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Hepatitis C & Reused Lancets

FINGER BLOOD SAMPLE DEVICE COULD SPREAD HCV.

Salvatore P. Dibenedetto, Division of Pediatric Hematology and Oncology, University of Catania, Catania, Italy.

Hepatitis Weekly, 04-22-1996, pp 11.



Taking blood samples from the finger with a nondisposable device can result in the transmission of hepatitis C virus, according to a report from Italy. The report is the first to implicate routine finger blood sampling in the spread of hepatitis C virus (HCV), and researcher Salvatore P. Dibenedetto and colleagues recommend the suspension of such practices. Advances in blood-banking techniques have reduced the incidence of infection by HCV, which accounts for most cases of non-A, non-B post transfusional hepatitis, but such infections have not been completely eliminated.

"Screening of blood donors by second generation HCV specific assays has been widely reported to reduce rates of postransfusion infection from about 7 to 17 percent to as little as 0.3 to 0.05 percent of units transfused. Nevertheless outbreaks of HCV infection have been reported in hematology wards, suggesting a role for routes other than transfusions in transmission of the infection,"

Dibenedetto et al. wrote ("Reduction in the Incidence of Infection by HCV in Children with Acute Lymphoblastic Leukemia After Suspension of Sampling from the Finger," The Pediatric Infectious Disease Journal, March 1996;15(3):265-266). "Furthermore, children with acute lymphoblastic leukemia (ALL) and/or other malignancies seem to be exposed more frequently than others to the risk of such infections."

In this study Dibenedetto et al. describe their experience in an outpatient hematology-oncology clinic for children. A total of 144 patients from newborn to 14 years of age, with newly diagnosed non-B cell acute lymphocytic leukemia (ALL) were admitted to the Catania, Italy hospital between January 1986 and December 1994. Before December 1989, all patients with ALL received blood products that had not been screened for HCV. Thereafter second generation tests for HCV were routinely conducted in the blood bank for screening of donated blood.

Starting in January 1990, all patients were examined for the presence of HCV specific antibodies at the time of first admission to the hospital and then every three months thereafter, during maintenance therapy in the post-remission phase. In patients diagnosed with ALL before January 1990, the presence of HCV specific antibodies was examined during maintenance therapy or during routine follow-up after cessation of therapy. Since September 1992, in view of an unexpectedly persistent high incidence of HCV infection, Dibenedetto et al. stopped sampling the blood of their outpatients with a finger-pricking device (a pencil with a spring-loaded disposable lancet).

"The finger stick procedure was performed by personnel who were informed of the proper use of the device as well as on the general precautions to prevent contamination," the researchers wrote. "Nevertheless the frequency with which gloves were worn varied among the operators. By contrast lancets were changed routinely between patients and the underside of the device was cleaned after each lancet was discharged. "All sera, which had been stored frozen at -20 degrees centigrade, were tested by a second generation enzyme-

linked immunosorbent assay specific for HCV (ELISA-2; Ortho Diagnostic Systems, Raritan, N.J.) and reactive sera were further examined by a second generation RIBA. Antibodies specific for HCV were detected in 28 (20.1 percent) of 141 transfused children and in one of three untransfused children with ALL who had been diagnosed between January 1986, and December 1994. Because the latter one child had been diagnosed as having ALL in July 1987, the authors do not know whether or not he was seropositive at the time of first admission to the hospital. The analysis was extended to his family and his father turned out to be seropositive for HCV.

Thirty-eight patients had been diagnosed before January, 1990 (the date of introduction of routine assays for HCV). These children had previously received unscreened blood or platelets. Twelve of them (31.5 percent) were seropositive for HCV. "The detrimental effects of blood sampling from the finger with this device were particularly evident in children with ALL who had undergone weekly or biweekly blood cell counts as outpatients for a prolonged period,"

Dibenedetto et al. wrote. "By contrast, patients with neoplasms other than ALL who occasionally and for short periods underwent such blood sampling as our outpatients were usually unaffected. This difference might reflect a requirement of multiple exposures over a long period of time of the transmission of HCV by routes other than the parenteral administration of blood products."

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

Regular monitoring of blood glucose levels is an important component of routine diabetes care (1). Capillary blood is typically sampled with the use of a fingerstick device and tested with a portable glucometer. Because of outbreaks of hepatitis B virus (HBV) infections associated with glucose monitoring, CDC and the Food and Drug Administration (FDA) have recommended since 1990 that fingerstick devices be restricted to individual use (2,3). This report describes three recent outbreaks of HBV infection among residents in long-term--care (LTC) facilities that were attributed to shared devices and other breaks in infection-control practices related to blood glucose monitoring. Findings from these investigations and previous reports suggest that recommendations concerning standard precautions and the reuse of fingerstick devices have not been adhered to or enforced consistently in LTC settings (2--5). The findings underscore the need for education, training, adherence to standard precautions, and specific infection-control recommendations targeting diabetes-care procedures in LTC settings (4--6) (Box 1).

