



## PATIENT-TO-PATIENT HEP B TRANSMISSION IN THE DENTAL SETTING

### *A Note from the Author*

Through the collaborative efforts of the Arizona Dental Association (AzDA), AzDA Council on Communications, and the Arizona Dental Foundation (ADF), I am pleased to announce that this edition of INSCRIPTIONS marks the beginning of the offering of continuing education (CE) credit as a component of "Infection Control Corner." I thank all for their efforts and hope you appreciate this new and valuable membership benefit.

As CE courses in Infection Control/Infectious Diseases are offered in only certain areas of the state, this will allow the opportunity for the entire membership and others to efficiently obtain credit in this very important area of dental practice, at a time convenient for the practitioner.

The INSCRIPTIONS "Infection Control Corner" in this capacity will be offered six times a year. During this period, you will have the opportunity to earn 6.0 CE credit hours, for dentists, or 4.0 CE credit hours for dental hygienists, as required by the Arizona State Board of Dental Examiners for triennial license renewal. AzDA is a Continuing Education Recognition Program (CERP) provider conducted under the auspices of the American Dental Association. This means that if you have licensure in another state, these credits will apply.

This month's offering is a repeat of my June/July 2008 column. The Learning Objectives are:

- Identify the type of bloodborne Hepatitis that is easiest to transmit by poor infection control practices.
- Examine the epidemiological investigation of the patient-to-patient transmission that transpired.
- Identify the 3 tools necessary to prevent the transmission of Hepatitis.

This column addresses a subject of vital concern in infection control, cross contamination leading to the first document case of patient-to-patient transmission of an infection in the dental setting. Please review the article and if desired, complete your CE quiz by using page 60 or go online at [AzDA.org/CE](http://AzDA.org/CE).

In the months ahead, this column will continue to address new infection control concerns and visit some topics from past columns, updated with the added benefits of the CE component. Primarily, the principles remain the same. We need to abide by them and educate and reeducate as needed to achieve best practices in dental infection control. I invite you to email me ([Kay@azda.org](mailto:Kay@azda.org)). I answer every email and your questions and comments could be addressed in future columns.

Kay Carl, RN, BS,  
Board Certified in Infection Control and Epidemiology

**Those of you who have** attended my lectures know that I have been giving a "heads-up" to everyone that it is now much easier to track disease transmission. I would hazard a guess that there has been patient-to-patient transmission of Hepatitis B virus (HBV) in a dental office in the past, but no clear way to trace it back to a dental procedure. We now have our first documented case of patient-to-patient transmission HBV in a dental facility in the United States. This case happened in 2001 at a freestanding oral surgery center in the state of New Mexico.

### **State & Federal Investigation**

Officials from The New Mexico Department of Health (DOH) and the Centers for Disease Control and Prevention (CDC) took part in the epidemiological investigation. The research report on the investigation was published in the *Journal of Infectious Disease* in 2007 [Redd JT, Baumbach J, Kohn W, Nainan O, Khristova M, Williams I. Patient-to-patient transmission of hepatitis B virus associated with oral surgery. *J Infect Dis* 2007;195(9):1311-1314]. The oral surgeons at the center cooperated with the health officials for the investigation. So let us look at the findings.

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## Index Patient

In April of 2002, the DOH was notified of an acute case of HBV. The patient was a 60-year old woman who became symptomatic that February. She had not received the HBV vaccination. She had no known traditional risk factors. In the six months before the manifestation of her disease, she had not been sexually active nor had an occupational blood exposure. She did not receive any blood products or blood transfusions. She had no history of IV drug use or hemodialysis. She had no household contact with a person with hepatitis B. She did recover from her HBV infection.

## Red Flags

What was interesting about this case were two pieces of information that alerted officials. First, as stated above, the index case had no known risk factors, but she did have oral surgery October 10, 2001. This started the epidemiological investigation. Secondly, officials had access to a confidential HBV registry kept by the DOH. Cross-referencing the registry with a list of patients treated at the oral surgery center, they found a known HBV chronic carrier who had oral surgery at the center the same morning as the index patient. The chronic carrier was operated on first, and 161 minutes later, the index patient had her procedure performed.

## Remember

High standards of professional practice protect the patient, the employee, and the practitioner.

