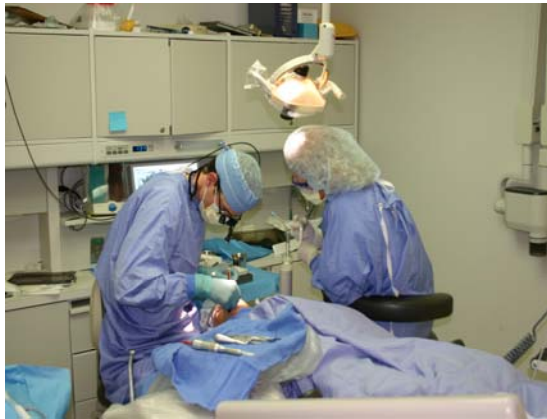




# University of Kentucky College of Dentistry

## Infection Control Manual

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## **Introduction**

### **Plan rationale**

The infection control program at the University of Kentucky College of Dentistry is designed to provide a framework in which dental treatment can be provided in a safe and effective manner. The primary responsibility for designing this program has been delegated to the Safety and Infection Control Committee. However, the true responsibility for implementing the program resides at the level of each clinical unit and is shared jointly by a Local Safety and Infection Control Officer and the Clinical Unit Manager. The Unit Manager, of course, has ultimate responsibility for ensuring the safety of faculty, staff, students, and patients. The Clinic Unit Manager is the faculty member who has ultimate administrative responsibility for the performance of the unit.

Safety, however, is everyone's responsibility and the LSO and Unit Manager cannot ensure a safe workplace without the help and support of everyone in the Unit. The goal of the plan, therefore, is to:

- Protect patients, faculty, staff, and students
- Educate faculty, staff, and students
- Surveillance of treatment-related infections
- Quality assurance / corrective action mechanism
- Local oversight with central input and accountability
- Ensure compliance with regulatory agencies and institutions

### **Standard Precautions or Universal Precautions ?**

For those of you that have had infection control training before, the term "universal precautions" is familiar. The term refers to all the precautions that are taken to ensure safety when dealing with bloodborne pathogens such as hepatitis B and HIV. Recently, the term "universal precautions" has been changed to "standard precautions." Although dental personnel should be familiar with this change in terminology, it has no substantial effect with regard to precautions observed in dentistry.

A term that is also used frequently in this plan is "protocol." Protocols are standardized ways of accomplishing important tasks. If you have ever been certified in Basic Life Support, you have learned protocols for CPR. Protocols are common when people's

safety depends upon jobs being performed correctly. In this manual, you will learn various protocols that are designed to protect the health of you and your patients.

## Abbreviations

Here are some definitions used in this publication:

- IC = Infection Control
- ICP = Infection Control Plan
- LSO = Local Safety and IC Officer
- SIC = Safety and IC Committee
- DHCP = Dental Healthcare Personnel
- DUW = Dental Unit Waterline

## Overview of the Program



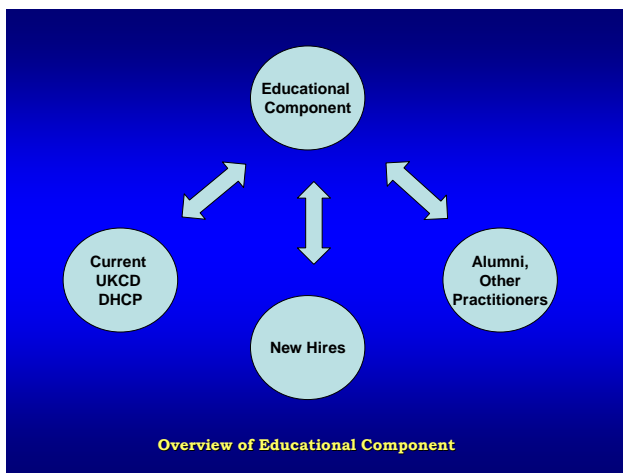
Figure 1: Overview of the Infection Control Program

The cornerstone of the IC Program is **local oversight** by the Clinic Unit Manager and a “Local Safety and Infection Control Officer” or LSO (described below). The Safety and Infection Control Committee (SIC) has oversight over the safety and IC activities of the various clinical units. The SIC is composed of all the LSOs, Clinic Unit Managers, and certain administrative personnel, including the Associate Dean for Clinical Affairs. The SIC coordinates all activities, provides resources, and ensures that all units are in compliance, but the actual implementation of the plan and local quality assurance are provided by the LSOs and Unit Managers.

A prominent piece of the IC Plan is the educational component. This is the mechanism by which UKCD faculty, staff, and students learn the protocols used at UKCD. The educational component includes an infection control manual (which you are now reading) and various other training aids.

The manual consists of a series of modules, each of which consists of background information and written protocols. The protocols specify how various tasks are to be done. For example, there is a protocol that describes how to prepare a treatment room for a patient visit. There is another protocol that describes how a treatment room should be cleaned and cleared after treatment has been completed. This material is found in this manual. It is consistent with federal, state, and UKMC regulations and reflects the best evidence in terms of infection control and disease prevention. Other training resources are available for use by clinical units, including PowerPoint presentations (either online or by SIC staff), videotapes, and a regularly published newsletter. The Safety and Infection Control Newsletter is an important education resource. All DHCP are expected to read this newsletter. Supervisors should post copies in a prominent place.

The educational component (Figure 2 below) is used to educate not only existing dental healthcare personnel (DHCP), but also new hires (as they join the UKCD team). The plan may also be used to provide guidance for alumni and other practitioners or institutions, under some circumstances.



**Figure 2: The Educational Component of the Infection Control Program**

## Programmed Text

The primary training tools for Safety and IC in the College are this manual and a series of online PowerPoint presentations. These slideshows contain essentially the same information as the manual. Part of the manual and slideshow are in a programmed text format. A programmed text is a special type of book that forces you to think and answer questions as you read. It will make learning easier, quicker, and more effective. It will also help you judge how thoroughly you are learning the material. The use of programmed text is not a new technique. It has a long history of positive results in healthcare disciplines such as cardiology (e.g., Dubin's Rapid Interpretation of EKGs) and neuroanatomy (Sldman's Neuroanatomy: A Programmed Text).

Some examples of programmed text are shown below. When you encounter programmed text in the hard copy manual, you should attempt to "fill in the blanks" below, the answers are found at the bottom of the page as footnotes. Here are a few examples:

Programmed text requires that you \_\_\_\_\_ <sup>1</sup> the blanks while reading.

A programmed text forces you to \_\_\_\_\_ <sup>2</sup> while you are reading.

Universal precautions are now referred to as \_\_\_\_\_ <sup>3</sup>.

LSO stands for \_\_\_\_\_ <sup>4</sup> (6 words).

The administrative responsibility for seeing that the infection control plan is implemented resides with the \_\_\_\_\_ <sup>5</sup>.

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<sup>1</sup> fill in

<sup>2</sup> think

<sup>3</sup> standard precautions

<sup>4</sup> Local Safety and Infection Control Officer

<sup>5</sup> Unit Manager

## **The Local Safety and Infection Control Officer (LSO)**

The LSO is responsible for safety and infection control in their clinical unit. LSOs are responsible for seeing that the IC Plan is adhered to and that all individuals receive proper IC training. The LSO will also suggest modifications to the master IC Plan to allow it to “fit” individual units better. All such changes must be approved by the Safety and IC Committee. The LSO is appointed by the Unit Manager of the clinical unit and may be either a staff or faculty member. The important qualities needed in the LSO are an interest in infection control and safety issues and a strong sense of personal responsibility and duty.

Specifically, the LSO must:

- know IC plan
- implement IC plan at local level
- transmit to SIC unit-specific modifications to IC plan (survey)
- attend periodic meetings of the Safety and Infection Control Committee
- implement quality assurance plan (conduct periodic examinations, identify problems, and apply corrective measures)

Implementation of the quality assurance plan includes the following responsibilities:

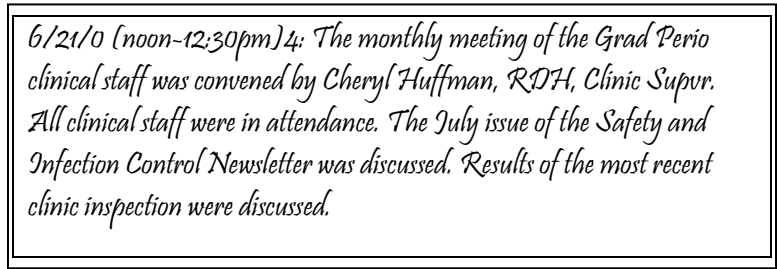
- Credentialing: all staff trained in IC plan
- Unit-level modifications
- Written protocols are realistic and followed
- Weekly inspections conducted with appropriate corrective action taken
- Completion of a periodic IC / Safety Survey

The periodic Safety / IC Survey must be filled out and returned by the specified due date. The LSO and Unit Manager share joint responsibility for the accurate and timely completion of the document, although the ultimate responsibility resides with the Unit Manager. The purposes of the survey are to obtain current information regarding actual IC practices in all units so that compliance can be monitored. A secondary purpose is to reinforce the main points of the Safety and IC plans by forcing the LSO and Unit Manager to consider how effectively the plan has been implemented in their area.