The three outbreaks described in this report were all reported by state or local health departments to CDC, which provided epidemiologic and laboratory assistance. In each of the three LTC settings, residents were tested for serologic markers for HBV infection. Under the case definitions used in these investigations, residents who tested positive for IgM antibody to hepatitis B core antigen (anti-HBc) were defined as having acute HBV infection. Residents who tested positive for hepatitis B surface antigen (HBsAg) and total anti-HBc, but who tested negative for IgM anti-HBc, were considered to have chronic HBV infection. Residents who tested positive for total anti-HBc, but who tested negative for HBsAg, or those who had antibody to HBsAg (anti-HBs) ≥ 10 milli-International Units (mIU) per milliliter were considered immune to HBV infection. Residents were considered susceptible to HBV if they had no HBV markers. A retrospective cohort study was performed as part of each investigation; the study was restricted to acutely infected and susceptible residents to identify risk factors. In all three investigations, staff members were evaluated; none were identified as sources of infection. Medical records were reviewed and infection-control procedures were assessed through direct observation and by interviews with nursing staff members.

Nursing Home A, Mississippi

During November--December 2003, the Mississippi Department of Health received reports of two fatal cases of acute HBV infection among residents of nursing home A. The first patient with recognized symptoms of HBV infection had received serologic testing for viral hepatitis infection in June 2003 as part of a hospital emergency department evaluation for abdominal pain. Although this patient was found to have a positive test for IgM anti-HBc, indicating acute HBV infection, and the finding was noted in the patient's chart in September 2003, nursing home A did not contact the state health department or initiate an internal investigation. Subsequently, the patient died.

In December 2003, after a second patient with acute HBV infection had died, and after a third with acute HBV infection was reported, serologic testing was performed on specimens from all 158 residents. Test results were available for 160 residents, including the two decedents; 15 (9%) had acute HBV infection, one was chronically infected, 15 (9%) were immune, and 129 (81%) were susceptible. Percutaneous and other possible exposures among residents were evaluated. Among 38 residents who routinely received fingersticks for glucose monitoring, 14 had acute HBV infection, compared with one of 106 residents who did not receive fingersticks (relative risk [RR] = 39.0; 95% confidence interval [CI] = 5.3--290.0).

Glucose monitoring of 14 residents with acute HBV infection and the resident with chronic HBV infection was performed by staff members based at the same nursing station. Reviews of infection-control practices and site inspections indicated that each of the four nursing stations in nursing home A was equipped with one glucometer and one spring-loaded, pen-like fingerstick device. Staff members reported that a new end cap and lancet assembly was used for each fingerstick procedure; however, the spring-loaded barrel and glucometer were not routinely cleaned between patients. Investigators also observed that insulin and other multidose medication vials were not labeled with patient names or the dates the vials were opened. In an anonymous survey, several staff members reported observing other workers reuse a needle or lancet or fail to change gloves between patients. No other percutaneous exposures were associated with illness.

Assisted Living Center B, Los Angeles County, California

During January--February 2004, 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. Because these initial reports were among residents with diabetes, serologic testing was performed in January 2004 on residents who had received fingersticks for blood glucose monitoring during May--December 2003. Of 22 residents tested (three declined), eight (36%) had acute HBV infection, including the four residents previously identified; six (27%) were immune (and excluded from the analysis), and none had chronic infection. Reviews of patient records indicated that one of the acutely infected residents had been repeatedly tested at a separate hemodialysis center and had seroconverted to HBsAg-positive in July 2003. 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 (RR = undefined; CI = 2.8--undefined). Although receipt of insulin was also significantly associated with infection, two residents with acute HBV infection had not received insulin. Other percutaneous exposures (e.g., podiatric or dental care) were not associated with HBV infection.

Fingerstick procedures were often performed by nursing staff members in a central living area, with diabetes patients seated at a common table. Although residents had their own fingerstick devices, nurses reported occasionally using a pen-like fingerstick device barrel from their own kits to collect consecutive blood samples; a single glucometer was typically used for all residents. Nurses reported that they were discouraged from wearing gloves to decrease the sense of a clinical environment, and hand hygiene was not performed between procedures.

Nursing Home C, North Carolina

In May 2003, a case of HBV infection in a resident of nursing home C was reported to the North Carolina Department of Health. During June--July 2003, serologic testing was performed on specimens from all 192 residents; 11 (6%) had acute HBV infection, 16 (8%) were immune, and 165 (86%) were susceptible. No resident had chronic HBV infection. Of 45 residents who received fingersticks for glucose monitoring, eight (18%) had acute HBV infection, compared with three (3%) of 117 residents without this exposure (RR = 6.9; CI = 1.9--25.0). After data were controlled for fingerstick exposures, acute HBV infection was not associated with other percutaneous exposures (e.g., insulin injections, podiatry procedures, or phlebotomy). Two diabetes patients at nursing home C who were potential sources of the outbreak were identified retrospectively; one had clinical symptoms of hepatitis B and serologic markers of acute infection during 2002, whereas the other had chronic HBV infection and died in February 2002.

