

## Transmission and post-exposure management of bloodborne virus infections in dental practice

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Occupational exposure to bloodborne pathogens is a well-recognised hazard to health care workers. Transmission is most likely to be from patient to Dental Health Care Personnel (DHCP), who frequently contacts blood and blood-contaminated saliva during dental procedures. Exposures that might place DHCP at risk of HBV, HCV, or HIV infection include percutaneous injuries (eg, a needlestick or cut with a sharp object), or contact with potentially infectious blood, tissues, or other body fluids. This review will focus upon the available pertinent scientific information concerning the transmission and post-exposure management of hepatitis B (HBV), hepatitis C (HCV) and HIV in the dental health care setting.

### INTRODUCTION

Exposure to bloodborne pathogens including hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV) is a significant occupational hazard among health care workers, and percutaneous injuries pose the greatest risk of infection.<sup>1,2</sup> Health care workers (HCWs) suffer between 600,000 and one million injuries from conventional needles and sharps annually.<sup>3</sup> These exposures can lead to hepatitis B, hepatitis C and HIV, the virus that causes AIDS. At least 1,000 HCWs are estimated to contract serious infections annually from needlestick and sharps injuries. Dentists are in danger of both contracting diseases from their patients and infecting patients with pathogenic organisms carried by them or transmitted from other patients.<sup>4</sup> Infections may be transmitted in the dental operatory through several routes, including direct contact with blood, oral fluids, or other secretions; indirect

contact with contaminated instruments, operatory equipment, or environmental surfaces; or contact with airborne contaminants present in either droplet spatter or aerosols of oral and respiratory fluids.

Needlestick injuries are wounds caused by needles that accidentally puncture the skin. Needlestick injuries are a hazard for people who work with hypodermic syringes and other needle equipment. These injuries can occur at any time when people use, disassemble, or dispose of needles. When not disposed of properly, needles can become concealed in linen or garbage and injure other workers who encounter them unexpectedly.

The prevention of HBV, HCV and HIV transmission in the health care setting depends on the practice of infection control measures based on the principles of standard precautions, provision of personal protective equipment and safety devices, and implementation of safer procedures such as avoidance of needle recapping and sharps disposal

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in designated containers. Management after exposure occurs involves provision of first aid, reporting, risk assessment, counselling and additional procedures specific to individual pathogens implicated. It is important that those responsible for management should familiarise themselves with the principles and procedures involved.

Post-exposure management is an integral component of a complete program to prevent infection after an occupational exposure to blood. During dental procedures, saliva is contaminated with blood.<sup>5</sup> Even when blood is not visible, it can still be present in limited quantities and therefore is considered a potentially infectious material by OSHA.<sup>6</sup> A qualified health-care professional should evaluate any occupational exposure incident to blood, including saliva, regardless of whether blood is visible in dental settings.

The main risk posed by needle-stick injury to workers is exposure to blood-borne viruses (BBV). The main viruses concerned are:

- Hepatitis B virus (HBV)
- Hepatitis C virus (HCV)
- Human immunodeficiency virus (HIV)

**Table 1.** Characteristics of hepatitis viruses causing disease in humans

Virus	Family	Nucleic acid type	Chronicity	Main known routes of transmission
HAV	Picornavirus	RNA	No	Fecal-oral
HBV	Hepadnavirus	DNA	Yes 3-5%	Sexual contact, parenteral
HCV	Flavivirus	RNA	Yes >85%	Parenteral, sexual contact
HDV	Satellite	RNA	Yes 20-70%	Sexual contact, parenteral
HEV	Calicivirus	RNA	No	Fecal-oral

## Hepatitis B

Hepatitis B poses the greatest risk to health care workers following needlestick injuries. Depending on the infectivity of needles contaminated with blood containing HBV, the risk of developing clinical hepatitis if the blood was positive for both HBsAg and HBeAg was 22%-31% and the risk of developing serologic evidence of HBV infection was 37%-62%.<sup>3</sup>

