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Hepatitis B immune status of staff in smaller acute healthcare facilities

Alex Hoskins[A] (*MN, RN, Infection Prevention and Control (IPC) consultant*), Leon James Worth[A,B] (*PhD, MBBS, FRACP, Acting Medical Director*), Michael James Malloy[A] (*PhD, BMSSc (Hons), Statistician*), Katherine Walker[A] (*MSci Epidemiology, Epidemiologist*), Ann Bull[A] (*PhD, MAppEpid, Operations Director*) and Noleen Bennett[A,C,*] (*PhD, MPH, RN, IPC consultant*)

For full list of author affiliations and declarations see end of paper

***Correspondence to:**
Noleen Bennett
Victorian Healthcare Associated Infection Surveillance System (VICNISS) Coordinating Centre, Doherty Institute for Infection and Immunity, Melbourne, Vic. 3000, Australia
Email: Noleen.Bennett@mh.org.au

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ABSTRACT

Objective. To determine the proportion of staff employed in smaller Victorian public acute healthcare facilities with evidence of immunity to hepatitis B. **Methods.** For optimal long-term immunity, a completed hepatitis B vaccination course and post vaccination hepatitis B surface antibody (anti-HBs) level ≥10 mIU/mL is desirable for all high-risk staff employed in healthcare facilities. For the financial years 2016/17–2019/20, a standardised surveillance module developed by the Victorian Healthcare Associated Infection Surveillance System (VICNISS) Coordinating Centre was completed by the smaller Victorian public acute healthcare facilities (individual hospitals with <100 acute care beds or their multi-site health service). Staff were assessed as having evidence or no evidence of optimal immunity to hepatitis B. Those without optimal evidence were sub-classified as 'incomplete vaccination course', 'no serology', 'contraindicated', 'non-responder', 'declined' or 'unknown'. Data were analysed to determine trends over time for healthcare facilities that participated more than once. **Results.** A total of 88 healthcare facilities reported hepatitis B immunity status of high-risk (Category A) staff ($n = 29\,920$) at least once over 5 years; 55 healthcare facilities reported more than once. The aggregate proportion with evidence of optimal immunity was 66.3%. Healthcare facilities with 100–199 Category A staff employed reported the lowest evidence of optimal immunity (59.6%). Of all Category A staff with no evidence of optimal immunity, the majority had 'unknown' status (19.8%), with only 0.6% overall who declined vaccination. **Conclusions.** Our study found evidence of optimal staff hepatitis B immunity in only two-thirds of Category A staff working in surveyed healthcare facilities.

Keywords: healthcare facilities, healthcare workers, hepatitis B, immunisation, immunity, surveillance, survey, vaccination.

Introduction

Staff employed in healthcare facilities are at risk of exposure to a range of communicable and vaccine preventable diseases (VPD), including hepatitis B.[1,2] To ensure the safety of staff and patients, healthcare facilities are required to have risk-based VPD policies and programs in accordance with national recommendations[2] and jurisdictional requirements.[3] In the state of Victoria, non-mandatory approaches to staff immunisation programs have generally been employed, and the impact of these has not been fully evaluated.

Since 2008, smaller Victorian public acute healthcare facilities (individual hospitals with <100 acute care beds or their multi-site health service) have periodically collected and submitted staff hepatitis B immunity survey data to the Victorian Healthcare Associated Infection Surveillance (VICNISS) Coordinating Centre. Immunisation programs within these healthcare facilities are generally coordinated by local Infection Prevention and Control (IPC) teams.

The objectives of this study were to evaluate the hepatitis B immunity status of staff employed in smaller Victorian public acute healthcare facilities, to determine if immunisation varied according to the number of staff employed, and to explore trends over time for facilities that completed serial surveys during a 5-year period (2016/17–2020/21).

Methods

For the financial years 2016/17 and 2019/20, smaller Victorian public acute healthcare facilities were required to participate in the VICNISS staff hepatitis B immunity module. Exemptions were permitted if in 2016/17 these healthcare facilities were participating in another specified VICNISS project[4] or in 2019/20, IPC resources were limited because of the focus on coronavirus disease 2019 (COVID-19) responses. For financial years 2017/18, 2018/19 and 2020/21 participation was optional. Education regarding standardised methods and definitions were provided by the VICNISS Coordinating Centre and all data were submitted via a secure online portal.

Eligible healthcare facilities and staff

The participating healthcare facilities were permitted to submit staff hepatitis B immunity survey data as an individual hospital or if easier to collect data multi-site health service. A health service included all hospitals (acute and sub-acute) and aged care homes within the health serviceas a whole. All permanent, temporary or casual staff employed by the healthcare facility were included. Unpaid staff (e.g. university students, volunteers) and those employed by outside agencies (e.g. agency nurses) were excluded.

