Post-exposure management of occupational exposure to blood-borne pathogens

DR Fortune Ncube
Consultant Epidemiologist/PHM, Blood Borne Viruses
Health Protection Agency, Centre for Infections
Communicable Disease Surveillance Centre
Department of HIV & Sexually Transmitted Infections
General considerations in managing BBV occupational exposures
Post exposure prophylaxis

Post exposure prophylaxis

- Available for cases of exposure where the risk of HIV and HBV are high
- HBV PEP involves HBV immunoglobulin
- Most important is vaccination for all at risk groups

There is currently no effective PEP for HCV

- Immunoglobulin shown not effective
- Alpha-interferon does not prevent transmission
- Antiviral agents not formally assessed
- No vaccine has been developed yet

Managed by Occupational health
Managing the exposed HCW

Employers should have in place systems and written protocols for:

- Prompt reporting of occupational exposures
- Post-exposure assessment of exposed HCW
- Sources for emergency advice and for psychological support
- Management options
- Comprehensive follow-up
- Source patient counselling, consenting for testing and testing
- Accessing out of hours services through A&E
- Inform and educate HCWs on policy, BBV risks, reporting and on PEP availability and benefits

Exposures to HBV infected source patients
Criteria in HBV Vaccination response

Following primary course of vaccination and testing for anti-HBs at 2 – 4 months post vaccination response to vaccination could be:

- **Anti-HBs <10 miu/ml**  Non-response
- **Anti-HBs >10 miu/ml**  Sero-response
- **Anti-HBs 10-100 miu/ml**  Hypo-response
- **Anti-HBs >100 miu/ml**  Sero-protection
# HBV prophylaxis for reported exposure incidents

<table>
<thead>
<tr>
<th>HBV status of exposed HCW</th>
<th>Significant exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HBsAg positive source</td>
</tr>
<tr>
<td>≤1 dose HB vaccine pre-exposure</td>
<td>Accelerated course of HB vaccine*</td>
</tr>
<tr>
<td>&gt;2 doses HB vaccine pre-exposure (anti-HBs not known)</td>
<td>One dose of HB vaccine followed by second dose one month later</td>
</tr>
<tr>
<td>Known responder to HB vaccine (anti-HBs &gt;10 miU/ml)</td>
<td>Consider HB vaccine booster</td>
</tr>
<tr>
<td>Known non-responder to HB vaccine (anti-HBs &lt;10 miU/ml 2-4 months post-immunisation)</td>
<td>HBIG x 1 Consider HB vaccine booster</td>
</tr>
</tbody>
</table>

*An accelerated course of vaccine consists of doses spaced at 0, 1 and 2 months. A booster may be given at 12 months to those at continuing risk of exposure to HBV. Immunisation Against Infectious Disease “The Green Book”. London: Department of Health, 1996.
HCW subsequently undergoing HBV seroconversion

- Referral to hepatologist for specialist advice
- Counselling on prevention of secondary transmission and management of household contact
- Restriction on performing exposure prone procedures to prevent HCW-to-patient transmissions
- Counselling on future management and career options
Primary care and BBV

• GPs v hospital consultants were significantly:
  - No less likely to have received their primary course
  - Less likely to have received HB booster vaccination
  - Less likely to have had their blood anti-HBs test checked 2-4 months after last vaccination

• GP nurses compared to hospital nurses were less likely to fill in a form following a community exposure incidents

• Limited access to occupational health services influenced receiving a booster and testing for immunocompetence

• OH services pivotal in the protection and follow-up of health care workers. Primary care services in UK disadvantaged

Exposures to HIV infected source patients
### Reported Occupational Transmissions of HIV: December - 2002

<table>
<thead>
<tr>
<th>Type of transmission</th>
<th>USA</th>
<th>Europe</th>
<th>Rest of World</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Documented seroconversion after a specific occupational exposure</td>
<td>57</td>
<td>35</td>
<td>14</td>
<td>106</td>
</tr>
<tr>
<td>Possible occupationally acquired infection</td>
<td>139</td>
<td>85</td>
<td>14</td>
<td>238</td>
</tr>
<tr>
<td>Total</td>
<td>196</td>
<td>120</td>
<td>28</td>
<td>344</td>
</tr>
</tbody>
</table>
Recommendations for PEP against HIV infection in HCWs

1. **According to exposure**

   - Percutaneous injury
     
     Deep injury*
     
     Visible contamination of the device with blood
     
     Needle placed in the source patient’s artery or vein

   - Exposure of mucous membrane, non-intact skin, bite

   - Exposure of intact skin

Recommended

Considered

Discouraged


Recommendations for PEP against HIV infection in HCWs

2. **According to material**

- Blood, body materials containing visible blood, CSF, concentrated virus in research labs or production facility