Interviews with staff and direct observation of glucose-monitoring practices revealed that only single-use lancets were used, and insulin vials were not shared among patients. However, on each wing of the facility, a single glucometer was used for all patients receiving fingersticks; glucometers were not routinely cleaned between patients. On some days, a single health-care worker performed approximately 20 fingerstick procedures during a single work shift. In an anonymous survey, nursing staff members indicated that some health-care workers did not always change gloves between patients when performing fingerstick procedures.

Reported by: *R Webb, MD, M Currier, MD, J Weir, KM McNeill, MD, Mississippi Dept of Health. E Bancroft, MD, D Dassey, MD, J Maynard, D Terashita, MD, Los Angeles County Dept of Health Svcs, California. K Simeonsson, MD, A Chelminski, J Engel, MD, North Carolina Dept of Health and Human Svcs. JF Perz, DrPH, AE Fiore, MD, IT Williams, PhD, BP Bell, MD, Div of Viral Hepatitis, National Center for Infectious Diseases; T Harrington, MD, C Wheeler, MD, EIS officers, CDC.*

Editorial Note:

Lack of adherence to standard precautions and failure to implement long-standing recommendations against sharing fingerstick devices place LTC residents at risk for acquiring infections from bloodborne pathogens such as HBV (2,3,7). In nursing home A, the spring-loaded barrel of a fingerstick device was used for multiple patients. Previous outbreaks have been linked to such devices when the platform or barrel supporting the disposable lancet was reused for multiple patients, when used lancets were stored with unused lancets, or when lancet caps were reused (2,3; CDC, unpublished data, 1999). In assisted living center B, nursing staff members routinely administered fingersticks without wearing gloves or performing hand hygiene between patients, and spring-loaded fingerstick devices were also occasionally shared.

In nursing home C, as with other recent outbreaks (8; CDC, unpublished data, 2002), transmission of HBV among residents with diabetes occurred despite use of single-use fingerstick devices or insulin medication vials that were dedicated for individual patient use. In these settings, glucose monitors, insulin vials, or other surfaces contaminated with blood from an HBV-infected person might have resulted in transfer of infectious virus to a health-care worker's gloves and to the fingerstick wound or subcutaneous injection site of a susceptible resident. Similar indirect transmission of HBV in health-care settings through contaminated environmental surfaces or inadequately disinfected equipment has been reported with other health-care procedures, such as dialysis (6,9). HBV is stable at ambient temperatures; infected patients, who often lack clinical symptoms of hepatitis, can have high concentrations of HBV in their blood or body fluids (6). To prevent patient-to-patient transmission of infections through cross-contamination, health-care providers should avoid carrying supplies from resident to resident and avoid sharing devices, including glucometers, among

residents.

The risk for patient-to-patient transmission of HBV infection can be reduced by implementing specific prevention measures (Boxes [1](#) and [2](#)). LTC staff often perform numerous percutaneous procedures; frequent blood glucose monitoring increases opportunities for bloodborne pathogen transmission. The outbreak investigations reported here identified residents with diabetes who received fingersticks from nursing staff members as often as four times per day, according to their physician's routine orders, despite having consistently normal glucose levels. Expert panels have concluded that approximately 8 years are needed before the benefits of glycemic control result in reductions in microvascular complications ([1, 10](#)). In LTC settings, schedules for fingerstick blood sampling of individual patients should be reviewed regularly to reduce the number of percutaneous procedures to the minimum necessary for their appropriate medical management. In each of the investigations described in this report, implementation of infection-control measures (Boxes [1](#) and [2](#)) was recommended, along with follow-up serologic testing for markers of HBV.

An estimated 70,000--80,000 HBV infections occur each year in the United States. Most of these infections occur among young adults with behavioral risk factors (i.e., sexual contact and injection-drug use); these adults should receive hepatitis B vaccine. Preventing transmission of HBV among patients in long-term--care settings requires adherence to recommended infection-control practices and prompt response to identified instances of transmission. Routine hepatitis B vaccination or screening of LTC residents is not recommended. In the outbreaks described in this report, initial cases were not identified or investigated in a timely fashion, resulting in missed opportunities to correct deficient practices and interrupt transmission. Evidence of acute viral hepatitis in any LTC resident should prompt a thorough investigation. For a case involving a resident with diabetes, fingerstick blood sampling procedures and insulin administration should receive particular scrutiny. Health departments should encourage reporting of such cases and offer assistance in identifying the source of infection. CDC continues to support investigations in LTC and other health-care settings and is working toward improved implementation of the infection-control recommendations described in this report.

