was obtained from this donor to allow further sequence comparison between their sample and recipient sample*
- *Unfortunately, HBV DNA was not detectable on the donor sample despite concentration (note low levels of fluctuating HBV DNA is typical in OBI)*
- *The recipient sample was identified as HBV genotype E; the common type identified in Sub-Saharan Africa and keeping with transmission*

2019 - Probable Hepatitis E (HEV) TTI case from 2019

- *This was a multi-transfused female in her 20s with aplastic anaemia and Turners syndrome*
- *She was diagnosed with HEV infection in August 2019, and although the virus has now cleared from her blood, anti-viral treatment has not been stopped yet (due to her immunosuppression)*
- *Fortunately, her alanine aminotransferase (ALT) levels have remained normal and she has not developed a hepatitis*
- *It was identified retrospectively that a red cell donation she received in June 2019 contained a small amount of HEV RNA (31IU/mL)*
- *This unit was tested correctly at the time of donation testing, but HEV RNA was not detectable with the screening assay at this level (a detection limit around 500IU/mL)*
- *Due to the small viral load, we could not do sequencing to confirm the transmission and hence the case is reported as probable*
- *It is recognised that the current HEV screening in place in England will not be able to identify donations with a very small amount of HEV RNA*