



HEPATITIS B OUTBREAK IN A SKILLED NURSING FACILITY

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BACKGROUND

Hepatitis B is a viral disease transmitted by contact with blood. In 2006, there were an estimated 46,000 acute cases in the United States (U.S.) and an additional 1.25 million people living with chronic Hepatitis B infection [1]. Infection with Hepatitis B can lead to serious sequel: 1% die of acute infection and approximately 40% are hospitalized. A total of 2-6% of adults who acquire acute infection with the virus develops chronic disease which can lead to liver failure, liver cancer, or death. Cases in children are rarely seen because of school vaccine requirements and aggressive follow-up of pregnant mothers who have chronic disease to ensure that their infants are fully vaccinated. In the U.S., the main adult risk groups are people with multiple sex partners, men who have sex with men, and injection drug users. Cases in adults >50 years are rare.

Healthcare associated Hepatitis B Virus (HBV) has been increasingly reported in the past 10-20 years. Outbreaks have been identified in long-term care facilities, mainly associated with sharing of diabetic testing equipment. A recent review of Hepatitis B in long-term care facilities revealed that all involved diabetic residents were associated with breaks in infection control, including using single-patient finger stick devices on multiple patients [2]. Outbreaks of Hepatitis B have also been associated with shared syringes and contaminated multi-use vials of medication. Outbreaks have been reported in homes for the developmentally disabled though the mode of transmission has not been well described. Since Hepatitis B has a long incubation period of up to six months, it is often difficult to conclusively identify a source.

In September of 2008, the Acute Communicable Disease Control Program (ACDC) of the Los Angeles County Department of Public Health (DPH) was notified of a single patient with a laboratory test indicative of acute Hepatitis B in a resident of a long-term care facility (Facility A). In October, the facility reported that two additional cases of acute Hepatitis B had occurred in patients between June 2008 and August 2008. None of the patients were diabetic and all were over 50 years. An investigation was begun to determine the cause of the outbreak and to implement control measures. Once the investigation identified a more extensive outbreak, investigators from the Centers for Disease Control and Prevention (CDCP) performed more extensive chart review and sent laboratory specimens for further analysis. This report will focus on the work performed by ACDC/DPH personnel.

METHODS

For this investigation, case definition of acute Hepatitis B was a patient who resided at Facility A anytime between January 2008 and December 2008 and who had a positive test for Hepatitis B IgM+ or a new test for Hepatitis B sAg, in the absence of previously documented chronic HBV infection. Case definition of chronic Hepatitis B was a patient who resided at Facility A between January 2008 and December 2008 who had a positive test for Hepatitis B sAg and a history of chronic HBV. A susceptible patient was one who tested negative for all markers of Hepatitis B infection. An immune patient was one who had a positive test for Hepatitis B sAb or Hepatitis B Ig total.

Setting: A 120-bed skilled nursing facility focusing primarily on people with mental health diagnoses with other chronic medical conditions.

Serological screening: ACDC tested the blood of all current residents for markers of Hepatitis B including IgM, sAg, sAb, and total Ab.

Additional case finding: For those residents between January and December 2008 who were not available to have their blood drawn, ACDC cross-referenced names against the Visual Confidential Morbidity (vCMR) database of all Los Angeles County residents who have been reported with acute or chronic Hepatitis B, as they are reportable conditions in California.



ACDC also sent the list of names to the California Department of Public Health to see if the former residents had been previously diagnosed with Hepatitis B in another jurisdiction in California. ACDC obtained the medical records of patients who had been discharged to acute care hospitals to see if their admissions were compatible with a diagnosis of acute Hepatitis B.

Chart review: ACDC reviewed charts of all patients who tested positive for acute Hepatitis B and reviewed the charts of 20 other non-case patients. Demographic information, medications, dates of blood draw, dental and podiatry visits were abstracted.

Case Interviews: ACDC interviewed cases with a standardized interview form, used for routine case investigation for acute cases of Hepatitis B in Los Angeles County. Questions included exposures to medications, sexual history and drug use history.