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Recommended practices for preventing patient-to-patient transmission of hepatitis viruses.

<Gee> anyone remember how they did in back then, no gloves, reused the lancet over and over again.

Purdy, A., et al. 1997. *Nosocomial hepatitis B virus infection associated with reusable fingerstick blood sampling devices* - Ohio and New York, 1996. Morbidity and Mortality Weekly Report. 46:217-220.

In 1996, outbreaks of hepatitis B virus (HBV) infection occurred among patients with diabetes mellitus in a nursing home in Ohio and hospital in New York City. Acute hepatitis B was diagnosed in 4 residents of an Ohio nursing home. Eleven residents were subsequently identified to be acutely or chronically

infected with HBV and all had diabetes mellitus. Among infected individuals, the attack rate was 53% in those who underwent fingerstick capillary testing and 0% among persons who did not require finger sticks. When the first case was identified, the facility routinely shared three fingerstick devices among patients. Lancets were routinely changed but end caps were not. After switching to individual fingerstick devices for each resident, no new HBV infections were detected. Acute hepatitis B was also diagnosed in 3 inpatients in a New York City hospital all of whom had diabetes mellitus and were hospitalized during the same time period. All 3 of these patients had fingerstick blood monitoring compared to 20 susceptible patients hospitalized at the same time who did not have fingersticks. Based on review of serological records, 11 additional patients with possible nosocomially acquired acute HBV infection were identified and 10 had received fingersticks while hospitalized during the previous 6 months. After the hospital switched from shared fingerstick devices to completely disposable, nonreusable devices, no new cases of nosocomially acquired HBV infections have been identified. Although similar outbreaks have been reported previously, these investigations confirm that HBV can be transmitted by fingerstick capillary-blood sampling devices. These results emphasize the need to restrict such devices, even if lancets are not reused, to individual patients. <http://cpmcnet.columbia.edu/dept/gi/mar97.html>

A Decade of Needlestick Prevention

A California Hospital's Experience

Lancet devices for glucose monitoring

Lancets for glucose monitoring have refined safety features, including retractable lancets and penlets that release the lancet without one needing to touch the lancet. Lancets are considered a high-risk source of pathogen transmission due to the direct contact with blood once the device is used. Lancets used for bedside glucose monitoring should be single-patient use. If a spring-loaded fingerstick device is used on more than one person, it should have a disposable finger guard to prevent the risk of disease transmission, since spring-loaded fingerstick devices have been implicated in the transmission of hepatitis B **virus among patients with diabetes mellitus**.

http://www.infectioncontrolresource.org/IC_Issue3/InfectionControl.pdf.

Deja vu: nosocomial hepatitis B virus transmission and finger stick monitoring.

Department of Veterans Affairs Medical Center, Brooklyn, New York, USA. Am J Med 1998 Oct 105:4 296-301 Quale JM, Landman D, Wallace B, Atwood E, Ditore V, Fruchter G

Abstract

PURPOSE: Three patients with acute hepatitis B virus infection were identified who had been hospitalized on the same medical ward during a 19-day period several months earlier. An investigation was undertaken to determine if nosocomial transmission had occurred. **SUBJECTS AND METHODS:** A cohort study of patients admitted to the medical ward during the 19-day period in 1995 was conducted. In addition, we reviewed medical charts and laboratory records of all patients with acute hepatitis B virus infection who had been admitted to the hospital from 1992 through October 1996 to identify other cases with possible nosocomial acquisition. **RESULTS:** The 3 patients who had developed acute hepatitis B infection 2 to 5 months after

hospitalization on the same medical ward had diabetes mellitus but no identified risk factors for hepatitis B infection. A source patient with diabetes mellitus and hepatitis B "e" antigenemia also was present on the same medical ward at the same time; all 4 patients were infected with the same viral subtype (adw2). Diabetes mellitus and fingerstick monitoring were associated with illness ($P < 0.001$). Through the review of medical charts and laboratory records, 11 additional cases of suspected nosocomial acquisition via fingersticks were identified in 1996, including two clusters involving an unusual subtype of hepatitis B virus (adw4). The fingerstick device employed had a reusable base onto which disposable lancet caps were inserted. There was ample opportunity for cross-contamination among patients because deficiencies in infection control practices, particularly failure to change gloves between patients, were reported by nurses and patients with diabetes mellitus. **CONCLUSION:** Transmission during fingerstick procedures was the most likely cause of these cases of nosocomial hepatitis B infection. Contamination probably occurred **when healthcare workers failed to change gloves between patients undergoing fingerstick monitoring**, although other means of contamination cannot be ruled out.

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