Chronic hepatitis B (CHB) is associated with significant morbidity and mortality. In 2011, approximately 218,000 people with CHB were living in Australia. Most of the people with CHB were born in countries where hepatitis B is highly endemic. Deaths from CHB sequelae in Australia are estimated to increase from 450/year to 1550/year between 2008 and 2017.

The National hepatitis B strategy 2010–2013 and Australia’s National hepatitis B testing policy prioritised sexual and household contacts of people with CHB for hepatitis B testing and vaccination. The Western Australian Department of Health (WA Health) recommends that all household and sexual contacts of a CHB case be tested for hepatitis B infection, and non-immune household and sexual contacts be offered free hepatitis B immunisation. Metropolitan public health units (PHUs) in WA send notifying doctors a letter offering free hepatitis B vaccination for non-immune household and sexual contacts, and assistance with contact tracing. Non-metropolitan cases were not included in this audit as each non-metropolitan PHU uses a different method of following up CHB notifications. This audit aimed to assess uptake of hepatitis B testing and vaccination among CHB contacts, and to explore factors associated with successful contact tracing.

Methods

Study population

Inclusion criteria

• People with CHB in the metropolitan area, aged ≥18 years, notified between 1 September 2011 and 1 September 2012

Exclusion criteria

• Notifications from prisons and immigration detention centres, as public health management of these cases is not the responsibility of WA Health.
• Notifications from non-metropolitan areas, as these regions use different contact tracing methods and their notifications comprise <20% of total WA CHB notifications.
• Notifications from services that refer patients back to their GP for contact tracing (eg. blood banks)

Study design

A retrospective cross-sectional study design was used. Telephone surveys took approximately 10 minutes per case and questions were mostly closed questions or multiple choice. Data were analysed using Microsoft Excel. The sampling framework for selecting cases is shown in Figure 1.

Uptake of testing and vaccination, and factors associated with successful contact tracing, were assessed using a web-based survey of doctors seeking information on contact tracing methods and outcomes; doctors were asked to refer to patient records and provide dates of hepatitis B testing and vaccination of contacts. A computer-assisted telephone interview (CATI) of patients with CHB was used to assess uptake of testing and vaccination of household and sexual contacts. Successful contact tracing was defined as identification of contacts who were immune or infected, or who were tested and had completed a course of hepatitis B vaccination. Data were collected in March 2013 to allow ≥6 months for contacts to be traced and complete a hepatitis B vaccination course.

Discussion

Increasing contact tracing by nurses could improve success rates. Public health unit assistance for contact tracing of complex cases should continue.

Keywords

contact tracing; hepatitis B; prevention and control; immunisation
An audit of chronic hepatitis B contact tracing in metropolitan Western Australia

The investigators had access to the Western Australian Notifiable Infectious Diseases Database (WANIDD) because of their responsibilities for statewide communicable disease control. As this audit was consistent with the National Health and Medical Research Council statement on quality assurance, ethics approval was not required.

**Results**

Notifying doctors of 31 patients (31/86, 36%) responded, representing 26 unique doctors, all of whom were GPs. Forty patients completed the CATI. Table 1 shows demographic characteristics of cases from both surveys.

**Contact tracing methods**

In about half of the cases (16/31, 52%), doctors asked patients to take responsibility for informing their contacts. For five patients (16%), doctors traced the contacts; for three patients (10%) nurses traced the contacts; for three patients (10%) contacts were not traced; two patients (6%) had no contacts; and data were missing for two patients (6%).

**Doctor knowledge of contact tracing**

Doctors of 26/31 (77%) patients reported receiving a letter or telephone call from a PHU with advice on contact tracing. Doctors of 23/31 (74%) patients knew that WA Health provided free vaccines for contacts.

**Doctor-reported testing and vaccination**

The 31 patients identified from the online survey had a total of 47 contacts; 35/47 (75%) contacts were successfully traced and 39/47 (83%) contacts had hepatitis B status documented. Of those tested, 15 were eligible for vaccination and of those 15 contacts, 11 (73%) were fully vaccinated, two were partially vaccinated and two did not respond to multiple recall attempts.

**Patient-reported testing and vaccination**

Thirty-four of the 40 patients who participated in the CATI (85%) reported that their doctor advised them that their contacts would need testing and vaccination; of 85 contacts, 56 (66%) had been successfully traced.

