

Unusual Cases of Hepatitis B Virus Transmission in Medical Settings

Although routine hepatitis B vaccination has been recommended for healthcare professionals since 1982, transmission of hepatitis B virus (HBV) continues to occur in medical settings. Transmission has been documented between patients, from patients to healthcare professionals, and from healthcare professionals to patients. Many HBV outbreaks have been associated with assisted glucose monitoring and reuse of blood collection lancets (illustrative examples are provided below). Because of this increased risk, in 2011 the Advisory Committee on Immunization Practices recommended routine hepatitis B vaccination for previously unvaccinated persons with diabetes (*MMWR* 2011;60(50):1709–1711).

In 2012 only 65% of healthcare professionals reported having received hepatitis B vaccine (*MMWR* 2014; 63(5); 95-102). Improved vaccination coverage among healthcare professionals will not only protect them directly, but also reduce the risk of transmission in health care settings.

An editorial about the report summarized in item #6 below stated, “There and in other instances, investigators have been unable to explain how the virus traveled from person A to person B – and that is troubling. It is troubling because it suggests that there are aspects of transmission of bloodborne disease that remain poorly understood.” (Transmission of hepatitis B in the health care setting: the elephant in the room...or the mouse? Allos BM, Schaffner W. *J Infect Dis* 2007; 195(9):1245–7.)

1. Notes from the field: deaths from acute hepatitis B virus infection associated with assisted blood glucose monitoring in an assisted-living facility – North Carolina, August–October 2010. *MMWR* 2011; 60(06):182.

SUMMARY: On October 12, 2010, the North Carolina Division of Public Health and the Wayne County Health Department were notified by a local hospital of four residents of a single assisted-living facility with suspected acute HBV infection. An investigation identified unsafe practices, including sharing of reusable fingerstick lancing devices approved for single patient use only and shared use of blood glucose meters without cleaning and disinfection between patients. Eight residents whom facility staff had assisted with blood glucose monitoring were eventually hospitalized, and six died from hepatitis B complications.

LINK: www.cdc.gov/mmwr/preview/mmwrhtml/mm6006a.5.htm

2. Five hepatitis B outbreaks in care homes in the U.K. associated with deficiencies in infection control practice in blood glucose monitoring. Duffell EF, Milne LM, Seng C, et al. *Epidemiol Infect* 2011; 139(3):327–35.

SUMMARY: This article is an account of the investigations into a series of HBV outbreaks linked to the use of lancing devices in community healthcare settings in the United Kingdom. Between February 2004 and December 2006, nine individuals with acute HBV infection were reported to five local units of the Health Protection Agency. Investigations identified an additional 12 individuals with HBV infection who were residents in these settings. The epidemiological

and environmental evidence suggests that HBV transmission occurred mostly from a significant breakdown in infection control measures in blood glucose testing.

LINK: www.ncbi.nlm.nih.gov/pubmed/20478083

3. Multiple clusters of hepatitis virus infections associated with anesthesia for outpatient endoscopy procedures. Gutelius B, Perz JF, Parker MM, et al. *Gastroenterology* 2010; 139(1):163–70.

SUMMARY: An outbreak of hepatitis B and hepatitis C occurred in two separate outpatient endoscopy facilities. An anesthesiologist was found to have used a single-patient-use vial of propofol for multiple patients. Reuse of syringes to redose patients, with resulting contamination of medication vials used for subsequent patients, likely resulted in viral transmission.

LINK: www.ncbi.nlm.nih.gov/pubmed/20353790

4. Acute hepatitis B outbreaks related to fingerstick blood glucose monitoring in two assisted living facilities. Counard CA, Perz JF, Linchangco PC, et al. *J Am Geriatr Soc* 2010; 58(2):306–11.

SUMMARY: At assisted living facility A, five confirmed acute, two probable acute, and one probable chronic HBV infections were identified in the 109 residents tested. All of the eight identified residents with HBV infection had diabetes mellitus. Transmission of HBV was associated with fingerstick blood glucose monitoring and insulin injections. At Facility B, seven of 21 residents (33.3%) receiving fingerstick blood glucose monitoring had evidence of recent HBV infection.

LINK: www.ncbi.nlm.nih.gov/pubmed/20070418

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5. Nonhospital health care-associated hepatitis B and C virus transmission: United States, 1998–2008.

Thompson ND, Perz JF, Moorman AC, Holmberg SD. *Ann Intern Med* 2009; 150(1):33–9.

SUMMARY: A review of outbreak information revealed 33 outbreaks of HBV or hepatitis C virus infection (HCV) in nonhospital health care settings in the past decade: 12 in outpatient clinics, six in hemodialysis centers, and 15 in long-term care facilities, resulting in 448 persons acquiring HBV or HCV infection. In each setting, the putative mechanism of infection was patient-to-patient transmission through failure of health care personnel to adhere to fundamental principles of infection control and aseptic technique (for example, reuse of syringes or lancing devices).

LINK: www.ncbi.nlm.nih.gov/pubmed/19124818

6. Patient-to-patient transmission of hepatitis B virus associated with oral surgery. Redd JT, Baumbach J, Kohn W, et al. *J Infect Dis* 2007; 195(9):1311–4.

