Investigation of a cluster of nosocomial HBV-infections in Sweden -obstacles and efforts

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### Nosocomial HBV-infections in Sweden I: Patients 1991-2002

<table>
<thead>
<tr>
<th>Year</th>
<th>Cases Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1991-96</td>
<td>12 cases</td>
</tr>
<tr>
<td>1997-2002</td>
<td>3 “blood”</td>
</tr>
<tr>
<td></td>
<td>2 “other nosocomial”</td>
</tr>
</tbody>
</table>

Data from Ragnhild Janzon, Swedish National Institute for Infection Control
Nosocomial HBV-infections in Sweden II: Staff

So – why bother?

Data from Ragnhild Janzon, Swedish National Institute for Infection Control
Cases at Huddinge University Hospital

1. November 1999
   75-year-old male, end-stage renal disease, recent shift from PD to HD after peritonitis

2. March 2000
   34-year-old male with Burkitt lymphoma

3. August 2000
   57-year-old male with coronary heart disease

4. August 2000
   18-year-old male with malignant lymphoma
Considerations

Identification of possible source(s)

Avoid further transmission

- Detect new (silent) cases
- Review infection control practises
Case # 1

A known HBV-positive dialysis patient?

Blood?

Unrecognised dialysis-/other patient?

More cases?
Case # 2

Same blood donor as # 1?

Thai wife?

Unrecognised patient in hematology?
Case # 3

No blood transfusion

No treatment in same clinics as #1 and #2

Isolated case...?
Case # 4

Treated at same clinic as # 2 during overlapping period, however not even blood sampling during same day

Same blood donor as # 1 and/or #2?
What we tried to do...

To find the source:
- Regular contact tracing among sexual partners, family members etc
- Rule out common blood-donors
- Identify seroconverted blood-donors
- Identify HBV-DNA positive dialysis patients
- Sequence HBV-DNA positive cases and possible sources

To identify new cases:
- Intensified surveillance of dialysis patients

Prevention:
- Vaccination of unvaccinated staff
- Review of infection control practices
What we didn´t do ...

Staff ?

Other patients ?
Outcome of source-hunting I

- Thai wife HBsAg positive (others negative)
- No common blood-donor
- 8/8 anti-HBc positive dialysis patients anti-HBc IgM and HBV-DNA negative
- 2/4 known HBsAg positive dialysis patients HBV-DNA positive

Results from sequencing...
Conclusion

Two coupled pairs (with one secondary case)

How?

One isolated case

Typing useful for confirmation of related cases as well as excluding non-related cases

End of story?
Case # 5  February -02

47-year old male with ALL, seronegative 2000, diagnosed having activated chronic HBV

meanwhile....
Eureka!

35-year old woman with acute HBV

Father 60 years old, coronary heart disease
Consequences at the individual level

1/5 patients died from liver failure

1/5 patients developed chronic infection and cirrhosis within 2 years, furthermore, he infected his wife

1/5 patients felt terrible about not knowing how he was infected

1/5 patients died from his underlying disease

1/5 chronic infection which cleared after cessation of immunosuppression
### Total measurable costs

<table>
<thead>
<tr>
<th>Service</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>157.000</td>
</tr>
<tr>
<td>Investigation of outbreak</td>
<td>40.000</td>
</tr>
<tr>
<td>Contact tracing</td>
<td>362.000</td>
</tr>
<tr>
<td>Vaccination</td>
<td>113.000</td>
</tr>
</tbody>
</table>

\[
\sim 672.000
\]

= vaccine cost for some 1.200 infants with monovalent HBV vaccine!
# Approximate price-tags:

## I Treatment

<table>
<thead>
<tr>
<th></th>
<th>price/unit</th>
<th>#1</th>
<th>#2</th>
<th>#3</th>
<th>#4</th>
<th>#5</th>
<th>sum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospitalization one day</td>
<td>4500</td>
<td>7</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>45.000</td>
</tr>
<tr>
<td>Out-patient clinic, doctor</td>
<td>1500</td>
<td>-</td>
<td>11</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>25.500</td>
</tr>
<tr>
<td>&quot; nurse</td>
<td>500</td>
<td>-</td>
<td>6</td>
<td>-</td>
<td>0</td>
<td>1</td>
<td>3.500</td>
</tr>
<tr>
<td>Antivirals (lamivudin)</td>
<td>20 /d</td>
<td>15</td>
<td>mo</td>
<td></td>
<td></td>
<td></td>
<td>9.000</td>
</tr>
<tr>
<td>(adefovir)</td>
<td>200 /d</td>
<td>9</td>
<td>mo</td>
<td></td>
<td></td>
<td></td>
<td>55.000</td>
</tr>
<tr>
<td>One secondary clinical case*</td>
<td>19.000</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td></td>
<td>19.000</td>
</tr>
</tbody>
</table>

\[ \sim \textbf{157.000} \text{ KrSEK} \]

[* Scand J Infect Dis 1993;25:693-697*]
## Price-tag II:
### Laboratory investigations of outbreak

<table>
<thead>
<tr>
<th></th>
<th>Price/unit</th>
<th>#1</th>
<th>#2</th>
<th>#3</th>
<th>#4</th>
<th>#5</th>
<th>sum</th>
</tr>
</thead>
<tbody>
<tr>
<td>HBV serology</td>
<td>160</td>
<td>80</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12.800</td>
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<tr>
<td>HBV-DNA PCR</td>
<td>700</td>
<td>11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7.700</td>
</tr>
<tr>
<td>HBV sequencing</td>
<td>~2,000</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>20.000</td>
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</table>

~ 40.000
**Price-tag III: Contact tracing**

<table>
<thead>
<tr>
<th></th>
<th>price/unit</th>
<th>#1</th>
<th>#2</th>
<th>#3</th>
<th>#4</th>
<th>#5</th>
<th>sum</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Identification of source/s</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sexual partners*</td>
<td>1.500</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>3.000</td>
</tr>
<tr>
<td>Each tested blood-donor*</td>
<td>1.500</td>
<td>9</td>
<td>35</td>
<td>111</td>
<td>0</td>
<td>54</td>
<td>313.000</td>
</tr>
<tr>
<td>HBV-DNA PCR blood donors</td>
<td>700</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>1.400</td>
</tr>
<tr>
<td>HBV surveillance 72 dialysispat x4</td>
<td>160</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>45.000</td>
</tr>
<tr>
<td>(ALT surv. every 2 w not incl)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Price-tag IV: Prevention

<table>
<thead>
<tr>
<th>Price/person</th>
<th>Sum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vaccination of a cohort of 72 dialysis patients, 4x 40 µg, serology afterwards</td>
<td>1400</td>
</tr>
<tr>
<td>Vaccination of 10 staff members, serology afterwards</td>
<td>500</td>
</tr>
<tr>
<td>~</td>
<td>113,000</td>
</tr>
</tbody>
</table>

HUDDINGE UNIVERSITY INSTITUTIONS
...to be honest...

...dialyspatients were only tested twice...
...dialysis patients were not vaccinated...
...only 132/209 blood donors have been tested...
...50 % of staff reporting needle-sticks and sharps are still unvaccinated against HBV...
...lots of opportunities for improvement...
Contributors

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