**Doctor and patient-reported testing and vaccination**

In nine cases of CHB, data had been obtained from the patients themselves and their doctors. For six of those nine cases, the patients’ and doctors’ responses regarding testing and vaccination outcomes were concordant. Of the remaining three cases, one patient reported three additional contacts not reported by the doctor; in one case the doctor and the patient
reported the same number of contacts but different testing and vaccination outcomes; and in one case the doctor’s and patient’s answers were discordant for both numbers of contacts, and testing and vaccination history.

Factors associated with successful contact tracing

Contact tracing success was similar in adults and children (Table 2). Doctors reported that 35/47 (75%) contacts had been successfully traced (Table 2). Success rates for tracing by nurses (used by one state government-funded clinic), doctors and patients were 100% (19/19), 60% (6/10) and 56% (10/18), respectively. The most frequently cited doctor-related barrier to contact tracing was that there were insufficient resources. This is illustrated by the comment below from the doctors’ survey: ‘Difficulties contacting people who are not patients at the clinic. After persistent efforts at contact tracing, you find that the patient has been seen elsewhere and resources spent on contact tracing have been wasted’.

Most doctors (15/26, 58%) reported that contact-tracing should be done by PHUs; two reported contact-tracing to be the doctor’s responsibility. Lack of information impeded patient-facilitated contact tracing. One patient was unaware of hepatitis B vaccination, another was unaware that non-sexual household contacts required vaccination and another was afraid to tell his partner. Two patients who were students living in shared accommodation did not divulge their status to housemates.

Discussion

Seventy-five percent of contacts were traced successfully. The success rate for tracing by nurses was 100%. After excluding tracing by nurses from the analysis, the success rate for contact-tracing was 57%. Most doctors (58%) reported that contact-tracing should be a PHU responsibility.

A Victorian study presented the proportion of successfully traced contacts. At the time of the Victorian study, Victorian PHUs did not routinely provide written advice to notifying doctors and this may be one of the reasons for the low success rate of 31% for adult contacts in Victoria, which is in contrast with this audit.

A Melbourne tertiary hospital set up a project in 2011 to assess contacts of patients with CHB. The project was terminated because of poor response rates from contacts. Our audit suggests that the primary care setting may be more suited to contact-tracing.

A United Kingdom (UK) study reported that 27% of eligible contacts were vaccinated. However, in contrast to our sample, where 77% of doctors received advice, only 15% of the UK doctors received advice on contact-tracing and 33% were unaware that household contacts needed vaccination.

An American study reporting low vaccination uptake (13% and 20% of eligible adult and child contacts, respectively, had commenced vaccination) identified cost as a barrier to vaccination. Free vaccines and universal health insurance are likely to have contributed to higher vaccination uptake rates observed in this audit.

Close concordance between the results of the doctor survey and patient CATI indicate that the high contact-tracing success rates observed in WA were less likely to be because doctors who responded were more conscientious contact-tracers or because of case recall bias. The doctor survey response rate of 36% is less than optimal but common in GP surveys; however, the combination with the CATI data allowed for triangulation. Relying on documentation of contact tracing in medical records may have resulted in contact tracing success being underestimated in the doctor survey. However, asking doctors to remember events from 6–18 months ago would have introduced recall bias.

A limitation of this audit is its small sample size. However, the demographic characteristics of patients in the doctor survey and patient CATI are similar to WANIDD notifications in the same time period so the sample is likely to be representative. Two patients did not disclose their CHB status to their household contacts as they were students in shared accommodation. Under the current operational directive, no

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Table 1. Demographics of patients included in the audit and notified to Western Australian Notifiable Infectious Disease Database (WANIDD)

<table>
<thead>
<tr>
<th></th>
<th>Data obtained from online survey (n = 31 patients)</th>
<th>Data obtained from CATI (n = 40 patients)</th>
<th>WANIDD notifications 01/09/2011–01/09/2012 (n = 216 patients)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median age (years)</td>
<td>31 (19–56)</td>
<td>37 (19–64)</td>
<td>35 (18–74)</td>
</tr>
<tr>
<td>Male/Female</td>
<td>16/15 (52%/46%)</td>
<td>20/20 (50%/50%)</td>
<td>115/101 (53%/47%)</td>
</tr>
<tr>
<td>Overseas born</td>
<td>27 (87%)</td>
<td>36 (90%)</td>
<td>170 (78%)</td>
</tr>
<tr>
<td>Number needing interpreter</td>
<td>Yes 6/31 (19%)</td>
<td>Yes 5/40 (13%)</td>
<td>Missing data 31 (15%)</td>
</tr>
<tr>
<td>Year of arrival in Australia</td>
<td>N/A</td>
<td>2011–12: 8</td>
<td>Missing data: 4</td>
</tr>
</tbody>
</table>