SUMMARY: A 60-year-old woman who was not sexually active, did not use IV drugs, and had no contact with HBV-infected persons developed acute hepatitis B. Molecular epidemiologic techniques discovered that the woman's virus was identical to virus isolated from an HBsAg-positive woman who had had teeth extracted at the same oral surgeon earlier the same day. Despite intensive investigation, no deficiencies in infection control practices were identified.

LINK: www.ncbi.nlm.nih.gov/pubmed/17397000

7. Transmission of hepatitis B virus among persons undergoing blood glucose monitoring in long-term care facilities – Mississippi, North Carolina, and Los Angeles County, California, 2003–2004. *MMWR* 2005; 54(9):220–3.

SUMMARY: In a Mississippi nursing home in 2003, two residents died of acute HBV infection, prompting an investigation. Nine percent of all residents tested HBsAg positive; among residents who routinely received fingersticks for glucose monitoring, 14 of 38 had acute HBV infection. In this facility, the spring-loaded barrel of a fingerstick device was used for multiple patients.

After a nursing home resident in North Carolina developed acute HBV infection, the other residents were tested. Of the 45 residents who received fingersticks for glucose monitoring, 18% had acute HBV infection. Only single-use lancets were used and insulin vials were not shared among patients. However, patients shared one glucometer, which was not routinely cleaned between patients. Other equipment may have been contaminated with blood as well, allowing HBV to be indirectly transferred between residents.

The Los Angeles County Department of Health Services received reports of four residents with diabetes in assisted living center B who had acute HBV infection during November 2003–January 2004. Of the nine patients who had daily exposure to fingerstick procedures performed by nursing staff, eight had acute HBV infection, compared with none among the seven residents who performed their own fingersticks.

LINK: www.cdc.gov/mmwr/preview/mmwrhtml/mm5409a2.htm

8. Transmission of hepatitis B and C viruses in outpatient settings – New York, Oklahoma, and Nebraska, 2000–2002. *MMWR* 2003; 52(38):901–6.

SUMMARY: In December 2001, the New York City Department of Health (NYCDOH) was informed of two elderly patients who had been diagnosed with acute HBV infection and who had visited the same physician. A follow-up investigation by NYCDOH found an additional 38 patients in the same practice who had acute HBV infection. Further study found that infection was strongly correlated with having received an injection at this office, where doses of atropine, dexamethasone, and vitamin B12 were drawn from multiple-dose vials into one syringe.

In August 2002, the Oklahoma State Department of Health investigated a pain remediation clinic where they discovered a certified registered nurse anesthetist routinely reused needles and syringes. They tested 793 patients for hepatitis C virus (HCV), HBV, and HIV infection. A total of 69 HCV and 31 HBV infections were identified that probably were acquired in the clinic.

LINK: www.cdc.gov/mmwr/preview/mmwrhtml/mm5238a1.htm

9. Transmission of hepatitis B virus from a surgeon to his patients during high-risk and low-risk surgical procedures during 4 years. Spijkerman IJ, van Doorn LJ, Janssen MH, et al. *Infect Control Hosp Epidemiol* 2002; 23(6):306–12.

SUMMARY: A general surgeon in the Netherlands infected a number of patients with HBV over four years of practice (transmission from the surgeon was confirmed in eight patients, probable in two, and possible in 18). Two patients were chronically infected, and one case of secondary transmission to a spouse was identified.

LINK: www.ncbi.nlm.nih.gov/pubmed/12083233

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10. Acute hepatitis B in two patients transmitted from an e antigen negative cardiothoracic surgeon. Molyneaux P, Reid TM, Collacott I, et al. *Commun Dis Public Health* 2000; 3(4):250–2.

SUMMARY: HBV infection was transmitted by a cardiothoracic surgeon to two patients during coronary artery bypass surgery. Both patients presented with serious clinical illness 12 weeks after surgery. The surgeon was HBsAg positive.

LINK: www.ncbi.nlm.nih.gov/pubmed/11280252

11. Molecular epidemiology of a large outbreak of hepatitis B linked to autohaemotherapy. Webster GJ, Hallett R, Whalley SA, et al. *Lancet* 2000; 356(9227):379–84.

SUMMARY: Thirty patients who received autohaemotherapy (a procedure that involves drawing the patient's blood, mixing it with saline, and reinjecting the mixture) at an alternative medicine clinic in the United Kingdom were infected with HBV. Five had markers of chronic HBV infection. Contaminated saline in a repeatedly used bottle was the probable method of transmission.

LINK: www.ncbi.nlm.nih.gov/pubmed/10972370

12. An outbreak of hepatitis B associated with reusable subdermal electroencephalogram electrodes. Hepatitis B Outbreak Investigation Team. *CMAJ* 2000; 62(8):1127–31.

SUMMARY: In 1996, an outbreak of HBV infection was detected among patients attending an electroencephalogram (EEG) clinic in Toronto. A follow-up of all available patients found 75 who developed HBV infection from 1991 to 1996. All of the cases had had at least one EEG performed with reusable subdermal electrodes. The outbreak was a result of a common source of infection (a technician who was HBeAg positive) and inadequate infection control practices.

