Lester Mascarenhas
Donna Mak

An audit of chronic hepatitis B contact tracing in metropolitan Western Australia

Background

People with chronic hepatitis B (CHB) are a source of transmission and those in contact with them are a national priority population for hepatitis B testing and vaccination. This audit examined contact tracing success rate and barriers. Success was defined as contacts tested and vaccinated if required.

Methods

An online survey of 26 general practitioners (GPs), and computer-assisted telephone interviews of 40 patients with CHB notified between 1 September 2011 and 1 September 2012.

Results

Half of the patients with CHB (16/31) were asked to take responsibility for informing contacts; contacts of five patients were traced by doctors and those of three patients were traced by nurses. The overall success rate was 75%. Contact tracing by nurses was 100% successful; after excluding nurse contact tracing from the analysis, the success rate was 57%. GPs reported 'insufficient resources' as the most frequent doctor-related barrier to contact tracing and 58% of doctors reported that public health units should be responsible for contact tracing.

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

Chronic hepatitis B (CHB) is associated with significant morbidity and mortality.[1] In 2011, approximately 218 000 people with CHB were living in Australia.[2] Most of the people with CHB were born in countries where hepatitis B is highly endemic.[2–5] Deaths from CHB sequelae in Australia are estimated to increase from 450/year to 1550/year between 2008 and 2017.[6]

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.[7,8] The Western Australian Department of Health (WA Health) recommends[9] 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.[9] 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
- Availability of the contact details for patients with CHB and the notifying doctors.

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 ≥6months for contacts to be traced and complete a hepatitis B vaccination course.

