Hep, Hep, Hooray: A new strategy for investigating an outbreak of hepatitis B virus in an assisted living facility

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Introduction

Hepatitis B virus (HBV) epidemiology, United States

• Bloodborne pathogens primarily spread by contact with blood or contaminated blood products or by sexual contact
• Preventable by vaccination, safe sex practices, and proper infection control measures
• Incubation period: 1½—6 months
• New HBV infections, 2009—2010: ~38,000
• President chronic HBV infections: ~3.4 million
• Annual deaths related to HBV-associated chronic liver disease: ~3,000

HBV outbreaks in congregate living settings

• 26 outbreaks reported to Centers for Disease Control and Prevention (CDC) from 1996—2010
• 22 linked to breaks in infection control practices
• 25 linked to improper blood glucose monitoring (BGM) techniques
• Risk factors for transmission in congregate care settings include BGM, podiatry services, wound care, receipt of injectable medications, dental visits, surgical procedures, and risky sexual practices

Materials and Methods

Epidemiologic investigation, Facility A

• Conducted medical record reviews and staff interviews
• Identified Case A as a diabetic receiving BGM and insulin injections
• Reviewed infection control policies and procedures
• Performed observation and monitoring of BGM and insulin administration

Initial testing based on epidemiologic investigation

• Requested HBV testing of Case A’s 2 roommates and 2 other diabetics on Case A’s floor; recommended vaccination of susceptible individuals
• 2 roommates test negative for HBV
• 2 diabetics test positive for acute HBV infection (Case B and Case C)
• Both cases received BGM and insulin administration at Facility A
• Required Facility A to immediately discontinue using penlets and institute use of auto-retractable lancets during BGM
• Identified during medical record review that Case B had recently been transferred into Facility A from another facility (Facility B) experiencing an HBV outbreak
• Case B acutely infected with HBV at Facility B
• Case B identified to be index case for Facility A outbreak

Outbreak investigation

• Established one-year exposure period (time from when index case entered Facility A to when control measures to stop transmission of HBV were implemented)
• Used retrospective approach to identify all individuals who lived at Facility A during exposure period
• Offered HBV testing and vaccination to current residents at Facility A and former residents at their new locations

Results

• Received report from Facility A that 3 medical technologists employed during the exposure period were observed by coworkers to be reusing penlets during BGM
• Discovered that staff often used the same glucose meter for multiple residents without disinfection or sterilization between residents
• Conducted HBV testing and vaccination against HBV (for susceptible individuals) on all consenting current and former residents of Facility A during exposure period

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Cases N=6 (%)</th>
<th>Controls N=153 (%)</th>
<th>Odds ratio</th>
<th>95% CI</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes‡</td>
<td>6 (100)</td>
<td>30 (20)</td>
<td>30,98</td>
<td>2.83—1006</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Risk Factor</td>
<td>Cases N=6 (%)</td>
<td>Controls N=30 (%)</td>
<td>Odds ratio</td>
<td>95% CI</td>
<td>p value</td>
</tr>
<tr>
<td>BGM†</td>
<td>6 (100)</td>
<td>25 (83)</td>
<td>1.87</td>
<td>0.13—131.8</td>
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<tr>
<td>Podiatry services</td>
<td>3 (50)</td>
<td>7 (23)</td>
<td>3.16</td>
<td>0.34—29.48</td>
<td>0.40</td>
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<tr>
<td>Wound care†</td>
<td>0 (0)</td>
<td>12 (40)</td>
<td>0.30</td>
<td>0.01—3.098</td>
<td>0.53</td>
</tr>
<tr>
<td>Injected medications‡</td>
<td>6 (100)</td>
<td>17 (57)</td>
<td>6.88</td>
<td>0.55—452.5</td>
<td>0.20</td>
</tr>
</tbody>
</table>

‡ 0.5 added to cells with counts of 0 during analysis

Conclusion

• Early identification of key risk factors for transmission of HBV among residents of Facility A allowed for:
  • Prioritized testing of close contacts and others with risk factor
  • Correction of faulty infection control practices, stopping further spread of HBV among susceptible residents

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*Denotes key component of new strategy for investigating HBV outbreaks