Classification of staff

Risk categories were applied based upon the level of contact staff had with patients and their risk of exposure to blood and body fluids:[5]

- Category A: staff who had physical contact with patients or potential exposure to blood or body fluids (e.g. clinical nursing staff);
- Category B: staff who had contact with patients but rarely had contact with blood or body substances (e.g. catering staff);
- Category C: staff who had minimal patient contact and therefore had no greater risk of exposure to infectious diseases than the general public (e.g. gardening staff).

For optimal long-term immunity to hepatitis B, completion of a nationally recommended vaccination course and a post vaccination serological test showing hepatitis B surface antibody (anti-HBs) level ≥ 10 mIU/mL is desirable.[2] For all Category A staff (required), and Category B and C staff (optional), their hepatitis B immunity status was reported as either:

- Evidence of optimal hepatitis B immunity, or
- No evidence of optimal hepatitis B immunity:
  i. Incomplete: vaccination course not completed.
  ii. No serological testing: vaccination course completed however post vaccination serological testing not performed.
  iii. Contraindicated: vaccination contraindicated because documented evidence of anaphylaxis to previous hepatitis B vaccine or a component of the vaccine, or staff member hepatitis B surface antigen positive.[3]
  iv. Non-responder: serological testing anti-HBs level ≥ 10 mIU/mL not achieved.
  v. Declined: vaccination course and serological testing offered but declined.
  vi. Unknown: none of the above criteria documented.

Data analysis

For the current study, survey data submitted between 1 July 2016 and 30 June 2021 were evaluated. All statistical analyses were performed in Stata/SE for Windows (Statacorp LP, College Station, TX, USA).

The overall proportion of staff with or without evidence of optimal hepatitis B immunity reported by participating healthcare facilities was determined. For those facilities that submitted more than one survey during a financial year, only the first survey was evaluated. To enable benchmarking between similarly-sized facilities, facility-level data were peer-grouped using an accepted reporting framework:[6] <50, 50–99, 100–199, 200–499 or ≥ 500 Category A staff.

Healthcare facilities which participated in serial surveys were also grouped according to the number of times (1, 2, 3 or 4–5) hepatitis B immunity data was submitted. With only a small number of facilities submitting data in all 5 years ($n = 3$), this group was combined with facilities that had participated for 4 years ($n = 12$). For each group except '1' the median and interquartile range of difference from the first to last submission in Category A staff immunity proportions was calculated.

Ethics

Consistent with NHMRC-defined Quality Assurance activities, no staff-identifying data were collected, and pooled data were captured for purposes of quality improvement within participating healthcare facilities. Ethical approval was therefore not required.[7]

Results

Over the 5-year surveillance period, 88 healthcare facilities (73 hospitals and 15 healthcare services) submitted survey data regarding staff hepatitis B immunity at least once (Table 1);

Table 1. Aggregate proportion of Category A staff with evidence of optimal hepatitis B immunity in smaller Victorian public acute healthcare facilities, by facility size over 5 financial years.

Category	2016–17	2017–18	2018–19	2019–20	2020–21	Overall
Participating healthcare facilities or staff						
No. of hospitals	44	23	18	46	32	73[A]
No. of healthcare services (hospitals)	7 (17)	5 (10)	3 (6)	7 (14)	4 (8)	15[B]
Proportion of eligible participating hospitals[C]	66.3	35.9	26.1	54.3	43.5	–
No. of Category A staff	6548	4637	4214	9608	4913	29 920
Facility size by number of Category A staff employed: peer grouped evidence of optimal hepatitis B immunity (%)						
<50	54.5	27.4	77.4	65.0	64.6	60.0
50–99	58.9	63.8	69.2	55.6	62.4	60.3
100–199	50.6	65.2	49.7	65.7	62.0	59.6
200–499	65.3	77.6	77.8	75.2	88.6	75.8
≥500	51.6	92.3	77.3	53.2	70.4	62.6
Overall	58.2	73.0	72.4	62.9	72.2	66.3

[A]Indicates total number of hospitals that participated at least once over the 5-year period.
[B]Indicates the total number of health services that participated at least once over the 5-year period.
[C]Includes the hospitals that participated as part of a health service. Denominator = all 92 hospitals with acute care beds <100 across Victoria.

55 facilities participated more than once. Of the 191 unique surveys submitted, 115 (60.2%) and 95 (49.7%) included optional Category B and C staff data, respectively. A total of 37 322 staff were represented, 80.2% (n = 29 920) of whom were designated as Category A staff.