A variety of resources are available to assist the LSO and Unit Manager. These include this written master plan, along with various online resources and forms. This manual will be on the College Safety and IC website and will be accessible by late summer of 2004. It will be updated as needed. When changes are made,

LSOs will be notified in the monthly Safety and IC Newsletter or at periodic Safety and IC Committee meetings.

The Newsletter is distributed 10 times per year. It is distributed as a Word attachment and is also posted on the Safety and IC Website. It must be posted in all workplaces and hard copies must be distributed to those staff who do not have computer access. This distribution is the responsibility of the LSO and Unit Manager. The Newsletter will be the chief mechanism through which important safety information will be distributed to the faculty, staff, and students of the College. Clinical Units shall have monthly staff meetings during which Safety and IC information can be shared. This material can be covered during the normal clinical staff meeting – there is no need to hold a separate meeting for safety and infection control. However, the group must meet monthly to discuss and review these issues. The LSO shall keep a file of minutes of such meetings (an acceptable example is shown in Figure 3 below). The minutes of these meetings shall be kept on-site in the unit and shall be available for inspection by appropriate authorities. A copy of the minutes shall be posted in a conspicuous place in the clinical unit, preferably in close proximity to the SIC Newsletter. It is the ultimate responsibility of the Unit Manager to ensure that such meetings take place and that such minutes are kept.



*6/21/0 (noon-12:30pm)4: The monthly meeting of the Grad Perio clinical staff was convened by Cheryl Huffman, RDH, Clinic Supvr. All clinical staff were in attendance. The July issue of the Safety and Infection Control Newsletter was discussed. Results of the most recent clinic inspection were discussed.*

**Figure 3: Sample clinical staff meeting log.**

The LSO must meet with the clinical staff at least once per \_\_\_\_\_<sup>6</sup> to review safety and infection control issues.

It is not necessary to keep minutes of the meeting if all staff are present (True or false).<sup>7</sup>

<sup>6</sup> month

<sup>7</sup> False. Minutes must be kept and shall be posted in the clinical unit area. Hard copies must be kept on-site in a special file.

## **Scientific Basis for the UKCD Safety and Infection Control Plan**

The plan is based upon the latest guidelines from the Centers for Disease Control and Prevention (CDC), the Occupational Health and Safety Administration, the National Institute for Occupational Health, the American Dental Association, the Organization for Safety and Asepsis Procedures (OSAP), and the Association for Professionals in Infection Control and Epidemiology (APIC). The primary source for the information in this plan is the CDC publication “Guidelines for Infection Control in Dental Health-Care Settings – 2003” (MMWR December 2003;52:1-68).

The Infection Control plan at UKCD is largely based on the \_\_\_\_\_<sup>8</sup>  
(published material; multiple words).

## **Records Maintenance and Security**

As a consequence of the activities of the Safety and IC Committee, certain sensitive and/or confidential information will be collected. Such information will be maintained in secure files in accordance with HIPAA regulations, plus all applicable federal, state, and local regulations. A Safety/IC file will be kept on all individuals and contain immunization records, occupational exposures to BBP, and medical work restrictions. Due to the sensitivity of this information, the highest level of security is needed to protect the integrity of the records and access shall be on a strict need-to-know basis. Responsibility for maintaining the database (which includes, but is not limited to, the credentialing database) resides with the Executive Associate Dean, who shall appoint a staff member to maintain these records.

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<sup>8</sup> Guidelines for Infection Control in the Dental Health-Care Setting: 2003, published by the Centers for Disease Control and Prevention, 2003.

## **Mandatory Infection Control Training**

### **Mandatory IC Training: Who must take it ?**

At the University of Kentucky College of Dentistry, all clinical staff who have contact with patients must undergo mandatory IC Training. This includes most all clinical staff such as assistants, hygienists, and laboratory technicians. It also includes administrative staff who make appointments and discuss financial arrangements with patients, as well as those who handle charts.

If your job is to register patients, you may wonder why you need IC training. You need this because you come in contact with patients or their charts. Patients may transmit diseases such as tuberculosis by coughing in your presence. Charts may be contaminated with viruses or bacteria from patients. A patient may speak to you immediately following surgery and accidentally bleed on the counter.

If your job is to register patients and make appointments, then you \_\_\_\_\_<sup>9</sup> take infection control training.

Each clinical unit shall have meetings to discuss safety and infection control meetings at least once per \_\_\_\_\_<sup>10</sup>.

### **Volunteers and Observers**

Volunteers and observers are a special case. Such individuals must be registered, receive an ID badge, have a tuberculin skin test, and complete some required paperwork. This is done through the Office of Volunteer Services in the Medical Center (phone number: 323-6023; current contact person is Bonnie Thornton). Please note that a volunteer or observer is anyone (other than a clinical faculty, staff, or student member of the College) that is going to spend any time in an area where clinical care is being delivered or a bloodborne (or other) threat exists (this would include most laboratories in the College). The amount of time is irrelevant. It could be as much as a year or as little as one hour. If you have questions about this, please contact Ms. Jarboe at 323-9667.

### **Mandatory IC Training: When should it be taken ?**

All clinical staff must receive mandatory training in safety and infection control. This training must be received shortly after being hired and annually thereafter. The first training exposure should be the bloodborne pathogens training video, which is available through the office of the Safety and Infection Control / Quality

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<sup>9</sup> must

<sup>10</sup> month

Assurance Coordinator (Ms. Glenna Jarboe). At the time this was written, this individual can be reached at 323-9667.

An acceptable alternative is available online at the Environmental Health and Safety website (<http://ehs.uky.edu/classes/bloodborne/bptrain.html>). If a worker chooses to use the website, there is a test that must be taken following the course. When asked for your department, enter "Dentistry" so that you will get appropriate credit for taking the course. The remainder of the Safety / IC Training must be completed within 30 days of the start date. This training consists of either reading this manual or watching the PowerPoint slide show online. Following this self-study, there is a test that must be passed. If you have difficulty accessing this material or reaching a website, please contact the Safety Quality Assurance Coordinator (who at present is Ms. Glenna Jarboe). It should be pointed out that the College Safety and Infection Control Committee considers the online course to be much less desirable for dental healthcare personnel and expects all personnel to attend one of the College-specific updates (which are described in the following paragraph). These are normally given 3-5 times a year, usually in the fall.

In addition to the course taken immediately after being hired, there are annual update sessions sponsored by the UKCD SIC. These are the preferred method of satisfying the ongoing educational requirement. The online course described above can be substituted **only** if it is impossible to attend one of the UKCD sessions. Failure to remain current in IC training can result in suspension of clinical privileges. Continued failure to comply with requirement could lead to dismissal. We take safety and infection control seriously, and we cannot protect faculty, staff, students, or patients unless all UKCD DHCP are properly trained.

### **Mandatory IC Training: Assessment**

Assessment tools are tests that are used to determine whether tasks have been accomplished. In order to ensure that all staff are familiar with the UKCD IC Plan and protocols, there will be periodic testing and assessment as directed by the Safety and Infection Control Committee. Some of the testing will be self-assessment. That occurs when the student (you) is forced to answer questions while reading. This type of learning occurs when using a \_\_\_\_\_<sup>11</sup> text.

Infection control training must be taken immediately after \_\_\_\_\_<sup>12</sup> and \_\_\_\_\_<sup>13</sup> thereafter.

The preferred option for annual training is attendance at the \_\_\_\_\_<sup>14</sup>. The reason for this is that our

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<sup>11</sup> Programmed

<sup>12</sup> being hired

<sup>13</sup> annually

annual bloodborne pathogens update course contains information that is specific to the dental setting and to the College.

If it is impossible to make it to the session, it is possible to satisfy the requirement by taking an alternative \_\_\_\_\_<sup>15</sup> available through Environmental Health and Safety.