## Similarities

The same oral surgeon and assistants treated both the source patient and the index patient in the same operative suite. Both patients had uncomplicated extractions of teeth. Three patients had oral surgery between the source patient and the index patient. Of the three assistants, one scrubbed in, one circulated and one held the patient's head and monitored the anesthesia. All maintained their same duties for all five surgeries. Both the source patient and the index patient received identical intravenous anesthetic (the source patient received two additional medications) from multiple-dose vials. The source patient received oxygen from a reusable rubber nasal mask. The same type of local anesthetic was used. The index patient also received nasal oxygen.

## Testing

Molecular epidemiologic techniques were used in this investigation. Research of the medical records on the source patient indicated she was a HBV chronic carrier with a high viral load at the time of surgery. DNA sequencing indicated an identical match between the source patient and the index patient. Patients, who were seen that week for oral surgery after the source patient's procedures, were notified by the oral surgeons to expect contact from the DOH. Patients were tested for HBV, Hepatitis C (HCV) and Human Immunodeficiency Virus (HIV). 25 of 27 patients were tested. 64% of the patients had been vaccinated against HBV. Of the patients who tested positive for Hepatitis B surface antigen, a sign of infection, their blood samples were further tested to determine if there were DNA matches to the source patient. No additional cases were found. All employees involved in

direct patient care were tested serologically. Of the 15 employees tested, 14 had received three doses of the Hepatitis B vaccine. None of the employees tested positive for HBV infection. No patients or employees tested positive for HCV or HIV.

## No "Smoking Gun"

A thorough on-site investigation revealed no apparent breaches in technique. They found a clean and modern facility. Personal protective equipment was changed between patients. Appropriate disposable coverings were used to cover equipment and changed between cases. Surface disinfectants were used appropriately between patient procedures. Rubber nasal masks were cleaned then disinfected according to manufacturers' instructions. Particular attention was paid to the way the intravenous medications were handled. Medications were found to be drawn up in a separate medication room using appropriate technique with strict one-way flow of needles. No needles were reused. No improper technique was observed. Handpieces were sterilized between use and handpiece motors were covered with disposable plastic barriers. Surgical instruments were manually washed with a soap and bleach solution and then autoclaved. Instruments were removed from surgical packs and placed on trays, covered and placed in clean storage before use.

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## Conclusions

As there was no direct observation of the procedures at the time of transmission, the investigators could only speculate as to what was the cause. During the on-site investigation, observed procedures were not found to be deficient in infection control practices. Hepatitis B is a hardy organism that can survive over a week on surfaces even in the absence of visible blood. As the source patient was found to have a high viral load at the time of her surgery, it is theorized that perhaps that an environmental surface was contaminated with her blood and passed onto the index patient due to inadequate cleaning and disinfection. The fact that a majority of the patients and the staff received Hepatitis B vaccinations helped to prevent a higher morbidity.

## Hepatitis

Hepatitis is an Inflammation of the liver caused by bacterial or viral infections, parasitic infestation, alcohol, drugs, chemical exposure or incompatible blood transfusion. In dentistry, our concern is with viral, bloodborne hepatitis as it can be spread patient to the dental health care worker (DHCW), DHCW to patient, and patient to patient. The greatest risk is from patient to DHCW. There are several types of viral infectious hepatitis:

- Bloodborne
  - Hepatitis B (HBV)
  - Hepatitis C (HCV)
  - Hepatitis D (HDV) delta virus
  - Hepatitis F (hepatitis B mutant)
  - Hepatitis G
- Enteric (fecal/oral)
  - Hepatitis A (HAV)
  - Hepatitis E (HEV)

## Testing

Defining testing For HBV can be extremely complicated. I would like to simplify it and just address two portions of the HBV panel that I feel are the most important to know:

### Hepatitis B Surface Antibody (Anti-HBs)

- A positive result represents Immunity to HBV by either vaccination or recovery from the disease.
- A negative result implies no immunity.

### Hepatitis B Surface Antigen (HBsAg)

- A positive result represents acute or chronic illness with HBV. The person is infectious and can transmit the disease to susceptible persons.

## Prevention

**Vaccinations:** Presently, we only have vaccines available for Hepatitis A and B. Hepatitis B and C are the two most common bloodborne diseases in the dental environment. These diseases can be transmitted by poor infection control practices. Of the two, HBV is much easier to transmit. It produces a high viral load and can cause infection at least 30% of the time when transmitted from a source patient to a susceptible person through a bloodborne exposure. There is a 3% chance with Hepatitis C under similar circumstances. The greater risk is then HBV. Vaccination for HBV has reduced healthcare workers' risk to the disease over 90%, bringing it below the general population risk.