  - Recommended

- Semen, vaginal secretions, synovial, pleural, peritoneal, pericardial, or amniotic fluid and tissues

  - Considered

- Urine, vomit, saliva, faeces, tears, sweat, sputum

  - Discouraged

Recommendations for PEP against HIV infection in HCWs

3. **According to source patient**

- Known to be HIV infected  
  - Recommended
- Serostatus unknown  
  - Considered
  
  *If available, inform the source patient and ask for informed consent to HIV testing.*

- Consent refusal  
  - Considered
- Unknown/cannot be tested (prevalence of HIV)  
  - Considered
- HIV seronegative  
  - Discouraged

Guidance on HIV PEP

• PEP should be initiated for all significant exposures
• Initiated ideally within an hour of exposure
• Time interval from exposure after which PEP discouraged is 72 hrs
• Still consider up to 2 weeks (kinetics and early pathogenesis of HIV not fully understood)
• PEP should be administered for 4 weeks
• HCWs should be followed-up for at least 6 months after the cessation of PEP

Choice of regimen

**Standard regimen:**

2 nucleoside reverse transcriptase inhibitor (NRTI)

- Zidovudine (AZT) and lamivudine (3TC) +

1 protease inhibitor (PI)  

- Nelfinavir

Or

1 non-nucleoside reverse transcriptase inhibitor (NNRTI)  

- Efavirenz

**Case by case regimen:**

Dual NRTI combination therapy (e.g. pregnancy avoiding use of efavirenz)

Country variations but triple therapy seems to be the preferred choice

**Guide:**

Stage, CD4+ T-cell count, viral load, treatment history, genotypic/phenotypic, viral resistance testing


Surveillance data: Six Week Forms (1997-2004)

HIV PEP regimens prescribed where source HIV+ve

Proportion (%) = the number of reports received as a proportion of reports where the HCW has commenced HIV PEP (n=402).

1 These include records where the original regimen prescribed was subsequently amended and all drugs taken have been included in this category.

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1 These include records where the original regimen prescribed was subsequently amended and all drugs taken have been included in this category.
Follow-up of HCW exposed to HIV

- Counselling on prompt reporting of symptoms/signs, prevention of secondary transmission during follow-up
- Baseline blood sample following exposure
- Testing and physical examination: 6 weeks, 3 months post-exposure
- Testing at 6 months post-exposure
- Follow-up for monitoring of acceptability and drug toxicity

Initiating HIV PEP

- Viral status not always available immediately following injury
- HCW started on PEP while awaiting results
- Delayed source patient results lead:
  - HCW on toxic drugs longer than necessary where source is negative
  - Prolonged psychological stress in HCW of not knowing if exposed to HIV
  - Retroviral therapy is expensive, delayed source test results not cost effective
Rapid source HIV status testing

- Test to results time ~45 minutes (e.g. Capillus quantitative HIV1/2 antibody test)
- Plan appropriate healthcare worker follow-up
- Appropriate administration of antiretroviral therapy
- Shown to facilitate improved exposure reporting
- Shown to decrease number of source patients remaining untested

Surveillance data: Six week Forms *(1997-2004)*

Number of days on HIV PEP where source HIV negative or of unknown HIV status

1 Proportion (%) = the number of reports received as a proportion of reports where the HCW had initiated HIV PEP, exposed to an HIV negative source and a time on PEP was provided (n=173).

2 Proportion (%) = the number of reports received as a proportion of reports where the HCW had initiated HIV PEP, exposed to a source of unknown HIV status and a time on PEP was provided (n=61).
International HIV Tables – PEP failure cases

Time from exposure to initiation of PEP

Number of reports post-exposure to initiation of PEP

- <1h: 6 reports
- 1-2h: 12 reports
- >2-24h: 4 reports
- >24h: 1 report

23% PEP failure rate. 77% success for documented cases cf 81%

(n=24; a time to PEP was not reported for 1 case.)