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<sup>14</sup> Annual (Infection Control) Update

<sup>15</sup> online course

## Nature of the threat: Infectious agents encountered in dental health-care settings

Transmission of blood-borne pathogens can normally be prevented through the use of **standard precautions**. This is the most important concept that you will learn in this course. The CDC defines *standard precautions* as "any standard of care designed to protect healthcare personnel and patients from pathogens that can be spread by blood or any other bodily fluid, excretion, or secretion." The term "standard precautions" replaces the previous term "universal precautions." Standard precautions apply to contact with blood, bodily fluids (except sweat), intact mucous membranes, and nonintact skin. These precautions are normally sufficient to prevent the transmission of infectious agents in the dental setting. It is worth noting that there are some uncommon clinical situations that require a higher level of infection control precautions. One example is the case of a patient with active tuberculosis. Such a patient cannot receive routine dental treatment in a normal setting and such patients require special precautions.

In this text we will sometimes abbreviate "blood and body fluids" as BBF. Another related abbreviation is OPIM, which stands for other potentially infectious material. This is sometimes shortened to PIM. Whenever you see BBF, you will know that this refers to \_\_\_\_\_<sup>16</sup>. Saliva contains traces of blood. Therefore, saliva is also presumed to be infectious and would fall into the category of \_\_\_\_\_<sup>17</sup>.

Theoretically, almost any infectious disease could be transmitted in the dental setting. From a practical standpoint, there are a few that are of primary importance. These include hepatitis B, hepatitis C, HIV, tuberculosis. An **exposure** is said to exist when an individual DHCW has come in contact with potentially infectious material. An accidental needlestick is an example of particular type of \_\_\_\_\_<sup>18</sup> known as a **percutaneous exposure**. Percutaneous means "through the skin" and refers to any injury in which the skin is penetrated. Other exposures can occur when blood or contaminated liquid from a dental evacuation system splashes in an assistant's eye or can even include airborne infections spread by aerosols generated by a dental handpiece (or by a patient's sneeze or cough).

Standard precautions are effective in breaking the chain of infection, since transmission of HBV is rare in cases where proper IC protocols are followed. Infection does not always occur following exposure. The risk of infection following exposure is determined by a number of factors, including **inoculum size** (how big a "dose" of organisms the person is exposed to), method of exposure, and susceptibility. Inoculum size is important, and is the reason why hollow needles

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<sup>16</sup> blood and body fluids

<sup>17</sup> BBF

<sup>18</sup> exposure

(which can carry a larger number of pathogens due to the hollow channel or lumen within the needle) are much \_\_\_\_\_<sup>19</sup> (more, less) effective in transmitting infection than solid instruments such as suture needles.

The route and method of infection are obviously important. For example, being stuck by a contaminated instrument with a large, hollow needle is more likely to result in infection than if you happen to touch a contaminated surface with your bare finger (assuming, of course, that your skin is intact). Needlesticks are particularly bad, since the hollow needle can carry a large load (inoculum) of organisms. A needlestick injury is an example of a \_\_\_\_\_<sup>20</sup> injury.

The rate of infection following needlestick is somewhat dependent upon the infection. For example, the rate of infection following a needlestick (percutaneous) injury is greater for cases of hepatitis B virus (6-30%) than for hepatitis C virus (3-6%) or HIV (0.3%). In order to better understand the nature of the threat, we will examine some of the more important diseases that may be encountered in the dental setting. However, it is important to note that it is really not necessary to know a great deal about most diseases in order to implement infection control programs. The transmission of the vast majority of infectious diseases can be prevented or greatly reduced by the use of standard precautions that have proven effective against hepatitis B.

***Viral hepatitis.*** Hepatitis is a generic term that means “inflammation of the liver.” Hepatitis can be caused by viral and bacterial infections, other parasites, or exposure to chemicals and drugs (such as alcohol). Viral hepatitis is caused by viral infections. Three types of viral hepatitis are important in dentistry.

***Hepatitis B.*** Hepatitis B (HBV) is caused by the hepatitis B virus. The viral particles may remain infectious for a week in dried blood at room temperature. Thus, contact with such surfaces may allow the virus to infect the DHCW through cuts and abrasions on the skin. Such transmission from environmental surfaces has been documented to occur in settings such as hemodialysis units. Hepatitis B is the most infectious bloodborne pathogen likely to be encountered in the dental workplace. For this reason, it is the target organism for infection control measures. If IC measures are effective in preventing the transmission of hepatitis B, they will probably be effective in preventing the transmission of other diseases.

It is estimated that there are between 200-300 million carriers worldwide, with over 1 million Americans chronically infected. Certain high-risk populations can be identified, such as certain healthcare workers, intravenous drug users, female prostitutes, male homosexuals, and immigrants from certain regions (e.g., Asia, Africa, the Middle East, Haiti) having a high prevalence of HBV. However, it is important to note that anyone can be a carrier of HBV. Approximately 10% of

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<sup>19</sup> more

<sup>20</sup> percutaneous

those with primary HBV infection eventually become carriers. Although several markers (antigens) are characteristic of HBV, the one most used to determine infectivity in asymptomatic carriers is the hepatitis B surface antigen (HBsAg). HBV carriers are at greatly increased risk for hepatocellular carcinoma, cirrhosis, and transmission to family members.

The symptoms of the initial HBV infection are often mild, and the infected individual may easily mistake them for influenza. Most individuals with HBV do NOT experience jaundice (yellowing of the skin and mucous membranes, which is seen in various liver diseases) during the initial infection. HBV causes over 4,000 deaths per year in the U.S. Fortunately, the incidence of HBV is declining due to the combined effects of improved IC practices, better education, and the availability of an effective vaccine.

All healthcare workers should be vaccinated against hepatitis B. Currently available forms of the vaccine are 98-99% effective. Three injections are required in the series. If you have not received the hepatitis B vaccine, inform your supervisor immediately so that arrangements can be made to be immunized. This must be done while the DHCW is in training or prior to contact with patients. If a DHCW contracts HBV, they may become a chronically \_\_\_\_\_<sup>21</sup> and may be at increased risk for a type of cancer known as \_\_\_\_\_<sup>22</sup>. There is no cure for this disease and the diagnosis carries a grim prognosis. This cancer is quite common in parts of Southeast Asia and Africa, which is probably due to the prevalence of \_\_\_\_\_<sup>23</sup> in these areas.

In closing, the key points to remember are: hepatitis B is easily transmitted and a safe and effective \_\_\_\_\_<sup>24</sup> exists. Be sure you receive this effective safeguard (which is provided by UKCD at no cost to you). If you do not wish to be immunized (a very unwise decision), then you must sign a form of **declination** stating that you **decline** (refuse) to receive the vaccine.

**Hepatitis C.** Hepatitis C (HCV) is the most common cause of so-called “non-A, non-B hepatitis.” One of the things that distinguishes HCV from HBV is the fact that approximately 80% of HCV infections result in a chronic carrier state. It is estimated that there are almost 4 million infected persons in the U.S., including over 2 million infectious carriers. Risk factors for HCV include exposure to BBF (needlesticks, sharing needles, etc.) and multiple sex partners. In many cases, no risk factor can be identified.

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<sup>21</sup> infected

<sup>22</sup> hepatocellular carcinoma

<sup>23</sup> hepatitis B

<sup>24</sup> vaccine

One chief difference between hepatitis B and hepatitis C is that no effective \_\_\_\_\_<sup>25</sup> exists for hepatitis C.

**Hepatitis D.** Hepatitis D is unique in that the virus (formerly known as the delta agent) can only replicate in the presence of the hepatitis B virus. Patients infected with both HBV and HDV sometimes have a particularly severe form of hepatitis known as *fulminant hepatitis*. Since HDV requires co-infection with HBV, it is likely that vaccination against HBV will also provide protection against HDV.

**Summary: hepatitis and dentistry.** Viral hepatitis is a risk for all healthcare workers. Although new treatments are available, such as interferon and antiviral agents, they are not permanent cures. It is far better to prevent transmission in the first place by observing proper infection control procedures and being immunized against \_\_\_\_\_<sup>26</sup>. Individuals immunized against hepatitis B are also unlikely to have \_\_\_\_\_<sup>27</sup> infections.