## Mode of Transmission

Although percutaneous injuries are among the most efficient modes of HBV transmission, these exposures probably account for only a minority of HBV infections among health care personnel (HCP). In multiple investigations of nosocomial hepatitis B outbreaks, the majority of infected HCP could not recall an overt percutaneous injury,<sup>7,8</sup> although in certain studies, approximately one third of infected HCP recalled caring for a patient who was HBsAg-positive.<sup>9</sup>

Blood contains the greatest proportion of HBV infectious particle titers of all body fluids and is the most critical vehicle of transmission in the health-care setting. HBsAg is also found in multiple other body fluids including breast milk, bile, cerebrospinal fluid, feces, nasopharyngeal washings, saliva, semen, sweat and synovial fluid. However, the majority of body fluids are not efficient vehicles for transmission because they contain low quantities of infectious HBV despite the presence of HBsAg.<sup>10</sup> The concentration of HBsAg in body fluids can be 100 to 1000-fold greater than the concentration of infectious HBV particles.<sup>11</sup>

In addition, HBV has been demonstrated to survive in dried blood at room temperature on environmental surfaces for  $\leq 1$  week.<sup>12</sup> Thus, HBV infections that occur in HCP with no history of nonoccupational exposure or occupational percutaneous injury might

have resulted from direct or indirect blood or body fluid exposures that inoculated HBV into cutaneous scratches, abrasions, burns, other lesions, or on mucosal surfaces.<sup>13</sup>

HBV is transmitted by percutaneous or mucosal exposure to blood or body fluids of a person with either acute or chronic HBV infection.<sup>14</sup> Persons infected with HBV can transmit the virus for as long as they are HBsAg-positive.

**Table 2.** Serologic markers for HBV and their significance

Serologic marker	Significance
Hepatitis B surface antigen (HbsAg)	Indicates chronic or active HBV carrier status.
Antibody to hepatitis B surface antigen (anti-HbsAg)	Indicates immunity to HBV.
Antibody to hepatitis B core antigen (anti-HbcAg)	Indicates exposure to HBV.
Immunoglobulin M antibody to hepatitis B core antigen (IgM-HbcAg)	Indicates acute infection with HBV or active disease during flare-up in a chronic HBV carrier.
Immunoglobulin G antibody to hepatitis B core antigen (IgG-HbcAg)	Indicates exposure to HBV and possible carrier state.
Hepatitis B e antigen (HbcAg)	Indicates active HBV replication and infectivity.
Antibody to hepatitis B e antigen (anti-HbeAg)	Indicates resolved HbeAg viremia.
HBV DNA	Indicates active HBV replication and infectivity

### Course of the Disease

Hepatitis B has an incubation period of about 2-6 months with inflammation of the liver usually without a high fever (acute hepatitis). During the latter half of the incubation period, the blood and saliva become infectious (i.e., contain complete virions). The acute phase lasts about 2 months and then the numbers of virions and surface antigen drop and high levels of antibodies to the core antigen develop. Antibodies to the surface antigen do not

develop until a number of weeks after the surface antigen is no longer detectable in the blood but they can persist for several years.

Serum from patients with clinical hepatitis B contains three types of viral particles:

- Complete virions (Dane particles) - complete viral units comprised of partially double stranded circular DNA surrounded by a protein core (HBcAg) and enclosed in an outer layer of surface antigen (HBsAg)
- Spherical particles - HBsAg only
- Tubular particles - aggregations of spherical particles
- Occasionally some patients also have hepatitis B e antigen (HBeAg)