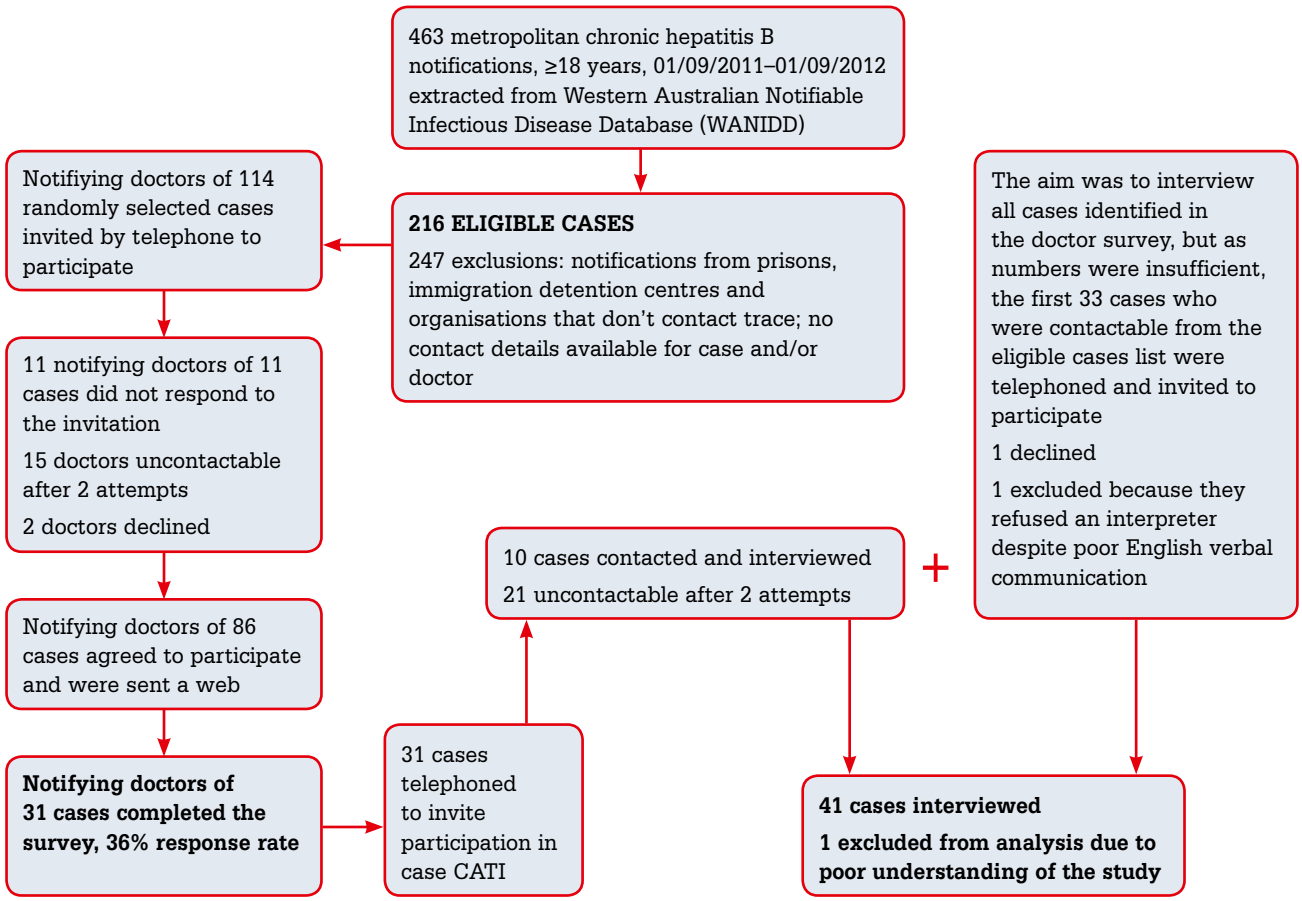

Figure 1. Sample selection framework

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,[10] 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

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

	Data obtained from online survey (n = 31 patients)	Data obtained from CATI (n = 40 patients)	WANIDD notifications 01/09/2011–01/09/2012 (n = 216 patients)*
Median age (years)	31 (19–56)	37 (19–64)	35 (18–74)
Male Female	16 (52%) 15 (48%)	20 (50%) 20 (50%)	115 (53%) 101 (47%)
Overseas born	27 (87%)	36 (90%)	170 (78%) Missing data 31 (15%)
Number needing interpreter	Yes 6/31 (19%) No 23/31 (75%) Missing data 2/31 (6%)	Yes 5/40 (13%) No 35/40 (87%)	
Year of arrival in Australia	N/A	2011–12: 8 2001–2010: 21 Before 2010: 3 Missing data: 4	

(WANIDD) from 1 September 2011 to 1 September 2012
*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

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[11] reported a contact-tracing success rate of 31% for adults and 75% for children. Their definition of contact-tracing success (cases where all contacts were tested and vaccinated) differed from ours (contacts who were tested and vaccinated), and they excluded all contacts from analysis if a patient was uncertain about the status of any of their contacts; therefore the results are not directly comparable. Our study offers more precision by presenting 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.[12]

A United Kingdom (UK) study reported that 27% of eligible contacts were vaccinated.[13] 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.[14] 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;[15] 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,[9] no

Table 2. Contact tracing outcomes

	Data from online survey (n = 31)	95% confidence intervals	Data from CATI (n = 40)	95% confidence intervals
Number of contacts	47		85	
Number of contacts per case, median (min–max)	1 (0–9)		2 (0–7)	
Age distribution of contacts† (years), median (min-max)	Adults: 33 years (22–73) Children: 8 years (1–16)		Adults: 34 years (19–77) Children: 6.5 years (1–16)	
Number of contacts with known hepatitis B status	Total 39/47 (83%)	72–94%	Total 56/85 (66%)	56–76%
	Adults 27/32 (84%)	71–97%	Adult 29/46 (63%)	49–77%
	Children 12/15 (80%)	60–100%	Children 27/39 (69%)	55–84%
Number of contacts eligible for hepatitis B vaccination	15		12	
Number of contacts vaccinated against hepatitis	Total 11/15 (73%)	51–96%	Total 12/12 (100%)	
	Adults 4/8 (50%)	15–85%	Adults 9/9 (100%)	
	Children 7/7 (100%)		Children 3/3 (100%)	
Number successfully contact traced*	Total 35/47 (75%)	62–87%	Total 56/85 (66%)	56–76%
	23/32 Adults (76%)	56–86%	Adults 29/46 (63%)	54–84%
	12/15 Children (80%)	60–100%	Child 27/39 (69%)	49–77%

*Defined as contacts who were tested and immune or infected OR tested and vaccinated

† Age data missing for one contact in CATI

distinction is made between household contacts who are sexual contacts and/or family members (who are at risk of contracting hepatitis B from the patient) and adult housemates whose interactions are casual and occasional. Accurate assessment of contacts may have the potential to increase contact-tracing efficiency through focusing resources on people whose type of contact with the patient puts them at risk of contracting hepatitis B.

