Hepatitis E Virus (HEV) and Blood Components: Information for clinical and transfusion laboratory staff

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Introduction

• Hepatitis E Virus (HEV)
  – RNA virus
  – Four genotypes:
    ➢ 1 + 2 are human viruses
    ➢ 3 + 4 are animal viruses (transmitted zoonotically)

• Increase in the reported cases of HEV arising from infection acquired within the UK (i.e. ‘non-travel associated’)

• Cases of non-travel associated infection are most likely to be:
  – caused by the genotype 3 strain (associated with pigs)
## Incidence of clinical acute HEV hepatitis in the UK

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of confirmed cases</th>
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<tbody>
<tr>
<td>2003</td>
<td>124</td>
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<tr>
<td>2004</td>
<td>149</td>
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<tr>
<td>2005</td>
<td>329</td>
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<td>2006</td>
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<td>2007</td>
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<td>2008</td>
<td>176</td>
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<td>2009</td>
<td>175</td>
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<tr>
<td>2010</td>
<td>274</td>
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<tr>
<td>2011</td>
<td>456</td>
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<tr>
<td>2012</td>
<td>578</td>
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<tr>
<td>2013</td>
<td>692</td>
</tr>
<tr>
<td>2014</td>
<td>869</td>
</tr>
<tr>
<td>2015</td>
<td>616 (Jan to Sept)</td>
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</tbody>
</table>

HEV infection

- Most cases are asymptomatic.
- Symptomatic cases present as an acute but mild transient illness requiring supportive management only.
- Average incubation period is approximately 40 days.
- Symptoms can last on average 1-4 weeks.
  - mild non-specific illness (fatigue, fever, nausea/vomiting)
  - derangement in liver enzymes and jaundice
HEV infection

- Immunocompetent patients are usually able to clear the virus
- In immunosuppressed patients, such as those undergoing transplant, HEV is more difficult to clear
  - lead to chronic changes including chronic inflammation and potential to develop cirrhosis
HEV transmission

- HEV is passed via oral-faecal route (contaminated sewage) in developing countries
- In developed counties, transmission potentially linked to:
  - eating under-cooked pork and game, processed pork products and some shell fish
  - transmission via blood components and organ transplantation
  - also via SD treated FFP, but now prepared from HEV negative plasma.
Hepatitis E virus in blood components: a prevalence transmission study in southeast England (The Lancet, July 2014)

- Samples from blood donations given in the southeast of England from October 2012 – September 2013 were screened retrospectively for HEV RNA.

- Prevalence of HEV RNA in donations was 1 in 2848 (79 out of the 225,000 donations tested)
  - 54 of the 79 HEV RNA positive samples were genotyped: all were genotype 3.

- 129 blood components were manufactured from the 79 donations: 62 of these were transfused before identification of infected donation.

- Follow up of 43 recipients showed 18 (42%) had evidence of infection.

- HEV transmission via Red Cells, Platelets (pooled and apheresis), Fresh Frozen Plasma, and Granulocytes was identified.
Hepatitis E virus in blood components: a prevalence transmission study in southeast England (The Lancet, July 2014)

Conclusions

• HEV genotype 3 infections are widespread in the English population and in blood donors.

• Transfusion transmission linked to viral load/serological status of donor.

• Transfusion-transmitted infection rarely caused acute morbidity.

• In some immunocompromised patients, infection became persistent, but could be influenced by reducing/modifying immunosuppression or treating with Ribavirin.
SaBTO recommendations

• Advisory Committee on the Safety of Blood, Tissues and Organs (SaBTO) set up a specific Hepatitis E working group in response to the Lancet article.

Key Recommendations:

• Introduce donor blood component testing to provide HEV negative blood components for patients undergoing solid organ or allogeneic stem cell transplants.

• Provide advice to allogeneic stem cell transplant and solid organ patients regarding risk of eating poorly-cooked pork or pork products including sausages and offal.
Indications for HEV negative blood components

• SaBTO expanded on the specific patient groups who should receive HEV negative blood components (see Box 1 on slide 15).

• Applies to cellular blood components (red cells, platelets and granulocytes) and plasma components (FFP and cryoprecipitate).

• No evidence at present to support a requirement for HEV negative blood components for pregnant women.
Testing and issue

- NHSBT now issues HEV negative blood components: all types of components are available as HEV negative.

- In 2016/17 a premium of £17.18 is being applied to each unit issued where HEV negative is requested as an additional requirement.

- Some components will be issued HEV negative as standard (see Box 2 on slide 16); the HEV premium does not apply to these components.

- NHSBT will provide HEV negative components for neonates and infants under the age of one year.
Component labelling

• Blood components manufactured by NHSBT that are HEV negative will be labelled ‘NEG: HEV’

• Non-UK plasma components issued by NHSBT, i.e. MB FFP and MB Cryoprecipitate, are already tested and confirmed as HEV negative in the country of donation (Austria); these components do not identify this on the blood pack label.
Ordering and receipt

- A tick box has been added to OBOS to select HEV negative as an additional requirement for the component - this will be in addition to any requirement for the component to be irradiated or CMV negative.

- Components that have HEV negative as part of the mandatory requirements will be automatically provided as HEV negative (see Box 2 on slide 16), and there is no need to tick this box when ordering these components on OBOS.

- Methylene Blue (MB) treated frozen components are already screened for HEV during the manufacturing process; when ordering these components on OBOS, **DO NOT** tick the HEV negative box – if it is ticked our system will not allow for the component to be dispatched; the order will be cancelled and have to be re-ordered.

- HEV negative status of blood components has been added to EDN specification.
Transfusion laboratory

- No additional handling or storage requirements for HEV negative components.

- Patients who require HEV negative blood components may need to be flagged on your LIMS (see Box 1 on slide 15) – refer to local policy.

- Transfusion laboratory staff should be trained to recognise clinical details on transfusion request forms that may indicate the need for HEV negative blood components.

- Transfusion laboratory should inform any receiving referral hospitals of the need for HEV negative blood components for the patient.

- Any suspected HEV transmission by blood component transfusion should be reported to NHSBT as soon as possible.
BOX 1

Patients who require HEV negative components

- **Patients awaiting solid organ transplant (SOT)** – from 3 months prior to date of planned elective SOT or from the date of listing for a solid organ transplant.

- **Patients who have had SOT** – for as long as the patient is taking immunosuppressants.

- **Patients with acute leukaemia** – from diagnosis (unless/until decision made not to proceed with stem cell transplant).

- **Patients awaiting allogeneic stem cell transplant** – from 3 months prior to the date of planned transplant and up to 6 months following transplant, or for as long as the patient is immunosuppressed.

- **Extra corporeal procedures** – e.g. dialysis, extra-corporeal circulatory support is included if within above indications.
## BOX 2

*Components issued HEV negative as standard*

- Red cells for neonatal use (i.e. ‘paedipack’/split pack)
- Platelets for neonatal use (i.e. ‘paedipack’/split pack)
- Red cells for intrauterine transfusion
- Platelets for intrauterine transfusion
- Red cells for large volume transfusion
- Red cells, irradiated, for exchange transfusion (neonatal)
- Pooled granulocytes, irradiated

- Methylene blue fresh frozen plasma (paediatric)
- Methylene blue fresh frozen plasma (neonatal)
- Methylene blue cryoprecipitate (pooled)
- Methylene blue cryoprecipitate (single)