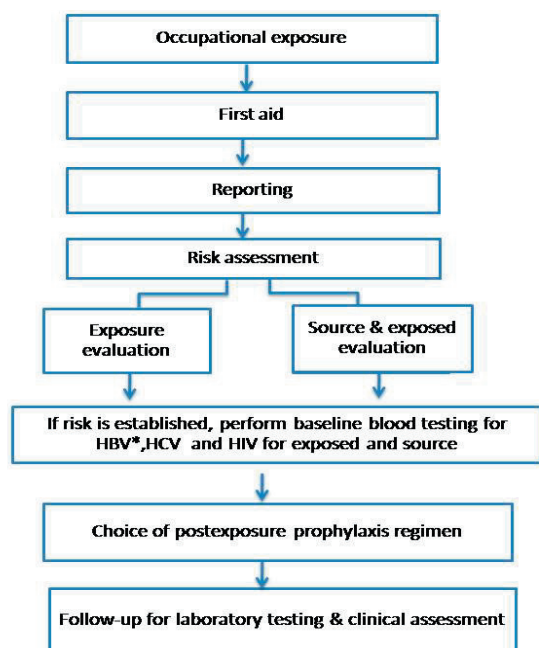
### Preventive Strategies

Because of the high risk of HBV infection among HCP, DHCP who perform tasks that might involve contact with blood, blood-contaminated body substances, other body fluids, or sharps should be vaccinated.<sup>10,15</sup> Vaccination can protect both DHCP and patients from HBV infection and, whenever possible, should be completed when dentists or other DHCP are in training and before they have contact with blood. Prevacination serological testing for previous infection is not indicated, although it can be cost-effective where prevalence of infection is expected to be high in a group of potential vaccinees. DHCP should be tested for anti-HBs 1-2 months after completion of the 3-dose vaccination series. DHCP who do not develop an adequate antibody response (i.e., anti-HBs <10 mIU/mL) to the primary vaccine series should complete a second 3-dose vaccine series or be evaluated to determine if they are HBsAg-positive. Revaccinated persons should be retested for anti-HBs at the completion of the second vaccine series.

Vaccine-induced antibodies decline gradually over time and 60% of persons

who initially respond to vaccination will lose detectable antibodies over 12 years. Even so, immunity continues to prevent clinical disease or detectable viral infection. Booster doses of vaccine and periodic serologic testing to monitor antibody concentrations after completion of the vaccine series are not necessary for vaccine responders.<sup>10</sup>

**Table 3.** Post-exposure (occupational) management of HBV, HCV and HIV infection.



### Post-exposure Management of HBV

Persons who prove to be HBsAg-positive should be counseled regarding how to prevent HBV transmission to others and regarding the need for medical evaluation. Nonresponders to vaccination who are HBsAg-negative should be considered susceptible to HBV infection and should be counseled regarding precautions to prevent HBV infection and the need to obtain HBIG prophylaxis for any known or probable parenteral exposure to HBsAg-positive blood.

The hepatitis B vaccine is an effective way to decrease the risk of developing these problems after a needlestick

injury. The current hepatitis B vaccine is manufactured through recombinant DNA technology. In the past, the vaccine was produced from human serum, and there was concern that it could lead to the transmission of infectious agents. The current vaccine does not pose this theoretical risk. The vaccine, which is available at hospital occupational health units, is usually administered for free. Unfortunately, many health care workers who are at potential risk, i.e., those that have potential contact with blood and body fluids have not taken advantage of the availability of the vaccine.

The vaccine is administered in a three dose schedule with the initial two doses one month apart and the third dose six months after the first. The vaccine should not be administered to individuals who have yeast allergies. The most common side effect is local pain at the site of injection. Some people report fatigue and fever. The frequency of complaints is somewhat lower following the second and third doses. Most individuals respond to the vaccine. However, approximately 10% do not develop adequate antibody responses between 30 and 50% of these people respond to a second series.

Another way to decrease the risk of developing hepatitis after a needlestick injury is by an injection of hepatitis B immune globulin (HBIG), a blood product that contains antibodies against hepatitis B. This should be given to those individuals with an inadequate antibody response to the vaccine after a needlestick injury or those who have not been vaccinated.

Recommendations for hepatitis prophylaxis following needlestick injuries depend on the following factors:

- the worker's hepatitis B vaccination state
- level of antibody response in the worker
- whether the hepatitis B status of the source is known or unknown.