**Human Immunodeficiency Virus (HIV).** In 1981, the CDC published the first reports of unusual infections in five homosexual men in Los Angeles. They were all suffering from infection with *Pneumocystis carinii* pneumonia (PCP), an infection not usually seen in healthy young adults. This brief report was the beginning of the AIDS epidemic, a public health event that transformed healthcare and focused increased attention on infection control. Although it was the AIDS epidemic that focused increased attention on IC in the dental setting, it appears that the danger of transmission in this setting is extremely low. According to the CDC, as of December 2001 there were no reports of transmission of HIV to DHCW as a result of workplace exposures. There is one report of HIV transmission from a dentist to several patients, but the mode of transmission has never been ascertained. In an effort to quantify the risk of transmission from HCW to patient, the CDC examined over 22,000 patients treated by 63 HIV-infected healthcare providers (including 33 dentists or dental students) and found no additional cases of transmission. It would thus appear that the risk of transmission in the dental workplace is rather low. It is estimated that risk of acquiring HIV infection after being stuck with an HIV-contaminated needle is approximately 0.3% (i.e., 3 chances in 1,000).

Routes of HIV transmission include contact with contaminated BBF or other potentially infectious material, various sexual practices, and vertical transmission from mother to child. HIV positive individuals may remain relatively symptom-free for years. Eventually, the immune system fails and the develops AIDS (acquired immunodeficiency syndrome). The virus is shed in blood and saliva, although low viral levels have usually been described in oral secretions. There is no cure for AIDS, although new drug regimens such as highly active antiretroviral therapy (HAART) have proven much more effective than older protocols.

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<sup>25</sup> vaccine

<sup>26</sup> hepatitis B

<sup>27</sup> hepatitis D

**Tuberculosis.** Tuberculosis is caused by the tubercle bacillus, *Mycobacterium tuberculosis* (Mtb). TB is spread chiefly through extremely small airborne droplet nuclei produced when an infected individual sneezes, coughs, or speaks. These droplet nuclei can remain airborne for hours. However, contact with Mtb is not sufficient to cause active tuberculosis. Many individuals are exposed to the organism (as indicated by a positive TB skin test) but only about 10% will develop active TB during their lifetime. In many cases, the organism remains in a latent or hidden state. In some cases, these latent infections may be reactivated when immune function deteriorates (e.g., due to AIDS or increasing age). TB is the most common cause of death from infectious disease in the world, particularly in parts of Asia and Mexico. Of great concern in these areas is the emergence of drug-resistant TB.

Tuberculosis was once a common cause of death in the U.S. With the advent of effective therapy and public health policies, its prevalence declined. In recent years, however, it has once again become a significant public health problem. Individuals from certain high-risk groups are more likely to contract TB. Some of these groups include patients with HIV, individuals in close contact with TB patients, immigrants from areas in which TB is highly prevalent, economically disadvantaged groups, alcoholics and IV drug users. Certain healthcare workers who care for TB patients may also be at risk.

**Prion diseases.** Prion diseases are unique. Prions are not bacteria and are not viruses. In fact, they are proteins and it is difficult to imagine them as living organisms at all. The best known example is the so-called “mad cow disease” that has been identified in Europe and recently in the U.S. Mad cow disease is an example of a group of diseases known as **transmissible spongiform encephalopathies** or TSEs. The name makes perfect sense, as the disease may be transmitted from one individual animal to another and causes “holes” in the brain (causing it to become “sponge-like”). Early on, it was recognized that mad cow disease was similar to a human condition known as Creutzfeldt-Jakob Disease (CJD). It appears that consumption of meat tainted with the BSE agent may result in human infection known as variant CJD. The reason for concern is that the normal methods of sterilization may not be effective against the CJD agent. These diseases have exceptionally long incubation periods (10-30 years). This will greatly complicate the epidemiologic study of the mode of transmission, since the event of transmission will be difficult to identify. It is also worth noting that some materials used in periodontal and oral surgery use materials derived from cattle (i.e., certain collagen membranes and sutures).

**Other infections.** When discussing disease transmission in the dental setting, the focus is naturally upon those infections with the most serious consequences such as AIDS and HBV. However, common diseases such as the common cold, influenza, various herpes viruses, and STDs may also be transmitted. The safeguards we take to prevent transmission of HBV, for example, will also reduce

the chances for transmission of other, more common pathogens. While not life-threatening (usually), diseases such as the common cold and herpetic skin infections may be debilitating and unpleasant for dental healthcare workers (and their families). The remainder of this manual will discuss methods for breaking the chain of infection.

## **Breaking the Chain of Infection**

Infectious diseases spread by direct contact between individuals, via airborne droplets, or on contaminated surfaces or instrument. One of the most important routes of transmission in the dental workplace is exposure to **blood and body fluids (BBF)**, as well as other **potentially infectious material (PIM)**. Blood is the most important fluid. Blood is usually found in saliva, due to gingival bleeding. Therefore, all saliva is considered a potentially infectious material and must be treated with caution. Specifically, BBF can be spread via aerosols generated by handpieces and ultrasonic scalers, by percutaneous injuries (e.g., needlestick injuries), or by direct contact with \_\_\_\_\_ or \_\_\_\_\_<sup>28</sup>

One of the oldest infection control strategies is to kill the organisms so as to render them harmless. This can be accomplished by a variety of methods. The choice of methods depends on the nature and use of the material to be sterilized. Patient care instruments can be classified as critical, semi-critical, and noncritical. \_\_\_\_\_<sup>29</sup> Critical instruments are those which penetrate soft tissue, contact bone, or otherwise gain access to normally sterile tissue. This would include scalpel blades, surgical burs, and suture needles. \_\_\_\_\_<sup>30</sup> Semi-critical items contact mucous membranes or non-intact skin but will not penetrate soft tissue. This would include dental mirrors, impression trays, and amalgam condensers. Although dental handpieces would seem to fall into the semi critical category, they are treated as critical items and require heat sterilization. \_\_\_\_\_<sup>31</sup> Noncritical items contact intact skin and include items such as blood pressure cuffs.

Critical items represent the highest risk for disease transmission. Therefore, they must be heat sterilized, preferably in a steam autoclave. Semicritical items pose a lower risk for transmission. However, the CDC advises that if semicritical items are heat-tolerant, they should also be \_\_\_\_\_ - \_\_\_\_\_ (hyphenated word)<sup>32</sup>. If the item may be damaged by heat, it must receive high-level disinfection (see below). Noncritical items, obviously, pose the lowest risk for disease transmission. Different levels of disinfectant may be required for different applications. A list of the different EPA designations can be found in the appendix. The EPA rates disinfectants regarding their effectiveness. An acceptable surface disinfectant should kill Mycobacterium tuberculosis. Such disinfectants are known as tuberculocidal. These are the types of surface disinfectants used at UKCD.

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<sup>28</sup> BBF or OPIM

<sup>29</sup> Critical

<sup>30</sup> Semicritical

<sup>31</sup> Noncritical

<sup>32</sup> heat

Barriers are another method of breaking the chain of infection. Barriers are especially useful in areas which are difficult to clean because of surface gaps and irregularities. An example are the bags used at UKCD to cover the bracket tray and handpiece holders. Personal protective equipment (PPE) might be viewed as a sort of barrier to cover the DHCP. PPE should include full length gloves, gowns, protective eyewear, close-fitting mask, and other items as required. These are described in detail below.

Hand hygiene is an overlooked but very important infection control measure. Years ago, before the germ theory of disease had been developed, an Austrian physician named Semmelweiss observed that patients treated by doctors who had come directly to the clinic after working in the anatomy laboratory had higher rates of infection (and death) than midwives who did not go to the anatomy laboratory. Hand hygiene is still quite important in breaking the chain of infection. Hand hygiene is one of the most important infection control methods. In addition to protecting the patient, you will also protect yourself.

Immunization is also an old, but important, technique in infection control. Later, we will discuss those diseases which the DHCP should be immunized against. All DHCP should avail themselves of these safe and effective methods to protect themselves and their families.

We will spend the remainder of this course learning ways to break the chain of infection.

## **Administrative Controls: Workplace Restrictions and Immunizations**

**Administrative controls** are methods of infection control that depend on administrative actions (“rules”). For example, someone with active TB is forbidden from treating patients. This is an administrative rule or control. Other examples include work restrictions for healthcare workers who have certain contagious conditions.

### **Medical Work Restrictions**

The presence of certain medical conditions may cause DHCP to be excluded from clinical duties. Decisions regarding medical restriction shall be made by the Associate Dean for Clinical Affairs or other administrative officer designated by the Dean with input from the Safety and Infection Control Committee and shall be based on epidemiologic evidence and CDC recommendations. Selected medical conditions and related work restrictions are shown below in Table 1.

This is not exhaustive and other conditions and recommendations may be found in the CDC’s *Guidelines for Infection Control in Dental Health-Care Settings (2003)*. The following table lists some conditions that may necessitate work restriction. Of particular interest is the increasing incidence of dermatitis secondary to latex allergy and frequent hand hygiene procedures. LSOs shall conduct periodic hand inspections and/or ascertain hand tissue integrity via other means (self-report). If you suspect that you have one of these conditions (or any other medical condition that could pose a threat to others), it is your responsibility to notify your LSO and/or Clinic Unit Manager.

