Surveillance and epidemiology of blood borne viral hepatitis in Australia: 21 years of the National Notifiable Disease Surveillance System

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Abbreviations

- **HBV** — Hepatitis B
- **HCV** — Hepatitis C
- **HDV** — Hepatitis D
- **BBVH** — Blood-borne viral hepatitis
- **NNDSS** — National Notifiable Disease Surveillance System
- **CDNA** — Communicable Diseases Network Australia
Background (1): Blood borne viral hepatitis (BBVH)

- HBV\(^1\)
  - Vertical transmission; sexual transmission; direct blood contact
  - Chronic HBV prevalence: 0.5-1.0\% (105 000 – 235 000 individuals)
- HCV\(^2\)
  - Direct blood contact (principally injecting drug use); sexual transmission (uncommon)
  - Chronic infection prevalence in Australia: 1.1-2.3\% (264 000 – 433 000 individuals)
  - 60-80\% prevalence among people who inject drugs
- HDV\(^3\)
  - HBV superinfection or coinfection
  - 5\% people infected with HBV

Background (2) - the NNDSS

• National system of mandatory infection disease notification – established in 1991
  
• Notifications made by diagnosing doctor, or laboratory
  
• Notifications include basic demographic details: age, sex, postcode
  
• Reporting of BBVH
  – HBV since 1991 (Newly acquired notifications since 1995)
  – HCV since 1995
  – HDV since 1999
  
• Classification of HCV and HBV notifications
  – ‘Newly acquired’ or ‘unspecified.’
  
• Surveillance data reported regularly

Aims

• To perform a descriptive analysis of Australian NNDSS data for blood borne viral hepatitis from 1991-2011 in order to characterise:
  – data completeness
  – temporal trends in notification number and notification rate
  – geographical and demographic distribution of disease burden
  – notification number and rate in populations eligible for HBV vaccination programs
Methodology

• Descriptive analysis of the NNDSS notification data set using STATA 12.1
  • Notification data set provided by Communicable Disease Network Australia (CDNA)
    – Data recoded and stratified into groups by year of reporting and demographic variables of interest
• Population data sourced from ABS and used to calculation notification rate
  – Notification rates adjusted such that only jurisdictions reporting national notifications in a given year were included in the population denominator for that year
• Geographical mapping
  – BBVH notifications distributed into Statistical Local Areas (SLAs) using notification postcode data and ABS postcode-to-SLA concordance tables and mapped using ABS digital boundary files
• Notifications in children of age-groups eligible for national vaccination programs extracted and analysed separately
Results (1)

- 431598 BBVH notifications reported nationwide (1991-2011)

<table>
<thead>
<tr>
<th>Disease</th>
<th>Period of national notification</th>
<th>Notifications ($n$)</th>
<th>Notifications/year Mean (range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIBV</td>
<td>Unspecified</td>
<td>1991-2011</td>
<td>125 967</td>
</tr>
<tr>
<td></td>
<td>Newly Acquired</td>
<td>1995-2011</td>
<td>4 659</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>274 (132-428)</td>
</tr>
<tr>
<td>HCV</td>
<td>Unspecified</td>
<td>1995-2011</td>
<td>233 120</td>
</tr>
<tr>
<td></td>
<td>Newly Acquired</td>
<td></td>
<td>6 678</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>393 (115-678)</td>
</tr>
<tr>
<td>HDV</td>
<td>Unspecified</td>
<td>1999-2011</td>
<td>382</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>28 (16-43)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>431 598</td>
</tr>
</tbody>
</table>

Table 1: National reporting periods and total notifications to 2011
Results (2): Hepatitis B

- Slight fall in notification number and rate since 2000
Results (3): Hepatitis B

- High notification rate among males aged 20-49 and Aboriginal and Torres Strait Islander Australians
Results (4): Hepatitis B

- Heterogeneous geographical distribution of disease burden
Results (5) Hepatitis B

- Notifications reported in children and adolescents eligible for vaccination warrant further study

<table>
<thead>
<tr>
<th>Program details</th>
<th>First year of implementation</th>
<th>Notifications among children and adolescents eligible for vaccination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Universal infant vaccination*</td>
<td>2000 (NT in 1990)</td>
<td>Unspecified 193</td>
</tr>
<tr>
<td>Adolescent vaccination†</td>
<td>1996</td>
<td>Unspecified 10,039</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Newly acquired 23</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total 216</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Newly acquired 449</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total 10,488</td>
</tr>
</tbody>
</table>