The need for a booster series in individuals who have responded to vaccine is an area of current research and is not routinely recommended at this time.

**Table 4.** Post-exposure management of Hepatitis B Virus infection

Exposed Worker	HbsAg-positive	HbsAg-negative	Unknown or not tested
<b>Unvaccinated</b>	1. Initiate hepatitis B vaccine - AND - 2. Worker should receive a single dose of hepatitis B immune globulin (HBIG) as soon as possible and within 24 hours, if possible.	Initiate hepatitis B vaccine	Initiate hepatitis B vaccine
<b>Previously Vaccinated<sup>a</sup></b>	No treatment	No treatment	No treatment
<b>Known Responder</b>			
Known			
Nonresponder	1. Worker should receive 2 doses HBIG (give second dose 1 month after the first dose) - OR - 2. Worker should receive 1 dose HBIG hepatitis B vaccine	No treatment	If known high-risk source, may treat worker as if source were HbsAg-positive
<b>Response Unknown</b>	Test exposed worker for anti-HbsAg: 1. In inadequate, 1 dose HBIG plus hepatitis B vaccine booster dose 2. If adequate, <sup>c</sup> no treatment	No treatment	Test exposed worker for anti-HbsAg: 1. If inadequate, initiate revaccination. 2. If adequate, <sup>c</sup> no treatment

a. Being "exposed to blood" means having blood, blood-contaminated saliva, or a blood-contaminated object come into contact with broken skin or mucous membranes, or pierce the skin as through a needlestick injury.

b. Exposed worker has already been vaccinated against hepatitis B.

c. Adequate anti-HbsAg is 10 milli-international units.

## Hepatitis C

Hepatitis C is one of the fastest growing infectious diseases and is the most common blood-borne infection in the United States and Australia.<sup>16</sup> HCV is an RNA virus, which is structurally unrelated to other hepatitis viruses. There are at least six major genotypes of hepatitis C. The specific genotype that an individual

is infected with may affect the detection of the virus, the natural history of the disease and the effectiveness of antiviral treatment.<sup>17</sup>

Infected individuals develop antibodies to HCV that can be detected serologically. These antibodies are markers of infection but do not confer immunity and only 10 percent to 15 percent of acutely infected individuals have a self-limited disease. Only 25 percent to 35 percent of individuals with acute HCV infections will exhibit clinical symptoms — such as malaise, anorexia and jaundice - which may appear on an average of six to seven weeks after exposure. This low rate of clinical disease contributes to the high incidence of infected individuals not being aware of their infectious status. The major causes of death secondary to chronic HCV infection are cirrhosis, liver failure, and Hepato Cellular Carcinoma (HCC).

## Transmission

Hepatitis C is potentially transmitted through blood products. Needlestick injuries, which commonly occur in the health care setting, can lead to transmission of the hepatitis C virus. The risk of transmission of hepatitis C is between 3-10% after a needlestick injury. The chances of transmitting the hepatitis C virus through a needlestick are greater than the HIV virus. There is also evidence to suggest that transmission rates may be higher if a person with hepatitis C is coinfecting with HIV or other sexually transmitted diseases.<sup>18</sup> Transmission of the hepatitis C virus by saliva alone is a remote possibility unless the saliva is contaminated with blood.<sup>19</sup>

HCV transmission from patients to health care workers has been documented.<sup>20</sup> HCV RNA can also be found in saliva from HCV-positive individuals and it has been suggested that transmission of HCV has occurred through human bites.<sup>21</sup> The probability of

transmission may depend on the infectivity (viral load levels) of the infected person. Although dentists are exposed to both saliva and blood, epidemiological studies have not indicated that dentists are at an increased occupational risk of contracting HCV.<sup>22,23</sup> The seroconversion rate after a percutaneous injury varies from 0 percent to 7 percent but may be higher, possibly dependent on geographical variations and infectivity of the patient.<sup>24</sup> HCV RNA has been detected on surfaces in a dental operatory after treatment of an HCV-infected patient.<sup>25</sup> Although HCV RNA can be detected on surfaces in room temperature for up to five days, it is not clear if inert contaminated objects can transmit HCV.