<b>Disease/condition</b>	<b>Work Restriction</b>	<b>Duration of Restriction</b>
Conjunctivitis	No patient contact	Until discharge ceases
Cytomegalovirus infection	No restriction	
Dermatitis	Seek appropriate medical care; clinic unit managers shall make judgment as to whether condition precludes patient contact	
Diarrhea	No patient contact	Until symptoms resolve
Diarrhea, salmonellosis	No patient contact	Until symptoms resolve

Hepatitis A	No patient contact	Until 7 days after onset of Jaundice
Hepatitis B (e antigenemia)	No invasive procedures until counsel from review panel sought	Until HBeAg negative; check for latest CDC, state and local regs
Hepatitis C	No restriction	
Herpes simplex, genital	No restriction	
Herpes simplex, whitlow	No patient contact	Until lesion(s) healed
Herpes simplex, orofacial	Consider restricting care to immunocompetent pts	
HIV infection	No invasive procedures until counsel from review panel sought	
Measles, active	Exclude from duty	Until 7 days after rash appears
Meningococcal infection	Exclude from duty	Until 24 hrs after start of effective therapy
Mumps, active	Exclude from duty	Until 9 days after onset of parotitis
Staph aureus infection, draining skin lesion	No patient contact	Until lesions have resolved
Strep infection, Group A	No patient contact	Until 24 hrs after therapy begun
Tuberculosis, active	Exclude from duty	Until proved noninfectious
Tuberculosis, PPD converter	No restriction	
Varicella, active	Exclude from duty	Until all lesions dry and crust
Zoster (shingles)	Cover lesions, restrict from care of immunocompromised patient	Until all lesions dry and crust

**Table 1: CDC Recommendations on work restrictions for healthcare personnel. MMWR RR-17**

### **A Special Case: Active Tuberculosis**

All DHCP must understand the signs, symptoms, and transmission of TB. Background information on TB is given in the introductory section of this manual. The following are CDC recommendations for handling patients with TB:

- a baseline tuberculin skin test (TST) is required of all DHCP at UKCD
- all DHCP who come in contact with a suspected or confirmed case of active TB must receive a TST
- each patient presenting to UKCD shall be assessed for a history of TB, as well as symptoms and risk factors associated with TB
  - symptoms of TB include: unexplained weight loss, night sweats, fatigue, malaise, bloody sputum, anorexia, fever, productive cough lasting > 3 weeks
- patients with a positive history of active TB or symptoms suggestive of TB shall be referred for evaluation promptly. The index patient shall remain in the clinic only as long as it takes to assess the dental status and arrange for referral. While in the dental clinic, the patient should be isolated from other patients and wear a surgical mask.
- elective dental treatment should be deferred until medical evaluation is complete and the patient's status is confirmed. Active TB patients cannot receive routine dental treatment unless and until they are confirmed to be noninfectious.
- dental treatment for active TB patients must take place in a facility designed to provide appropriate engineering controls for airborne infection isolation; surgical masks do NOT provide protection against transmission of M. tuberculosis
- clinicians treating active TB patients must wear disposable N-95 respirators that are tested for proper fit
- DHCP with symptoms of TB (as described above) should be referred for medical evaluation promptly and the DHCP shall not return to the workplace until confirmed noninfectious

A 28 year old patient from China seeks care in the clinic. She reports a history of chronic cough, bloody sputum, night sweats, fatigue, and weight loss. She attributes the cough to a 1 ppd smoking habit. What should you do?

<sup>33</sup>

### **A Special Case: Prion Diseases (Creutzfeldt-Jakob Disease)**

The transmissible spongiform encephalopathies (TSEs) include diseases such as “mad cow disease” (bovine spongiform encephalopathy or BSE) and, in humans, Creutzfeldt-Jakob disease (CJD). These diseases are caused by small proteinaceous particles, as described in the introductory section. The CDC offers

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<sup>33</sup> The patient should be referred for medical evaluation (to rule out TB) before treatment is rendered. Such a patient would be more likely to have multi-drug resistant TB, a particularly bad form of the disease.

no recommendations regarding special precautions to be taken when treating patients suffering from TSEs. Available scientific information suggests a very low risk of transmission. Nevertheless, the CDC offers some possible precautions for consideration and these have been adopted for use at UKCD:

- when treating individuals suffering from a TSE, use single-use disposable items and equipment whenever possible
- if items are difficult to clean (e.g., endodontic files) discard after one use
- keep instruments moist until cleaned and decontaminated (this, of course, is always desirable as dried blood and secretions are harder to remove)
- do NOT use flash sterilization or abbreviated sterilization protocols
- use steam sterilization at 134° for 18 minutes

## Immunization Program

Immunization is one method to protect DHCP from possible work-related infections. At UKCD we have an active immunization program. Consistent with CDC recommendations, all DHCP are strongly urged to receive the following vaccinations: hepatitis B (recombinant vaccine), influenza, measles (live-virus), mumps (live-virus), rubella (live-virus), and varicella-zoster (live-virus). More details concerning these recommendations can be found in Table 2 below.

**Table 2: Immunizations recommended for healthcare personnel (CDC MMWR RR-17)**

<b>Vaccine</b>	<b>Dose schedule</b>	<b>Indications</b>	<b>Precautions</b>	<b>Special Considerations</b>
HBV	3-dose schedule at 0,1,6 mos in deltoid	DHCP at risk for BBF	Allergy to baker's yeast	No adverse effect if given to HBV-infected person; should be tested 1-2 mos post-vaccine to determine serologic status
Influenza	Annual single-dose	DHCP at UKCD	Allergy to eggs or other vaccine components	
Measles (live-vaccine)	2 dose regimen	No reliable history of infection or serologic evidence of immunity; DHCP born before 1957 considered immune	Pregnancy, immunocompromised status; allergy to gelatin or neomycin	MMR (measles-mumps-rubella) is recommended vaccine for these three diseases
Mumps		"	"	"
Rubella		"	"	"
Varicella-zoster	2 doses 4-8 wks apart	No reliable history of varicella infection or serologic evidence of immunity	As with MMR; avoid salicylate use (aspirin) for 6 weeks after vaccination	71-93% of U.S.-born persons are immune; may consider testing before vaccination

The above table is not exhaustive. Definitive information regarding vaccination should be obtained from your physician.

Individuals refusing recommended immunizations must sign a formal letter indicating that they have declined the opportunity to be immunized, despite being aware of the health risks that this entails. A file containing records of immunizations and letters of declination shall be maintained by a designated staff member under direction of the Safety and Infection Control Committee. This file shall be reviewed annually for errors and omissions. As part of orientation, all new hires must meet with a clinical affairs staff member so that his/her file can be initiated and the need for immunization documented.

You have a painful abscess on your finger. What should you do?  
\_\_\_\_\_.<sup>34</sup>

A patient reports that he is taking medication for TB. What precautions must be taken before treating this patient? \_\_\_\_\_.<sup>35</sup>

Individuals should be tested following hepatitis B immunization to determine if the vaccine was \_\_\_\_\_.<sup>36</sup>



**Figure 4: Jenner administers the first vaccine**

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<sup>34</sup> You should notify your LSO or Clinic Unit Manager. This could be a staphylococcal abscess, which would prevent you from patient contact. It would also prevent you from setting up sterile instruments.

<sup>35</sup> The patient must be declared to be non-infectious by a competent physician or public health authorities. This normally occurs quickly after therapy is begun, but may be significantly delayed if the patient has drug-resistant TB.

<sup>36</sup> Effective.