Nearly two-thirds (62.7%, n = 23 389) of all surveyed staff had evidence of optimal hepatitis B immunity; 66.3% (n = 19 841) Category A staff had evidence of optimal hepatitis B immunity. Of Category A staff, about one-fifth (19.8%; n = 5936) had unknown hepatitis B immune status and 0.6% (n = 185) had declined vaccination or serological testing. In 2020–21 specifically, 14.9 and 0.3% Category A staff had unknown and declined status respectively.

Optimal hepatitis B immunity was highest in healthcare facilities with larger numbers of employed staff. Healthcare facilities with 100–199 Category A staff employed reported the lowest evidence of optimal immunity (59.6%). Incremental increases in Category A staff with evidence of optimal hepatitis B immunity over the 5 years were most evident in the 200–499 staff group, with 88.6% reported during the 2020–21 survey (an increase of 23.3% from 2016/17) (Table 1).

Healthcare facilities which submitted multiple surveys demonstrated modest improvements from the first year to the last year of participation. Those participating at least four times reported a median increase of 13.3% when initial and final surveys were compared (Table 2).

Table 2. Median and interquartile range (IQR) of optimal hepatitis B immunity in Category A staff from first to last year of participation, stratified by frequency of participation.

Healthcare facilities		Category A staff hepatitis B immunity	
No. of times participated	No.	Median difference	IQR
1	33	–	–
2	27	3.0	−10.5 to 9.3
3	13	−0.6	−8.7 to 10.6
4–5	15	13.3	−4.4 to 42.0

Discussion

Victoria is the only Australian jurisdiction with a standardised surveillance framework for monitoring the hepatitis B immunity status of staff employed in healthcare facilities. Our study analysed data reported over a 5-year period and found a relatively low proportion of high-risk (Category A) staff employed in smaller Victorian public acute healthcare facilities to have evidence of optimal hepatitis immunity (67.2%). Previous Australian studies have reported evidence of hepatitis B immunity in 83% of staff[8] and 82% hepatitis B immunity for Category A staff.[9] Internationally, reported hepatitis B immunity rates among healthcare workers have been variably reported (46.6–91.7%).[10,11]

Our aggregate findings demonstrated notable variation between some years in the proportion of Category A staff with evidence of optimal hepatitis B immunity. This variation may have been in part because the cohort of participating healthcare facilities was different each year. At the same time however, there was an increase in the aggregate proportion for those healthcare facilities which serially surveyed staff. This is consistent with ongoing use of data to support local

quality improvement activities. Many strategies have been introduced by hospitals globally in an attempt to increase staff vaccination uptake. These include ensuring easy and free access to immune assessment and vaccines when required, and education regarding the benefits of vaccination.[12]

In the state of Victoria, legislation mandating the vaccination of healthcare staff has recently been passed, enabling the Department of Health to direct public acute care hospitals and other health service services to require the persons they employ or engage to be vaccinated against specified diseases.[13] Implementation pathways are yet to be defined but it is likely documented follow up of those healthcare facility staff whose immune status is unknown will be required. We identified that approximately one-fifth (19.5%) of Category A staff had an unknown Hepatitis B immunity status. We propose that many of these unreported staff have evidence of optimal hepatitis B immunity, and hence the (true) overall proportion is higher. The low proportion of refusals is consistent with this assumption.

Our study has a number of limitations. First, monitoring was performed only in smaller Victorian public acute healthcare facilities. Looking ahead, the VICNISS staff hepatitis B immunity module is to be made available to all healthcare facilities, including larger public and private acute care hospitals. This will provide data representative of staff more broadly. Second, there is the potential for selection bias in those data submitted by participating healthcare facilities. IPC teams lacking resources to complete surveys may represent a specific cohort of facilities with unique needs for staff vaccination.

In conclusion, we report a modest proportion of staff with evidence of optimal hepatitis B immunity employed by smaller Victorian public acute healthcare facilities. To mitigate the risk of acquiring hepatitis B in the event of an occupational exposure to blood-borne pathogens incident, enhanced immunisation policies and programs are needed to support staff hepatitis B vaccination and serological testing; this includes documented follow up of those staff whose immune status is currently reported as unknown.

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Data availability. The data that support this study will be shared upon reasonable request to the corresponding author.

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Author affiliations

[A]Victorian Healthcare Associated Infection Surveillance System (VICNISS) Coordinating Centre, Doherty Institute for Infection and Immunity, Melbourne, Vic. 3000, Australia.

[B]Department of Medicine, University of Melbourne, Melbourne, Vic. 3065, Australia.

[C]Department of Nursing, Melbourne School of Health Sciences, University of Melbourne, Melbourne, Vic. 3065, Australia.