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.

Authors

Lester Mascarenhas MBChB, General Practitioner (Refugee Health), ISIS Primary Care, Melbournem VIC; formerly Public Health Medical Registrar, Communicable Disease Control Directorate, Health Department of Western Australia, Perth, WA. lmascarenhas@doctors.org.uk

Donna Mak MBBS, MPH, FAFPHM, FACRRM, Public Health Physician, Communicable Disease Control Directorate, Health Department of Western Australia, and Head, Population & Preventive Health, University of Notre Dame, Fremantle, WA

Competing interests: None.

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

Acknowledgement

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

References

1. McMahon BJ. Epidemiology and natural history of hepatitis B. Semin Liver Dis 2005;25(Suppl 1):3–8.
2. MacLachlan JH, Allard N, Towell V, Cowie BC. The burden of chronic hepatitis B virus infection in Australia, 2011. Aust N Z J Public Health 2013;doi: 10.1111/1753-6405.12049.

3. Bell SJ, Lau A, Thompson A, et al. Chronic hepatitis B: recommendations for therapy based on the natural history of disease in Australian patients. J Clin Virol 2005;32:122–27.
4. HIV, viral hepatitis and sexually transmitted infections in Australia. Sydney: The Kirby Institute for Infection and Immunity in Society, University of New South Wales, 2011.
5. Tawk HM, Vickery K, Bisset L, Lo SK, Selby W, Cossart YE. The current pattern of hepatitis B virus infection in Australia. J Viral Hepat 2006;13:206–15.
6. Butler JR KR, Watson KJ, Watson AR. The impact of chronic hepatitis B in Australia: Projecting moratlity, morbidity and economic impact. Canberra: Australia Centre for Economic Research on Health, 2009.
7. Australian Government, Department of Health. National Hepatitis B Virus (HBV) Testing Policy Expert Reference Committee. National Hepatitis B testing policy 2012.Available at www.health.gov.au/internet/main/publishing.nsf/Content/ohp-bbvs-hbv-testing-policy [Accessed 2 September 2013].
8. Australia. Department of Health and Ageing. National hepatitis B strategy 2010-2013. Publications No: 6636. Available at www.health.gov.au/internet/main/publishing.nsf/ [Acessed 5 March 2013].
9. Western Australia. Department of Health. Operational Directive/IC No: OD 0237/09. Hepatitis B vaccination program. 2009. Operational Directive/IC No: OD 0237/09. Available at www.health.wa.gov.au/circularsnew/circular.cfm?Circ_ID=12576 [Accessed 20 December 2012].
10. Australia. National Health and Medical Research Council. When does quality assurance in health care require independent ethical review? [Internet]. 2003. Reference No: E46. Available at www.nhmrc.gov.au/guidelines/publications/e46 [Accessed 20 December 2012].
11. Williams S, Vally H, Fielding J, Cowie B. Hepatitis B prevention in Victoria, Australia: the potential to protect. Euro Surveill 2011;16(22).
12. Leder K. Public health management of hepatitis B virus contacts. Med J Aust 2013;198:366.
13. Richardson G, Evans MR, Westmoreland D. Hepatitis B immunisation of household contacts: retrospective study of vaccine coverage. J Epidemiol Commun Health 2001;55:934–35.
14. Weinberg MS, Gunn RA, Mast EE, Gresham L, Ginsberg M. Preventing transmission of hepatitis B virus from people with chronic infection. Am J Prev Med 2001;20:272–76.
15. Bonevski B, Magin P, Horton G, Foster M, Girgis A. Response rates in GP surveys: Trialling two recruitment strategies. Aust Fam Physician 2011;40:427–30.
16. Anderson K. Nurse practitioners: shifting the boundaries. Aust Nurs J 2012;20:30–33.
17. Bryce J. National support for NPs. Aust Nurs J 2012;20:25.

correspondence **afp@racgp.org.au**