## **Exposure Control: Personal Protective Equipment, Hand Hygiene, and Postexposure Protocol**

### ***Preventing Exposures to BBF and OPIM: an overview***

BBF refers to \_\_\_\_\_ and \_\_\_\_\_<sup>37</sup>, while OPIM refers to \_\_\_\_\_<sup>38</sup> (phrase). The following procedures are recommended by the CDC (and required by UKCD) to prevent or reduce such exposures:

- CDC approved standard precautions (formerly called universal precautions) shall be used for all patient encounters. The underlying assumption is that any patient may be a source of a bloodborne pathogen.
- engineering controls should be used (e.g., sharp containers, needle shields or recapping devices, self-sheathing IV needles) to prevent percutaneous injuries from sharps (burs, blades, needles, etc.) whenever such items are used.
- if engineering controls are not available for a given application, extreme care must be used when handling such objects
- be especially wary of unpredicted movements by the patient (sedation may be considered in some cases)
- in case of an exposure, follow the written UKCD postexposure protocol
- read the Safety/IC Newsletter for examples of exposures that have occurred at UKCD and tips on their prevention
- if you see unsafe conditions or practices, or have an idea as to how workplace practices might be made safer, please communicate these to your local Safety/IC Officer
- annually, in January, the Safety/IC Committee will analyze the dental marketplace for newer and safer instruments and devices (particularly when they address an ongoing source of exposures such as needlesticks or percutaneous bur injuries)
- used sharps should be placed in puncture-resistant sharps containers that are clearly marked with the biohazard symbol; these should be readily accessible
- do not recap needles in such a way that the needle is pointing toward any part of your body; instead, use a scoop technique or device that permits one-handed recapping (such as the small device incorporated into many of the UKCD instrument cassettes)

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<sup>37</sup> blood and body fluids

<sup>38</sup> other potentially infectious materials

## ***Hand Hygiene***

Hand hygiene, as noted earlier, is an important and overlooked aspect of proper infection control. All DHCP should develop good hand hygiene habits. Read the monthly Safety/IC Newsletter for new developments in this important area. The following protocols should be used by all DHCP at UKCD:

- hands should be washed with an antimicrobial soap when visibly soiled; an acceptable soap is 4% chlorhexidine (CHX; Hibiclens) which is located in the soap dispensers in the predoctoral clinic
- if the hands are not visibly soiled, an alcohol-based hand rub (AHR) can be used in lieu of soap (follow manufacturer's instructions; generally, these agents are applied to the hands, which are then rubbed together vigorously until dry)
- regardless of method, make sure the agent reaches all surfaces of hands, between fingers, etc.
- CHX (chlorhexidine; Hibiclens; this is the antiseptic scrub in the soap dispensers on the clinic floor) should be used for a minimum of 15 seconds
- AHR should be used as follows: place recommended amount on hands and rub vigorously until dry
- hands should be washed with CHX or cleaned with an AHR at the following times:
  - when visibly soiled
  - after touching surfaces likely to be contaminated (including work surfaces in the operatory, such as cabinetry)
  - before and after treating each patient (i.e., hand hygiene should be performed before donning gloves and immediately after removing gloves)
- before performing surgery (and donning sterile surgical gloves) a more intense surgical hand antisepsis must be performed (wash hands thoroughly for 2-6 minutes with CHX)
- soap dispensers on clinic floor must be filled, but should not be topped off; soap reservoirs should be washed and dried before refilling
- hand lotions may be desirable to prevent chapping and dryness (although compatibility of lotion and antiseptic and glove should be considered; some oil emollients affect glove integrity – see below)
- fingernails should be short (1/4"); no artificial nails should be worn
- rings with stones or facets should not be worn as these may cause breaks in the glove surface

Alcohol-based hand rubs can be used if hands are \_\_\_\_\_<sup>39</sup>.

When using an alcohol-based hand rub, the hands should be rubbed vigorously \_\_\_\_\_<sup>40</sup>.

Before performing surgery, CHX antiseptic soap should be used for a minimum time of \_\_\_<sup>41</sup>.

Before performing routine restorative dentistry, CHX antiseptic soap should be used for a minimum time of \_\_\_<sup>42</sup>.

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<sup>39</sup> not visibly soiled

<sup>40</sup> until dry

<sup>41</sup> 2-6

<sup>42</sup> 15 seconds

## ***Personal Protective Equipment (PPE)***

Personal protective equipment is very important part of our IC protocols. All DHCP are to wear PPE suitable for the particular activity in which they are engaged. Remember that PPE are also required during laboratory procedures in which contact with contaminated materials is likely.

- Masks, eyewear, faceshields
  - a properly fitted surgical mask and protective eyewear (with side shields) should be worn during procedures likely to cause splashing or splattering of blood; this includes various cleanup duties as well as direct patient care (e.g., cleaning plaster traps and evacuation systems)
  - change masks between patients or if mask becomes soiled or wet
  - if you change the mask, you must first remove your gloves
  - clean and disinfect face shields, if used, and protective eyewear
  - face shields may be considered in ADDITION to surgical masks in the case of particularly messy procedures
- Protective clothing
  - protective clothing should be worn during patient care and other duties in which splatter or contact with BBF/OPIM is likely
  - gowns should completely cover personal clothing and/or skin “likely to be soiled with BBF or OPIM”
  - protective gowns should be changed if soiled or wet
  - all PPE must be removed when leaving the treatment area
    - when traveling between the second and third floors, DHCP may leave gowns on if they use the stairs at the end of the clinic near the laboratories (since these wells should not be accessed by patients and others, they are considered clinical areas)
- Glove protocol
  - wear examination or surgical gloves when the potential exists for contact with BBF/OPIM
  - hands should be washed prior to donning gloves and immediately after removing them
  - gloves should NEVER be washed
  - no faceted jewelry should be worn under gloves
  - no artificial nails should be worn under gloves
  - remove gloves that exhibit tears or punctures
  - it is desirable to change gloves during long procedures (>60 minutes); while CDC has not identified an optimal time for changing gloves, it is well established that glove integrity deteriorates with time (increased formation of small “pinholes” in the glove)

- surgeon's gloves should be worn during surgery and during other procedures that are lengthy and involve a good deal of bleeding (e.g., periodontal surgery, extraction of teeth, certain cases of scaling and root planing)
- gloves should be selected that fit the operator well
- if you begin to experience hand fatigue, cramping, or carpal tunnel-like symptoms (e.g., numbness) you may try a slightly larger glove (or different brand glove)
- if allergic to latex and/or powder, notify your supervisor or LSO and appropriate alternative gloves will be provided (see section on contact dermatitis below)
- when removing gloves, be careful not to allow "glove juice" to splatter on instruments or patients
- soiled gloves should be discarded immediately and should not contact any critical or semicritical items
- consult with manufacturer regarding materials incompatibility with gloves
- the CDC has made no recommendations regarding the use of double gloves and considers this an unresolved issue; there are studies that demonstrate fewer punctures of the inner glove and less blood on surgeon's hands when double gloves are worn

When extracting a tooth in the Oral Surgery Clinic, \_\_\_\_\_<sup>43</sup> gloves must be worn.

Protective glasses must be worn when treating patients; protective side shields are \_\_\_\_\_<sup>44</sup> (required; not required).

When excessive splatter is expected, it may be prudent to wear a \_\_\_\_\_<sup>45</sup> (two words).

The CDC has made no recommendation regarding the use of double gloves. Some studies have shown that double gloving offers \_\_\_\_\_<sup>46</sup> (some; no) additional protection over the use of single gloves.

You have just finished treating your restorative patient and need to check on a case you have in the laboratory. You should remove your \_\_\_\_\_<sup>47</sup> before leaving the clinic.

Gloves should \_\_\_\_\_<sup>48</sup> (always; often; never) be washed with chlorhexidine.

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<sup>43</sup> sterile

<sup>44</sup> required

<sup>45</sup> face shield

<sup>46</sup> some

<sup>47</sup> personal protective equipment, including soiled gown

<sup>48</sup> never

### ***Latex Allergy and Dermatitis in DHCP***

With increased use of latex gloves, there has been a corresponding increase in the frequency of latex allergy and contact dermatitis in healthcare workers. This is a serious and growing problem, but there are steps that can be taken to reduce its impact.

- you should notify your clinical unit manager and/or LSO if you notice signs that might indicate a latex allergy or dermatitis
  - symptoms include itching, redness, rash, dryness, fissures/cracking, hyperkeratosis, swelling
  - other symptoms may include general allergic symptoms referred to the respiratory and other systems, such as sneezing, wheezing, hives (urticaria), and red, watery eyes
- medical consultation should be sought if you have these symptoms
- patients may also be allergic to latex and they should be identified by history
- in rare cases, life-threatening emergencies (e.g., anaphylaxis) may occur and will require prompt treatment

## Postexposure protocol

Exposure prevention is best accomplished by an active ongoing education program, a QA program to ensure compliance with IC protocols, and an active postexposure program that includes incident analysis (see Figure 4 below).