*Vaccination funded and delivered at birth (within 7 days) for all babies born in Australia
†Vaccination for all 11-12 year olds recommended and funded from 1996, delivered through community and some school-based programs with variation between jurisdictions
Results (6): Hepatitis C

- Similar profile of notifications for HBV + HCV
- Fall in notification number and notification rate for both HCV and HBV since 2000
Results (7): Hepatitis C

- High notification rate in males, age-group 20-49, and Aboriginal and Torres Strait Islander Australians
Results (8) Hepatitis C
Results (9): Hepatitis D

- Very low rates of reporting
- 382 notifications in total
- HDV reported at 0.4% reporting rate of HBV
- Notifications clustered around 3 major cities
Discussion (1)

- Key findings
  - Fall in notification rate for both HCV and HBV since 2000 (unspecified and newly acquired)
  - Similar profile of notifications for HBV + HCV
  - High rates of notification in males, age-group 20-49, Aboriginal and Torres Strait Islander Australians, and people living in rural and remote areas
  - Very low rates of reporting for HDV (Estimated 5% prevalence vs 0.4% notification rate) – suggestive of under-diagnosis
Discussion (2)

- Broadly consistent with the existing literature\(^1,2,3,5\)
  - Fall in HCV + HBV since 2000 (coincides with introduction of vaccination programs and a reduction in the heroin supply in Australia)
  - Increased risk in young adult males, Aboriginal and Torres Strait Islander Australians

- Strengths and weakness of the data set
  - Convenience and feasibility of mandatory notification as a surveillance tool
  - Notifications an imprecise epidemiological marker – distorted by disease presentation, healthcare practice and resourcing as well as disease incidence

Reflection – AFPHM core competencies (1)

• AFPHM core competencies ‘information, research and evaluation’
  – Role and applications of infectious disease surveillance and mandatory notification

  • Public health surveillance is the systematic ongoing collection, collation and analysis of data for public health purposes and the timely dissemination of public health information for assessment and public health response as necessary. (World Health Organisation)

  – Critical evaluation and scientific communication
Reflection – AFPHM core competencies (2)

• ‘Policy’ and ‘Health promotion and disease presentation’
  – Intersection of BBVH incidence and broader healthcare inequality
  – Geographical considerations in resource allocation
  – Importance of ongoing evaluation of healthcare interventions including vaccination programs
Acknowledgements

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• RACP Foundation, AFPHM
Appendices
## Appendix 1: data completeness

### Table 1: Notification data completeness

<table>
<thead>
<tr>
<th>Data type</th>
<th>HBV (% reporting rate)</th>
<th>HCV (% reporting rate)</th>
<th>HDV (% reporting rate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, sex, state, postcode</td>
<td>98-100%</td>
<td>&gt;99%</td>
<td>&gt;99%</td>
</tr>
<tr>
<td>Indigenous status</td>
<td>36%</td>
<td>35%</td>
<td>58%</td>
</tr>
<tr>
<td>Country of birth</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any data reported</td>
<td>30%</td>
<td>29%</td>
<td>46%</td>
</tr>
<tr>
<td>Country other than Australia</td>
<td>&lt;0.5%</td>
<td>&lt;0.1%</td>
<td>0%</td>
</tr>
<tr>
<td>reported</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reason for testing</td>
<td>25%</td>
<td>25%</td>
<td>33%</td>
</tr>
<tr>
<td>Vaccination status</td>
<td>1%</td>
<td>N/A</td>
<td>0%</td>
</tr>
<tr>
<td>Serogroup</td>
<td>N/A</td>
<td>&lt;1%</td>
<td>N/A</td>
</tr>
</tbody>
</table>

N/A = not applicable
Appendix 2: exclusion criteria
Appendix 3: impact of adolescent vaccination program

<table>
<thead>
<tr>
<th>Program details</th>
<th>First year of implementation</th>
<th>Age-group of interest</th>
<th>Years</th>
<th>Pre-vaccination group</th>
<th>Post-vaccination group*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adolescent vaccination†</td>
<td>1996</td>
<td>13-19 years</td>
<td>1991-1995</td>
<td>117</td>
<td>1.96</td>
</tr>
</tbody>
</table>