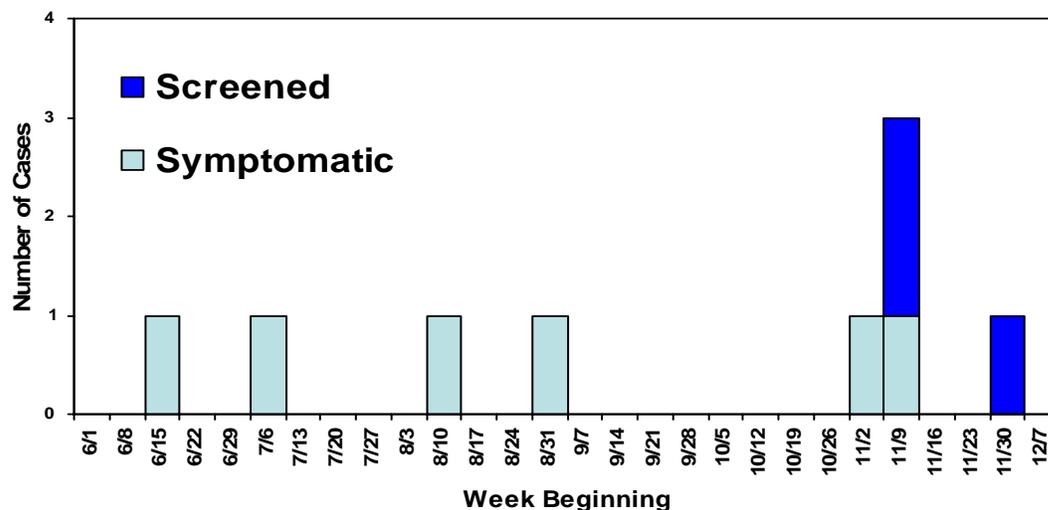
Infection Control Observation: Podiatry procedures were observed. Also inquired were finger stick, barbering, and nail cutting procedures. ACDC inspected the personal care cart used to hold shaving, cleaning, and nail cutting supplies.

Data and Statistics: All data were entered and managed in Microsoft Excel. Odds ratios and chi-square statistics were calculated using SAS v. 9.1, Cary NC and Epi Info 2000, Atl, GA.

RESULTS

A total of nine acute cases and five chronic cases were identified in current and former residents of Facility A. Five patients were symptomatic and tested positive for HBV IgM at Facility A. Review of the vCMR database revealed an additional patient with acute Hepatitis B who had been discharged over the summer. Upon serological screening of 120 residents, 9 (7.5%) patients tested positive for IgM, 5 of which had not symptoms; 3 (2.5%) patients were sAg+, 7 (6%) patients had evidence of immunity due to vaccination and 11 (9%) patients had evidence of prior HBV infection. The remaining 90 (75%) had no markers of Hepatitis B infection or vaccination. Two of the three current residents who tested positive for Hepatitis B sAg were in the local Hepatitis B registry. Review of vCMR database also identified an additional two discharged residents with previously reported chronic Hepatitis B. Review of the state Hepatitis B registry and of medical records for 21 of 37 former residents who had been discharged to acute care hospitals did not identify any other acute or chronic cases of Hepatitis B.

Figure: Acute Hepatitis B cases by means of detection and date of onset or diagnosis, Facility A, 2008





The onset of the symptomatic cases occurred between June-November 2008. The three asymptomatic cases were identified through serologic screening in November. Given an average onset of acute Hepatitis B from six weeks-six months, it appears that this may have been a point-source outbreak (Figure).

Chart Review: The acute cases were aged 49-72 years; six were male and three were female. Only one received finger sticks regularly to check blood glucose and four received injection medications during their incubation period but none of the medications or days of injections overlapped. Four had dentist appointments but none on the same day. None of the female cases had roommates with chronic or acute Hepatitis B. However, 5 of the male cases did have roommates with acute or chronic disease during their incubation periods.

Of the 5 chronic cases, 2 were female and 3 were male. Two of the chronic male cases were discharged early in the year and did not pose a risk of transmission for as long as the three other chronic residents, who resided in the facility from January to December 2008. One of the females received finger sticks regularly to check blood glucose levels. Two received injection medications and three had dentistry consults.

A cohort analysis revealed that male residents who were roommates of male residents who had chronic Hepatitis B or had acute Hepatitis B were more likely to be subsequently diagnosed with acute Hepatitis B. Of the six acutely infected male cases, five shared a room with a chronic case or a vermeil acute case. Males with a roommate who were acutely or chronically infected with Hepatitis were 14.6 times as likely to become acutely infected compared to males who did not have roommates ($p = 0.003$, 1.9-114.8, 95% CI). This increased risk was not found for the acute female cases all of whom had roommates who were neither acutely nor chronically infected.

Chart review revealed that five of the initial acute cases all had podiatry care on the same day in mid-March. On this day, one of the chronic cases (Patient A) also had podiatry care. The onset of these five cases occurred from mid June-mid November. Of the remaining four cases, one had podiatry care on the same day as Patient A in the beginning of October and had an onset of illness in mid-November, one had a reported sexual relationship with Patient A, one received finger sticks at the same time as Patient A, and one was a roommate of another acute patient who had podiatry care in March with Patient A.