LINK: www.ncbi.nlm.nih.gov/pubmed/10789626

13. Nosocomial hepatitis B virus infection associated with reusable fingerstick blood sampling devices – Ohio and New York City, 1996. *MMWR* 1997; 46(10):217–21.

SUMMARY: In 1996, nine residents of an Ohio nursing home were diagnosed with acute HBV infection and two with chronic HBV infection; all were diabetic. HBV infection was associated with fingerstick capillary sampling, specifically with the use of a lancet device with a re-used end cap. That same year, acute hepatitis B illness was diagnosed in three diabetic patients in a New York hospital. A review of serologic records of previous patients identified another 11 possible cases of nosocomially [hospital] acquired HBV infection. Transmission seems to have occurred through contamination of a fingerstick blood sampling device.

LINK: www.cdc.gov/mmwr/preview/mmwrhtml/00046679.htm

14. Outbreaks of hepatitis B virus infection among hemodialysis patients – California, Nebraska, and Texas, 1994. *MMWR* 1996; 45(14):285–9.

SUMMARY: Outbreaks of HBV infection occurred in five chronic hemodialysis centers in California, Nebraska, and Texas from April through August 1994. Transmission of HBV from hemodialysis patients with chronic HBV infection to susceptible patients was believed to have resulted from failure to identify and isolate HBV-infected patients during dialysis; sharing of staff, equipment, and supplies among patients; and failure to vaccinate susceptible patients against the hepatitis B virus.

LINK: www.cdc.gov/mmwr/preview/mmwrhtml/00040762.htm

15. Transmission of hepatitis B virus to multiple patients from a surgeon without evidence of inadequate infection control. Harpaz R, Von Seidlein L, Averhoff FM, et al. *N Engl J Med* 1996; 334(9):549–54.

SUMMARY: In July 1992, a 47-year-old woman became ill with acute HBV infection after undergoing a thymectomy. The thoracic surgery physician-in-training who assisted in surgery had had acute HBV infection six months earlier and was subsequently found to be HBeAg positive. Though the hospital had used appropriate infection control procedures, further investigation identified 19 other infected patients.

LINK: www.ncbi.nlm.nih.gov/pubmed/8569821

16. Patient-to-patient transmission of hepatitis B in a dermatology practice. Hlady WG, Hopkins RS, Ogilby TE, Allen ST. *Am J Public Health* 1993; 83(12):1689–93.

SUMMARY: Twenty-two cases of acute hepatitis B disease were linked to a Florida dermatologist's practice during 1985–1991. Since the dermatologist was not HBsAg positive, the outbreak is believed to have resulted from the dermatologist's failure to apply either universal precautions or sterile surgical technique.

LINK: www.ncbi.nlm.nih.gov/pubmed/8259796

17. Nosocomial transmission of hepatitis B virus associated with the use of a spring-loaded finger-stick device. Polish LB, Shapiro CN, Bauer F, et al. *N Engl J Med* 1992; 326(11):721–5.

SUMMARY: From June 1989 through March 1990, 26 patients in a California hospital contracted acute HBV infection. A retrospective cohort study indicated that transmission of the virus occurred percutaneously through contamination of the stabilizing platform on a spring-loaded fingerstick device.

LINK: www.ncbi.nlm.nih.gov/pubmed/1738376

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18. Hepatitis B and workers in institutions for the mentally retarded: risk of infection for staff in patient care.

Livengood JR, Miller GE, Coulter D, Foster LR. *Am J Prev Med* 1989; 5(3):170–4.

SUMMARY: A study of 920 employees in a large residential institution for the developmentally disabled in Oregon found an overall prevalence of 10% for anti-HBc, a marker of present or past HBV infection. Antigen positivity was significantly associated with a history of working directly with clients.

LINK: www.ncbi.nlm.nih.gov/pubmed/2787161

19. Epidemiologic notes and reports: outbreak of hepatitis B associated with an oral surgeon – New Hampshire. *MMWR* 1987; 36(9): 132–3.

SUMMARY: In 1986, four cases of HBV infection were linked to an oral surgeon practicing in New Hampshire. One of the patients developed severe complications; another became

chronically infected with HBV. CDC reported eight other outbreaks of HBV infection traceable to general dentists or oral surgeons from 1974 to 1986, with the number of clinically infected patients in each outbreak ranging from 3 to 55.

LINK: www.cdc.gov/mmwr/preview/mmwrhtml/00000885.htm

20. Lethal outbreak of hepatitis B in a dental practice. Shaw FE Jr, Barrett CL, Hamm R, et al. *JAMA* 1986; 255(23):3260–4.

SUMMARY: Between April 1984 and February 1985, 24 cases of HBV infection occurred among the patients of a dentist practicing in rural Indiana. Two of these patients died of fulminant hepatitis. The dentist had never had hepatitis B symptoms, but blood tests indicated he was hepatitis B surface antigen (HBsAg) positive.

LINK: www.ncbi.nlm.nih.gov/pubmed/2872342