*After excluding non-metropolitan cases, children, newly acquired cases, incomplete contact details for doctors and/or case, prison and detention centre notifications and notifications from organisations that do not routinely contact trace.
A nurse-facilitated contact tracing had the highest success rate. However, this option may not be feasible in private practice despite the current push to expand nursing roles in primary care.16,17 Contact-tracing involves telephoning and/or sending letters to people who may not be patients of the CHB patient’s GP. Furthermore, these services do not generate Medicare Benefits Schedule payments. There were 463 CHB notifications in metropolitan WA during the 1-year audit time frame, meaning that most of WA’s 9436 doctors would notify one case of CHB every few years. Given the infrequent nature of this occurrence, doctors and nurses may feel unskilled at contact tracing. Even with more commonly notified infections, such as chlamydia, nurse-facilitated contact-tracing is infrequently used in general practice.13 These structural barriers in private practice underscore the importance of PHU resources and expertise continuing to be available for doctors who require assistance with contact tracing.

### Implications for general practice

- CHB contact tracing was generally well done, but after excluding contacts who were traced by nurses, the contact-tracing success rate was only 57%.
- Using nurses could increase contact-tracing success rates in general practice. This may reduce the demand on doctor time, thus overcoming some barriers to contact tracing.
- PHU assistance for contact tracing in complex cases should continue.
- Additional strategies that may have the potential to improve contact tracing include Medicare Benefit Schedule payments for contact tracing and differentiating between household members who have family/sexual contact versus casual/occasional interactions.

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Provenance and peer review: Not commissioned; externally peer reviewed.

### Acknowledgement

We acknowledge the assistance of Trinity Mahede in developing the study design.

### References


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**Table 2. Contact tracing outcomes**

<table>
<thead>
<tr>
<th>Data from online survey (n = 31)</th>
<th>95% confidence intervals</th>
<th>Data from CATI (n = 40)</th>
<th>95% confidence intervals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of contacts</td>
<td>47</td>
<td>85</td>
<td></td>
</tr>
<tr>
<td>Number of contacts per case, median (min–max)</td>
<td>1 (0–9)</td>
<td>2 (0–7)</td>
<td></td>
</tr>
<tr>
<td>Age distribution of contacts† (years), median (min–max)</td>
<td>Adults: 33 years (22–73) Children: 8 years (1–16)</td>
<td>Adults: 34 years (19–77) Children: 6.5 years (1–16)</td>
<td></td>
</tr>
<tr>
<td>Number of contacts with known hepatitis B status</td>
<td>Total 39/47 (83%)</td>
<td>72–94%</td>
<td>Total 56/85 (66%)</td>
</tr>
<tr>
<td></td>
<td>Adults 27/32 (84%)</td>
<td>71–97%</td>
<td>Adult 29/46 (63%)</td>
</tr>
<tr>
<td></td>
<td>Children 12/15 (80%)</td>
<td>60–100%</td>
<td>Children 27/39 (69%)</td>
</tr>
<tr>
<td>Number of contacts eligible for hepatitis B vaccination</td>
<td>15</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Number of contacts vaccinated against hepatitis</td>
<td>Total 11/15 (73%)</td>
<td>51–96%</td>
<td>Total 12/12 (100%)</td>
</tr>
<tr>
<td></td>
<td>Adults 4/8 (60%)</td>
<td>15–85%</td>
<td>Adult 9/9 (100%)</td>
</tr>
<tr>
<td></td>
<td>Children 7/7 (100%)</td>
<td></td>
<td>Children 3/3 (100%)</td>
</tr>
<tr>
<td>Number successfully contact traced*</td>
<td>Total 35/47 (75%)</td>
<td>62–87%</td>
<td>Total 56/85 (66%)</td>
</tr>
<tr>
<td></td>
<td>23/32 Adults (76%)</td>
<td>56–86%</td>
<td>Adults 29/46 (63%)</td>
</tr>
<tr>
<td></td>
<td>12/15 Children (80%)</td>
<td>60–100%</td>
<td>Child 27/39 (69%)</td>
</tr>
</tbody>
</table>

*Defined as contacts who were tested and immune or infected OR tested and vaccinated
† Age data missing for one contact in CATI


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