**Standard Precautions According to the CDC:** "Standard Precautions combine the major features of Universal Precautions (UP) and Body Substance Isolation (BSI) and are based on the principle that all blood, body fluids, secretions, excretions except sweat, nonintact skin, and mucous membranes may contain transmissible infectious agents. Standard Precautions

include a group of infection prevention practices that apply to all patients, regardless of suspected or confirmed infection status, in any setting in which healthcare is delivered. These include: hand hygiene; use of gloves, gown, mask, eye protection, or face shield, depending on the anticipated exposure; and safe injection practices. Also, equipment or items in the patient environment likely to have been contaminated with infectious body fluids must be handled in a manner to prevent transmission of infectious agents (e.g., wear gloves for direct contact, contain heavily soiled equipment, properly clean and disinfect or sterilize reusable equipment before use on another patient)."

**Aseptic Technique** is the process of inhibiting the growth and multiplication of microorganisms. To further define aseptic technique, we usually refer to two separate categories, surgical and medical. **Surgical aseptic technique** refers to the process of rendering and keeping objects and areas free of all microorganisms. The goal is to achieve the elimination of all microorganisms. **Medical aseptic technique** refers to the practice of reducing the transfer of pathogens from one person to another either directly or indirectly. Medical asepsis, through a clean environment, is the state of being free of pathogenic organisms. Reducing the bioburden to safe levels is also a goal of medical asepsis; in other words, if there are not as many bugs, you lower the chance of infection.

In dentistry, we use a combination of both surgical and medical aseptic technique. Sometimes, to my dismay, little attention is spent on surgical asepsis as "the mouth

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is not sterile.” Then the lines fade to gray as to what is necessary to keep the environment safe for our patients. What we need to address is how we decide when to **sterilize**, when to **disinfect** and when to just **clean** when we are reusing patient care items. The easiest way to do this is put the patient care items in four categories: critical, semicritical, non-critical and environmental. **Always, always clean the item first before disinfection or sterilization.**

**Critical items** are those items which will come in contact with sterile body areas. In dentistry, this means if the procedure is invasive, beyond intact mucous membranes, you must use instruments that are heat sterilized. They must be wrapped and sterilized and the packages not opened until time of use. An example of this would be an explorer or surgical instrument. In dentistry, all dental instruments capable of heat sterilization come under this category. **Semicritical items** are those items which come in contact with intact mucous membranes. An example would be an impression tray. However, in dentistry, many times we are using an impression tray with non-intact mucous membranes so it would be best to sterilize the reusable tray or use a clean single-use disposable tray. **Noncritical items** contact only unbroken skin or make no contact with the patient. Noncritical items must be kept clean and sanitary. An example would be

the dental chair. **Environmental surfaces** that have no direct contact with the patient must be cleaned and then disinfected if contaminated with bioburden. Examples are countertops.

## And Finally... Kay's Two Cents

I would not venture a guess as to what caused the transmission at the oral surgery center. However, I would like to share some of my thoughts on oral surgery practice. And yes, according to Karen Lewis, M.D., Epidemiologist for the Arizona Department of Health Services, Arizona has a chronic HBV registry. It can be used to identify possible sources of infection in an outbreak of public health importance.

**Instrument Washing:** Surgical instruments should be cleaned either in ultrasonic machines using enzymatic cleaners or in FDA approved dental washers. After the mechanical cleaning, instruments should be examined for any remaining biological debris. It is usually the bone files that may still have material in them along with hinged instruments that have been kept closed. A long-handled brush should be used to remove the remaining debris. No handwashing of instruments should occur before mechanical cleaning. United States Department of Labor Occupational Safety & Health Administration (OSHA) law considers this putting the employee at risk for bloodborne pathogen infection.

## Summary

### Tools to prevent the transmission of Hepatitis B

- HBV Vaccination
- Standard Precautions
- Aseptic Technique

**Oral Surgery Set-ups:** The instruments should remain intact in sterile surgical wrap until time of use. The pack should be opened at chair side immediately before surgery. Taking instruments out of sterile packs, placing them on trays and then in storage negates their sterility.

**Disposable/Single Use Items:** When possible, single-use disposable items such as nasal hoods should be used for patient care items to avoid disease transmission.

**Irrigating Solutions:** Irrigating solutions should be drawn up at chair side at the time of surgery. A sterile syringe and a sterile solution unit intended only for the individual patient should be used. Bulk filling of syringes, kept only in clean storage cannot be considered sterile at time of use.