### Course of the Disease

Hepatitis C is a virus that causes serious damage to the liver and can be fatal. Infection can occur without symptoms or only mild ones. Chronic hepatitis develops in 75-80 percent of infected patients and 70 percent of these individuals get active liver disease. Of those with active liver disease, 10-20 percent develops cirrhosis and 1-5 percent develops liver cancer.

Extra hepatic manifestations of HCV have been reported. Two of these conditions are of interest to dentists — lichen planus and a Sjogren-like syndrome. Several studies have suggested that individuals with lichen planus have a high prevalence, 34 percent to 62 percent, of HCV.<sup>26,27</sup> Furthermore, patients with chronic HCV infections have been found to have a higher prevalence of lichen planus compared with the general population.<sup>23</sup>

### Post-exposure Management of HCV

In cases of percutaneous injuries, no prophylaxis is recommended because no post-exposure measures have shown to be effective.<sup>28</sup> It appears that for interferon to have a beneficial response, an established infection need to be present. There are

no standardized assays to determine infectivity. Furthermore, it is not known what concentration of HCV is necessary to establish infection. The course of action is usually watchful waiting, with periodic monitoring of the viral load to assess the risk of HCV transmission.

Treatment of HCV infection with interferon has not shown long-term efficacy and seems to be a function of its genotype. HCV type 1 is associated with more progressive liver disease and poor response to interferon treatment.<sup>29</sup> Combination therapy with interferon and ribavirin may have a beneficial effect on disease progression. Recent studies have indicated that initial treatment, as well as treatment of patients after relapse of chronic HCV infection, with interferon and ribavirin may produce a sustained undetectable viral load.<sup>30</sup>

### HIV Infection and AIDS

Acquired Immunodeficiency Syndrome (AIDS) is caused by the human immunodeficiency virus (HIV). HIV preferentially infects cells bearing the CD4 surface receptor which comprise mainly T-helper cells. As these T-helper cells are killed by the virus the ratio of T-helper cells to T-suppressor falls and immune suppression results. The immune suppression increases the susceptibility to secondary infections and cancer which eventually cause death.<sup>31</sup>

The potential for occupational acquisition of AIDS is a tremendous concern for healthcare workers.<sup>32</sup> Following a deep puncture with a needlestick contaminated with HIV, the virus associated with AIDS, the risk of contracting HIV is approximately one in 250. The risk of transmission of the virus through broken skin or mucous membrane contact with contaminated body fluids is lower but still present.<sup>33</sup>

Unlike hepatitis B, there is no vaccine or immune globulin which would decrease

the risk of contracting the disease. Individuals who have received a needlestick injury from an HIV positive patient should go to the occupational health unit at their institution for counseling. They should be offered the HIV antibody test and explained the pros and cons of testing. Should they elect to have testing, it is typically repeated at three and six months to assess for changes in the HIV antibody status.

HCWs with occupational exposure to HIV should receive follow-up counseling, post-exposure testing and medical evaluation regardless of whether they receive post-exposure prophylaxis (PEP). HIV-antibody testing should be performed for at least 6 months post-exposure (e.g., at 6 weeks, 12 weeks and 6 months). It is unclear whether an extended follow-up period (e.g., 12 months) is indicated in certain circumstances. Although rare instances of delayed HIV seroconversion have been reported,<sup>34</sup> the infrequency of this occurrence does not warrant adding to HCWs' anxiety by routinely extending the duration of postexposure follow-up. Circumstances for which extending the duration of follow-up have been suggested include the use of highly potent antiretroviral regimens (i.e., more than two drugs) because of theoretical concerns that HIV seroconversion could be delayed or simultaneous exposure to HCV. Data are insufficient for making a general recommendation in these situations. However, this should not preclude a decision to extend follow-up in an individual situation based on the clinical judgment of the HCW's health-care provider. HIV testing should be performed on any HCW who has an illness that is compatible with an acute retroviral syndrome, regardless of the interval since exposure. HIV-antibody testing using EIA should be used to monitor for seroconversion.