One acute case had dentistry on the same day as a chronic case, but was unlikely the source of infection as the acute case was discharged two weeks later with acute Hepatitis B infection. There were no other overlapping risk factors between acute and chronic residents identified in the case chart review. All cases denied drug use or sexual contact with others at Facility A.

Infection Control Observations: ACDC observed the podiatrist perform routine procedures on residents at Facility A and identified breaches in infection control policies. There was a sink in the procedure room and hand washing protocols were generally followed. The procedure room was small and consequently, there was not sufficient counter space for the podiatrist (or dentist) to lay out their tools and separate contaminated tools from tools that had had no contact with patients. Furthermore, there was no dedicated sharps disposal container in the procedure room. After observing five patients receive procedures such as nail cutting and callous debridement, blood was visible on the skin of two of the patients. Used nail cutters, contaminated with blood, were placed in an open vinyl pouch on the counter next to the sterile nail cutters. Upon leaving Facility A, the podiatrist placed the open vinyl pouch into his medical tool box, potentially contaminating the surface of other medical equipment such as bandages, tape, and the sterile wrappers of the unused nail cutters.

ACDC also inspected the personal care cart which contained razors and personal use toe-nail clippers. Facility A does not allow patients to have individual razors; patients are issued individual disposable razors when they shave and these razors are thrown out after use. However, the nail clippers that patients use to clip their fingernails, or nurses use to clip patients' fingernails, are used repeatedly by multiple patients. The Facility says that it has a policy to wipe nail clippers with a disinfectant after each use. However, inspection of one of the nail clippers revealed nail clippings still caught in the clipper.



DISCUSSION

A total of nine acute Hepatitis B cases were identified in Facility A between September and December 2008. Additionally, five chronic Hepatitis B cases were also identified. The nature of the facility and residents in Facility A made this outbreak investigation unique from typical Hepatitis B outbreaks in skilled nursing facilities. Identifying a possible cause of the outbreak was difficult with a very mobile population that often interacts away from the watchful eye of staff members.

None of the traditional risk factors for Hepatitis B were identified as possible sources for the outbreak. Risk of infection through close household contacts was not a significant factor for this population, in part, because they are not confined to their rooms. Although assigned to the same rooms, residents wander throughout the facility and may interact with others more than their roommates. Routine distribution and disposal of individual razors and toothbrushes during grooming exercises also greatly decreased risk of infection via close contact.

The majority of acute cases received podiatry on March 19th, following Patient A. Podiatry has not previously been shown to pose a significant risk for transmission of Hepatitis B, especially in a skilled nursing facility. This outbreak highlighted how few infection control resources are available for podiatry care, especially for podiatry consultants. It also pointed out the importance of an appropriately designed procedure room in skilled nursing facilities to allow for ample space between designated clean and dirty areas to prevent the possibility of cross-contamination.

Infection control practices at Facility A, although adequate, still needed improvement. Since resident independence is promoted through grooming practices, it is vital that proper cleaning and disinfection of non-disposable grooming devices such as nail clippers be rigorously performed to prevent transmission of disease. It was also recommended that the facility follow the CDC's Recommended Infection Control and Safe Injection Practices to Prevent Patient-to-Patient Transmission of Bloodborne Pathogens for their diabetic patients.

CONCLUSIONS

ACDC conducted an investigation that included case identification, serological screening, additional case finding, chart review, patient interviews and an evaluation of infection control practices at the facility. A total of nine acute Hepatitis B cases were identified along with five chronic Hepatitis B cases. Previous investigations of acute Hepatitis B outbreaks in long-term care facilities have routinely involved diabetic patients and risk factors identified have been related to the care of the diabetic patient. In this investigation, these risk factors were not identified. Several breaks in infection control were observed including the mixing of dirty equipment with clean equipment during podiatry procedures and improper cleaning by the facility of non-disposable grooming devices such as nail clippers. It was found that the majority of acute cases received podiatry care on the same day as a resident who had chronic Hepatitis B. The findings of the investigation emphasize the need for long-term care facilities to establish an active, effective infection control program which includes observation of the infection control practices of consultants who deliver clinical services in the facility.

REFERENCES

1. Centers for Disease Control and Prevention (CDC). Recommended Infection-Control and Safe Injection Practices to Prevent Patient-to-Patient Transmission of Bloodborne Pathogens Report available at: <http://www.cdc.gov/hepatitis/Populations/GlucoseMonitoring.htm>.
2. Thompson N, Perz J. Non hospital Health Care–Associated Hepatitis B and C Virus Transmission: United States, 1998–2008. *Ann Intern Med.* 2009;150:33-39.