- Upon exposure, whether percutaneous (needlestick) or contact of BBF or OPIM with mucous membranes or broken skin, the DHCP will interrupt treatment and inform the clinical unit manager or his/her designee
- a specific protocol is then to be activated which involves testing of the DHCP and patient, as well as provision of treatment, if required (see appendix for complete protocol)
- the exposure control coordinator will be notified of all exposures
- patients and UK DHCP will be referred to the University Health Service for evaluation and, if necessary, treatment
- in addition, an analysis of the incident will be immediately undertaken by the LSO and exposure coordinator and a report submitted to the Safety/IC Officer which outlines the incident and lists ideas as to how future incidents might be prevented; a log of these incidents shall be maintained by the exposure coordinator
- representative exposures will be described in the regularly published Safety/IC Newsletter; the newsletter is required reading for all DHCP at UKCD
- in cases of exposure to active TB case, a baseline TB skin test shall be obtained (this is true even of administrative personnel who may have come in contact with the case); this will be repeated in three months

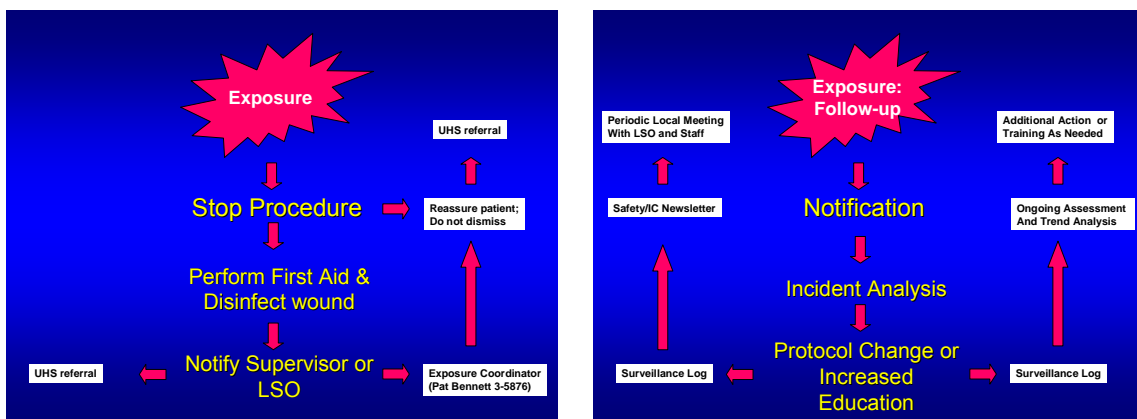


Figure 5: Post-exposure protocol

You are treating a patient in the clinic. As you get up to get an instructor, you feel a sharp pain in your left thigh and notice that your pants have a small tear in that area. You think you may have caught yourself with the dental bur that was left in the handpiece. What should you do?<sup>49</sup>

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<sup>49</sup> This should be treated as an exposure and the postexposure protocol activated. You could go in the bathroom to inspect the leg, but what if you miss a small puncture wound? This should receive the full protocol. A good way to avoid this common problem is to remove burs from handpieces promptly after use.

## **Environmental Infection Control**

This section contains both general and specific recommendations regarding asepsis in the dental workplace. All clinical units are expected to conform to these standards. If a unit manager believes that the protocol must be changed to accommodate circumstances peculiar to that unit, he or she must prepare a request in writing, including documentation of efficacy of the proposed protocol change, and submit it to the Safety and Infection Control Committee.

### **General information**

- **Disinfectants**
  - Only EPA-registered disinfectants are to be used for general environmental IC. These shall be rated “tuberculocidal” to provide intermediate level disinfection. High-level disinfectants (so-called “cold sterilants”) are not to be used for general disinfection of environmental surfaces.
- **Personal protective equipment (PPE).**
  - Personal protective equipment should be worn when performing housekeeping and clean-up duties. At a minimum this should include protective clothing (UKCD standard clinic gown), protective eyewear (the level depending upon the danger of splash and splatter of BBF and OPIM; in extreme cases when handling large amounts of contaminated liquid, a face shield must be worn), and gloves. For normal clean-up use, puncture resistant gloves are to be used and should be constructed of a relatively heavy material (e.g., nitrile).
- **Barrier use**
  - Barriers should be used to protect clinical surfaces that cannot be easily cleaned. Such surfaces include the handles of the operatory light, the bracket tray/arm/handpiece console, and dental chair. The arm rest of the assistant’s stool should similarly be covered. These barrier bags can be used to bag general trash upon completion of the procedure.
  - In case any clinical surface (that might be touched during a procedure or is in close proximity to the field of operation) cannot be covered with a barrier, it must be disinfected using an intermediate-level (tuberculocidal) EPA-registered disinfectant. Visible blood and debris must be removed.

- **General housekeeping:**
  - Floors, walls, and sinks must be cleaned with detergent/water or an EPA-registered hospital disinfectant/detergent on a regular basis. The schedule is to be based on the nature of the facility, patient flow, types of procedures performed, degree of contamination, etc. In any case, such surfaces must be cleaned if visibly soiled and no less frequently than weekly. Such cleaning solutions should be prepared fresh before use and changed as needed during the cleaning process.
  - Mop heads and cleaning cloths must be cleaned after use and allowed to thoroughly dry before next use, unless single-use disposable items are used.
  - All clinical areas are to be inspected after cleaning by a housekeeping supervisor. All clinical unit managers or their designees will inspect the clinical area daily for general cleanliness and report performance problems to the office of administrative affairs.
  - Operatories should generally be free of extraneous materials to facilitate cleaning and disinfection. Loose items should be placed in drawers or other storage.
- **Blood spills**
  - spills of blood or other grossly contaminated liquid (e.g., as might be encountered when cleaning a plaster trap) should be cleaned with an intermediate-level (tuberculocidal) EPA-registered disinfectant.
- **Carpeting and cloth furnishings**
  - carpeting and cloth-upholstered furniture or surfaces shall not be used in dental treatment rooms, sterilization/instrument processing areas, and dental laboratories
- **Medical waste disposal (also see “Medical Waste section below)**
  - all medical waste shall be disposed of in accordance with current federal, state, local, and UK Medical Center regulations and policies
  - all DHCP who handle such waste must be trained in proper handling and disposal procedures, and must be trained in general IC, including the threat of BBF, postexposure protocol, etc.
  - general medical waste shall be placed in leakproof bags that are color-coded and clearly marked with the universal biohazard symbol.
  - sharps shall only be placed in special, color-coded sharps containers. These shall be leakproof, puncture-resistant, and clearly marked with the universal biohazard symbol. During disposal or movement of the container, it should be securely closed to prevent spillage. In the event of a sharps container spill, extreme caution should be exercised in cleaning the area (which must be

secured and made free of foot traffic until the clean-up is completed).

- Liquid medical waste, including blood, can be poured into a drain connected to the public sanitary sewer system, in compliance with local and state regulations. When pouring large quantities of liquid, extreme care should be exercised and adequate PPE should be worn, including a face shield.
- **Nonclinical personnel (visitors) in treatment area**
  - Generally, the only persons that are permitted in the dental operatory are the patient and UKCD dental healthcare personnel
  - There may be occasions when it is necessary or desirable for others to be present during treatment (e.g., parents of a young child, guards accompanying a prisoner)
  - This should only be done when, in the judgment of the attending dentist, it is absolutely necessary
  - When such individuals are permitted into the treatment area, they must wear the same PPE as the operator

## Treatment Room Protocols

- Clean gloves must be worn during room preparation and instrument setup (sterile gloves should be worn when setting up for surgical and endodontic procedures).
- Flush dental unit waterlines for 3 minutes at beginning of each clinic session (i.e., immediately prior to seeing patients during either the morning or afternoon clinic sessions; if you are seeing patients in both the morning and afternoon, you would flush for 3 minutes at approximately 9:00am and also at approximately 2:00pm ). \*
- Cover the following surfaces with barriers (***units should stock barriers appropriate and sufficient for the following***):
  - dental chair (use large bag)
  - bracket table and handpiece holder (use large bag)
  - operating light handles (small plastic covers)
  - air/water syringes and evacuators (saliva ejector and HVE)
  - ultrasonic unit and other equipment (e.g., amalgamator)
- In the event that barriers are not available for any of the above, these items must be disinfected prior to use using either the Spray-Wipe-Spray method or disinfectant wipes (either method is acceptable):
  - **Spray-Wipe-Spray**
    - spray an EPA-registered intermediate level (tuberculocidal)

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\* The only exception to this rule is if you are seeing patients in a clinical unit (e.g., Graduate Periodontology or the Research Clinic on the third floor) that employs closed water systems (i.e., systems that are NOT connected to city water and use, instead, bottles that must be filled with sterile water). These waterlines are maintained in a different fashion and it is only necessary to flush these closed lines for 20 seconds prior to seeing patients. The closed water system protocol is covered in a separate section of the manual.

disinfectant on 4 x 4 gauze sponge (e.g., ProPhene® is the disinfectant of choice at UKCD)