## To obtain CE Credit

Turn to page 60 for your “Infection Control Corner” CE quiz!

Successful completion entitles respondent to one hour of CE credit through the Arizona Dental Association (AzDA). There is a \$20.00 processing fee for each test submitted. A portion of the proceeds will go to the Arizona Dental Foundation. Incomplete tests will not be processed. Check the answers you believe to be correct for each question. AzDA is a Continuing Education Recognition Program (CERP) provider conducted under the auspices of the American Dental Association.

Turn to page 60 for quiz and complete instructions!

**KAY CARL IS BOARD CERTIFIED IN INFECTION CONTROL AND EPIDEMIOLOGY. SHE HAS OVER 30 YEARS EXPERIENCE IN INFECTION CONTROL AND HAS WORKED IN COLLABORATION WITH AZDA SINCE 1991 TO PROVIDE CONTINUING EDUCATION IN OSHA, INFECTIOUS DISEASES AND INFECTION CONTROL. SHE IS AN ACTIVE MEMBER OF OSAP, THE NATIONAL DENTAL INFECTION CONTROL ASSOCIATION, AND A PROLIFIC CONTRIBUTING AUTHOR AND EDITOR FOR VARIOUS INDUSTRY PRINT AND ELECTRONIC MEDIA.**

# INFECTION CONTROL CORNER QUIZ

## To obtain CE Credit

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**Complete the quiz  
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A portion of the proceeds from "Infection Control Corner" CE quizzes will go to the Arizona Dental Foundation (ADF) which directs its efforts toward community-related activities that expand AzDA's ability to bring much-needed dental care to underserved populations in Arizona. Processing fee is deductible only to the extent allowed by law; consult your tax advisor for details.

1. A positive Hepatitis B Surface Antibody (Anti-HBs) may indicate that the patient has:
  - a. Immunity to Hepatitis B by getting a vaccination series
  - b. Been infected with Hepatitis B and has recovered
  - c. Both a and b
  - d. None of the above
2. Before disinfection or sterilization, one must first do what?
  - a. Soak the item in bleach
  - b. Clean the item
  - c. It is not necessary to clean first before you disinfect or sterilize.
  - d. Both a and b
3. Which of the following are known traditional risk factors for HBV?
  - a. IV drug use
  - b. Blood transfusions
  - c. Occupational blood exposure
  - d. All of the above
4. Surgical aseptic technique refers to the process of:
  - a. Rendering and keeping objects and areas free of all microorganisms
  - b. Achieving the elimination of pathogenic microorganisms
  - c. Keeping the surgical arena clean as possible
  - d. None of the above
5. The following types of hepatitis are bloodborne:
  - a. Hepatitis B (HBV)
  - b. Hepatitis C (HCV)
  - c. Hepatitis F (hepatitis B mutant)
  - d. All of the above
6. The following types of hepatitis are transferred by fecal/oral contact:
  - a. Hepatitis A
  - b. Hepatitis B
  - c. Hepatitis C
  - d. Hepatitis D
7. If an environmental surface is contaminated with blood or body substances:
  - a. It should be cleaned then disinfected.
  - b. It should be cleaned then left overnight to air dry.
  - c. It is not necessary to clean it as it is not going to come into direct contact with the patient.
  - d. None of the above
8. If a patient tests positive for Hepatitis B Surface Antigen (HBsAg):
  - a. There is no need to worry; the patient has recovered from HBV.
  - b. The patient has developed immunity to HBV by vaccination and is noninfectious.
  - c. The patient has been infected with HBV and is either in the acute or chronic stage.
  - d. The patient is susceptible to HBV infection.
9. The following statement(s) is(are) true:
  - a. In dentistry, we do not need to worry about disease transmission, it cannot be traced back to a dental procedure.
  - b. We need to employ all current infection control techniques to protect our patients.
  - c. DNA sequencing can track transmission of disease in the dental environment.
  - d. b and c
10. To prevent Transmission of HBV in the dental setting, which of the following is true?
  - a. Antibiotics are a safe and effective method to prevent the spread of HBV in the dental office.
  - b. We should test all patients for bloodborne diseases before treatment.
  - c. Aseptic technique should be used in the treatment of dental patients.
  - d. Changing personal protective equipment between each patient prevents all transfer of infectious disease.

**Please send my CE certificate:**  Electronically (must provide email address)  By Mail

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