The routine use of direct virus assays to detect infection in exposed HCWs generally

is not recommended.<sup>35</sup> Although direct virus assays may detect HIV infection a few days earlier than EIA, the infrequency of HCW seroconversion and increased costs of these tests do not warrant their routine use in this setting.

### **Counseling and Education**

Although HIV infection following an occupational exposure occurs infrequently, the emotional impact of the exposure often is substantial.<sup>36</sup> In addition, HCWs are given seemingly conflicting information. Therefore, access to persons who are knowledgeable about occupational HIV transmission is an important element of post-exposure management. HIV-exposed HCWs should be advised to use the following measures to prevent secondary transmission during the follow-up period, especially during the first 6 -12 weeks after the exposure when most HIV-infected persons are expected to sero-convert: use sexual abstinence or condoms to prevent sexual transmission and to avoid pregnancy and refrain from donating blood, plasma, organs, tissue or semen. If the exposed HCW is breastfeeding, she should be counseled about the risk for HIV transmission through breast milk and discontinuation of breastfeeding should be considered, especially following high-risk exposures. If the HCW chooses to receive PEP, temporary discontinuation of breastfeeding while she is taking PEP should be considered to avoid exposing the infant to these agents.

There is no need to modify an HCW's patient-care responsibilities to prevent transmission to patients based solely on an HIV exposure. If HIV seroconversion is detected, the HCW should be evaluated according to published recommendations for HIV-infected HCWs.<sup>37</sup>

Exposed HCWs should be advised to seek medical evaluation for any acute illness that occurs during the follow-up period. Such an illness, particularly

if characterized by fever, rash, myalgia, fatigue, malaise, or lymphadenopathy, may be indicative of acute HIV infection but also may be due to a drug reaction or another medical condition. Exposed HCWs who choose to take PEP should be advised of the importance of completing the prescribed regimen. Information should be provided about potential drug interactions and the drugs that should not be taken with PEP, the side effects of the drugs that have been prescribed, measures to minimize these effects, and the methods of clinical monitoring for toxicity during the follow-up period. They should be advised that the evaluation of certain symptoms should not be delayed (e.g., back or abdominal pain, pain on urination or blood in the urine, or symptoms of hyperglycemia [i.e., increased thirst and/or frequent urination]).

### **Prevention of Occupational and Nosocomial Exposure**

#### **Standard Precautions**

Standard precautions are infection control measures that reduce the risk of transmission of blood-borne pathogens through exposure to the blood or other body fluids of patients and health care providers. As it is not possible to identify everyone who may be infected with a bloodborne pathogen, protecting HCWs and patients against HIV and hepatitis viruses should be based on the concept that all patients and HCWs are assumed to be infected with bloodborne diseases.

The application of standard precautions requires that all blood and other body fluids should be regarded as potentially infectious and appropriate protective action taken. To help protect HCWs and patients from bloodborne infections, including HIV, WHO advises that standard infection control precautions be used.

#### **Recapping**

Recapping of needle can account for 25 to 30 percent of all needlestick injuries of nursing and laboratory staff. Often, it is the single most common cause.

It is extremely dangerous to hold a needle in one hand and attempt to cover it with a small cap held in the other hand. Injuries occur three different ways:

- the needle misses the cap and accidentally enters the hand holding it.
- the needle pierces the cap and enters the hand holding it.
- the poorly fitting cap slips off of a recapped needle and the needle stabs the hand.