Managing HCWs exposed to HCV positive source patients
HCV exposure follow-up testing*

**Known HCV infected source:**
- Obtain baseline serum for storage from healthcare worker
- Obtain serum/EDTA for genome detection at six and 12 weeks
- Obtain serum for anti-HCV at 12 and 24 weeks

**Source known not to be infected with HCV:**
- Obtain baseline serum for storage from healthcare worker
- Obtain follow-up serum if symptoms or signs of liver disease develop

**HCV status of source unknown:**
- Obtain baseline serum for storage from healthcare worker
- Designated doctor to perform risk assessment:
  - *High-risk:* Manage as a known infected source
  - *Low-risk:* Obtain serum for anti-HCV at 24 weeks

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# UK HCV seroconversions

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Device</th>
<th>Procedure</th>
<th>1st test positive (weeks)</th>
<th>HCW treated</th>
<th>Virus cleared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Junior Doctor (1996)</td>
<td>Hollowbore needle</td>
<td>Resuscitation A&amp;E</td>
<td>16</td>
<td>NK</td>
<td>Yes</td>
</tr>
<tr>
<td>Surgeon (2000)</td>
<td>Solid needle</td>
<td>Suturing</td>
<td>8</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Dentist (2001)</td>
<td>Hollowbore needle</td>
<td>Injection</td>
<td>4</td>
<td>NK</td>
<td>Yes</td>
</tr>
<tr>
<td>Nurse (2003)</td>
<td>Hollowbore needle</td>
<td>Venepuncture</td>
<td>8</td>
<td>N/A*</td>
<td>Yes</td>
</tr>
<tr>
<td>Doctor (2003)</td>
<td>Hollowbore needle</td>
<td>Venepuncture</td>
<td>8</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Nurse (2004)</td>
<td>Hollowbore needle</td>
<td>Someone else’s sharp</td>
<td>6</td>
<td>Yes†</td>
<td>Treatment ongoing</td>
</tr>
<tr>
<td>Nurse (2004)</td>
<td>Hollowbore needle</td>
<td>Cannulation</td>
<td>7</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Healthcare Assistant (2004)</td>
<td>Hollowbore needle</td>
<td>Someone else’s sharp</td>
<td>7</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Domestic Assistant (2003)</td>
<td>Hollowbore needle</td>
<td>Collecting rubbish bag – needle protruding</td>
<td>6</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

(     ) = Year of seroconversion  
N/A* = HCW referred to Specialist but treatment not required  
† = Source co-infected with HIV; HCW received PEP for 4 weeks and at 6 weeks post-treatment, HCW blood tests were HIV negative
Risks in the source patient

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Source patient risk factors</th>
<th>Source status at time of incident</th>
<th>Genotype of source</th>
<th>Age range of source patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Junior Doctor (1996)</td>
<td>IDU</td>
<td>HCV +ve</td>
<td>Not known</td>
<td>Not known</td>
</tr>
<tr>
<td>Surgeon (2000)</td>
<td>IDU</td>
<td>NK</td>
<td>Not known</td>
<td>Not known</td>
</tr>
<tr>
<td>Dentist (2001)</td>
<td>NK</td>
<td>HIV/HCV +ve</td>
<td>Not known</td>
<td>Not known</td>
</tr>
<tr>
<td>Nurse (2003)</td>
<td>IDU</td>
<td>HCV +ve</td>
<td>Not known</td>
<td>&gt;60</td>
</tr>
<tr>
<td>Doctor (2003)</td>
<td>IDU</td>
<td>HCV +ve</td>
<td>1</td>
<td>50-59</td>
</tr>
<tr>
<td>Nurse (2004)</td>
<td>IDU</td>
<td>HIV/HCV +ve</td>
<td>1B</td>
<td>NK</td>
</tr>
<tr>
<td>Healthcare Assistant (2004)</td>
<td>IDU</td>
<td>NK</td>
<td>3</td>
<td>20-29</td>
</tr>
<tr>
<td>Domestic Assistant (2003)</td>
<td>NK</td>
<td>Unknown source</td>
<td>NK (HCW = 1A)</td>
<td>Unknown source</td>
</tr>
</tbody>
</table>

( ) = Year of seroconversion
Issues for consideration in HCV exposures

• Completeness of follow-up
• Confusion in the application of virological markers to the management of patients
• When should we be initiating treatment for HCW who have seroconverted? Is the existing evidence sufficient to now recommend early treatment in the health care setting?
• HCV viral load is high at seroconversion, what are the implications of this in HCW to patient HCV transmission and should we be looking for possible cases of transmission as part of the post exposure management of the exposed and infected HCW?
Summary on HCW BBV post exposure management

- Protocols and 24/7 access to services
- Prompt evaluation and assessment of the exposed HCW
- Source patient testing, mindful of the ‘serological window’ in the source patient
- Rapid source testing useful in guiding the use of PEP
- Viral resistance aid in deciding on regimen to use
- HCW Compliance and dealing with side effects
- Rigorous follow-up for preventing secondary transmission and offering appropriate treatment to the HCW
Selected UK guidelines