Several agencies have recommended that workers avoid recapping needles before disassembly or disposal. Despite this, some health care workers have continued the practice even when informed of the dangers. In some cases, inappropriate training or force of habit may be responsible. In a recent study, however, workers gave the following reasons for recapping despite knowing about the potential hazards:

- to protect themselves when disassembling a non-disposable needle device with an exposed contaminated needle.
- to protect themselves from exposed needles when several items were carried to a disposal box in a single trip.
- to store a syringe safely between uses if its contents were to be administered in two or more doses at different times.
- to protect other people in crowded conditions on the way to the disposal box.

Guidelines from the Laboratory Centre for Disease Control recommend that workers do not recap (or bend or cut) needles but dispose of them directly into approved, puncture-proof containers.

### **Safe Recapping Procedures**

In situations where recapping is considered necessary, develop safe approaches which workers can follow. Workers should never move an exposed needle tip towards an unprotected hand. Recapping can be safe when people lay the cap on a flat surface and scoop it onto the tip of a syringe held in one hand. They must keep the free hand away from the sheath and well behind the exposed needle. Several devices are available for recapping needles safely. Some devices permit single-handed recapping by parking a needle cap on a flat surface. Other devices are designed to protect the hand that holds the cap during two-handed recapping procedures. As yet, most products have not received independent testing and the two-handed recapping process remains a cause for concern. Recapping devices require further investigation. They may provide a practical solution for situations where recapping is considered necessary.

### **Safer Needle Device**

A safer needle device has built-in safety controls to reduce needlestick injuries before, during, or after use and to make needlesticks less likely. The needlestick injuries can be reduced by using devices containing needles with built-in safety. In fact, almost 83 percent of injuries from hollow bore needles are potentially preventable.<sup>38</sup>

Needle stick injury amounts to more dental injuries than any other instrument. According to the British Dental Association (BDA), around a third of such injuries are caused by non-disposable syringes which obviously carry concerns about the potential risk of resulting serious

blood borne infections such as HIV and hepatitis B and C. As a result, more and more dental staffs are now opting for safer single use syringes in preference to multi-use options.

The potential for injury occurs when dental professionals recap a used needle with a plastic sheath just before removing it from a multi-use syringe for disposal.

### **Needleguard**

NEEDLE GUARD™ is specifically designed to guide the needle into the sheath so it is completely sealed. NEEDLE GUARD™ is kept with the needle sheath attached to protect the operator's fingers, thus eliminating the possibility of needle sticks. Its unique shape prevents the NEEDLE GUARD™ from moving during recapping.

NEEDLE GUARD™ is a safe, economical, efficient deterrent against AIDS and Hepatitis B cross infection by preventing accidental needle sticks. NEEDLE GUARD™ has been designed with the safety of you and your staff in mind. NEEDLE GUARD™ helps satisfy OSHA guidelines by allowing a safe and easy method of recapping a contaminated needle. NEEDLE GUARD™ is designed for efficiency by allowing you to pre-load your syringes on the tray. NEEDLE GUARD™ is autoclaveable and therefore is reusable.

## **CONCLUSION**

The risk of occupationally related blood borne viral infection from patient to dentist or vice versa is exceptionally low. The introduction of universal precautions and hepatitis B immunization by the dental profession has done much to reduce the risks of such occupational infections. The implications of new anti-viral treatments and diagnostic techniques continue to unfold. It is important to keep abreast of these changes since they may impact on dental practice. However, despite this a

situation may arise where a considerable degree of doubt exists about the most appropriate action to take, especially in the setting of general dental practice where expert advice may be particularly difficult to obtain. Written protocols should therefore be readily accessible within the practice to deal with such an eventuality. Regular staff training will do much to reduce the physical and psychological consequences of such an incident.

If you experienced a needlestick or other sharps injury or were exposed to the blood or other body fluid of a patient immediately:

- Wash needlesticks and cuts with soap and water
- Flush splashes to the nose, mouth, or skin with water
- Irrigate eyes with clean water, saline, or sterile irrigants
- Immediately seek medical treatment
- Report the incident to your supervisor

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