- wipe surfaces until no debris is seen
- spray surface with EPA-registered intermediate level (tuberculocidal) disinfectant (such as ProPhene®) and allow to remain on surface until dry (or the spray may be wiped off after remaining for 10 minutes, if desired)
- the operating light lens should be free of streaks and droplets (if the lens is easily removable, it should be removed for cleaning)

- **Disinfectant Wipes**

- disinfectant wipes are available in the clinic and may be used in lieu of **SWS** protocol, if directed by your supervisor
- includes CaviWipes® (or equivalent tuberculocidal EPA-registered disinfectant)
- thoroughly wet surfaces with CaviWipe® and allow to dry for 10 minutes
- place sterile cassette on bracket tray, but do not open until patient is seated (student)

## **Asepsis During Treatment**

- Hands must be washed at the start of each day, before and after gloving, and after touching contaminated objects or surfaces. Thoroughly wash the hands and wrists with an antiseptic soap for a minimum of 15 seconds and dry completely before donning gloves. A standard surgical scrub is required before surgery (see section on **Hand Hygiene**).
  - An acceptable alternative is the use of an alcohol handrub (AHR). The recommended amount of the AHR is placed on the hands, which are then vigorously rubbed together until dry.
  - If you experience dermatitis or irritation of the skin of the hands, consult your supervisor and seek medical advice ASAP. Some individuals are allergic to latex or glove powder, and alternatives are available.
  - Prior to washing hands and donning gloves, faceted rings and watches should be removed.
- Operator and assistant must wear PPE, consisting of UK gown, protective eyewear, properly fitted mask, and gloves. The mask should be fitted to the contours of the face. In cases where an unusual amount of splatter may be expected, it may be prudent to wear a face shield in addition to a mask.
- Once gloves have come into contact with PIM, they are considered contaminated. Do not touch the chart, door handles, telephones, etc. while wearing contaminated gloves. Contaminated gloves should not be worn outside of the treatment cubicle.

- Gowns and masks should be changed when visibly soiled or wet
- Patients must wear protective eyewear
- Gloves must be changed immediately if punctured or torn. Since gloves develop pinholes over time, gloves should be changed during long procedures at least hourly and preferably every 30 minutes.
- Exposure to blood or other potentially infectious material (as defined in the Bloodborne Exposure Plan) should be promptly reported to your supervisor. This includes needlestick injuries and similar circumstances. In addition to receiving appropriate medical attention, it is important that each event be analyzed to determine how to prevent a recurrence. Forms for this are kept in Clinical Affairs.
- Needles should be safely recapped after each use (use approved method, such as one-handed scoop). Many of the cassettes in use in the College have a small tab to be used for one-handed recapping. Sharps should be discarded in the red sharps container located in the cubicle. Sharps should be handled with forceps or other devices to prevent accidental injury. Empty anesthetic carpules are considered to be sharps.
- The handpiece should be placed in the holder in such a manner as to reduce the chance of being stuck with the bur. This is a common source of injury. When you are done with the handpiece, the bur should be immediately removed.
- Impressions should be properly disinfected before sending to laboratory, using a suitable disinfectant. The disinfectant shall be approved for use in such applications by the manufacturer of the impression material.
- Proper aseptic protocol is required when taking and processing radiographs; exposed radiographs should be considered infectious and should be handled with gloves. Film barrier packets should be used whenever possible. (see **Radiology** section)
- To reduce aerosol contamination, the high-volume evacuator and rubber dam should be used whenever possible, particularly when the high-speed handpiece and ultrasonic scaler are in use.
- **Sterile water must be used as an irrigant during endodontic and surgical procedures. Water from the dental unit (e.g., handpiece or air/water syringe) should not be used for this purpose.**

### **After Treatment Protocol**

- Student dentist: Remove gloves, wash hands thoroughly, and remove mask. Complete progress notes and all paperwork (do not allow chart to contact PIM).
- Assistant (or whoever will clean treatment room): Using heavy nitrile gloves, gown, and mask (plus face shield, if needed), ensure that all instruments are returned to the cassette, which is then closed and locked.
- Ensure that all sharps are placed in the red sharps container, if this has not already been done. This includes burs and anesthetic carpules.
- Remove all barriers and non-sharp disposables and discard, using chair

- cover as trash bag. Chair cover must be turned inside out so that contaminated surface faces inward.
- Run cleaner through vacuum system (both HVE and saliva injector) at end of day. Valves should be wide open.
  - The following surfaces must be cleaned and disinfected using the **SWS** technique or disinfectant wipes (as described above):
    - **Chair:** arm rests (if not covered by barrier)
    - **Light:** handles, switch, and lens (make sure there are no streaks or droplets left on light lens; clean only after light has cooled)
    - **Unit:** handpiece holders, tubing, controls, switches, tray surface, HVE/saliva ejector valves, air/water syringe, composite curing light
    - **Other work surfaces:** counter tops, soap dispenser, xray view box, sink and faucet, and any other equipment that may have been touched during a procedure lens of the operating light
    - **Note:** any surface covered with a barrier need not be disinfected **UNLESS** visibly contaminated with potentially infectious material. The only exception to this are the air/water syringes, saliva ejectors, and HVEs; these must be disinfected even if covered with barrier
  - When using a **closed system** (see section on Dental Unit Waterline Maintenance for definition of a closed system), the handpiece and air/water syringe lines should be flushed (water allowed to run into a sink) for 30 seconds at the end of each clinic session.

## Dental Unit Waterline Maintenance

There is evidence that biofilms often form in dental unit waterlines. The source of most of these organisms is from the water supply. The health consequences of the biofilm is not known, but it is clear that large numbers of bacteria are released into the water when such biofilms are present. Such organisms could, conceivably, pose a threat to patients or dental healthcare workers. Therefore, precautions must be taken to protect the safety of all concerned. The systems are tested periodically to ensure that the effluent meets EPA standards for drinking water quality, as specified in the CDC Guidelines.

The water systems may be divided into open and closed systems. Open systems are those that receive water from the city water system, while closed systems have a bottle that serves as a water source. The two systems require different protocols to maintain acceptable water quality.

**Open systems.** Open systems are connected to the city water supply. Open systems are found on the second and third floor clinics, and faculty patient care. Based on our own microbiological research, the UKCD protocol for open water systems requires that the handpiece and air/water syringe be flushed for 3 minutes prior to each clinic session. Therefore, if you are scheduled to see a patient on the second or third floor clinic, you should flush the lines for 3 minutes shortly before the patient is seen. Following treatment, the lines should be flushed for 20-30

seconds. Periodically, the Safety and IC Committee monitors these lines microbiologically.

**Closed systems.** Closed systems are found in the Delta Dental of Kentucky Clinical Research Center (3<sup>rd</sup> floor), Graduate Periodontology Clinic (4<sup>th</sup> floor), and in miscellaneous areas throughout the College of Dentistry system (e.g., vans). Closed water units can readily be identified by the bottle attached to the unit (see below).



**Figure 6: Closed water system**

Closed systems are monitored for effluent quality by the Safety and Infection Committee. If effluent is unacceptable, you will be informed. Initially, the system will be “shocked” by using Sterilex Ultra, a waterline disinfectant on three successive nights. The directions for Sterilex Ultra are as follows:

- 1) At the end of the workday, add 8 ounces of hot water to a Sterilex measuring cup or beaker.
- 2) Add one package of Sterilex Ultra to the hot water and stir until dissolved. The resulting solution should appear pink. Pour this solution into the water reservoir bottle and screw onto unit. The bottle should be a high-density polyethylene bottle of at least 0.08 inches wall thickness.
- 3) Run the solution through the unit until the pink solution appears at the end of the air/water syringe and handpiece lines. Always remove the handpiece before running the solution through the system. Failure to do so may cause serious damage.
- 4) Allow the solution to sit in the unit overnight. Place ends of handpiece lines and air/water syringe in a sink or container in case solution drips overnight.
- 5) Before patients are seen the next day, discard the remaining pink solution and rinse the reservoir bottle with hot water.
- 6) Fill the bottle with hot water and flush all handpiece lines and air/water syringe until the bottle is empty.
- 7) Refill bottle with water and drop in one ICX tablet.
- 8) At the end of the workday, repeat the above sequence. Do this for two additional nights (that is, at the end of the treatment period, you will have run Sterilex Ultra through the unit three times).
- 9) Thereafter, the dental unit waterlines should be treated daily with ICX tablets.
- 10) The water from the unit will be tested monthly by a designated member of the Safety and Infection Control Committee.

If the water quality is acceptable from the beginning, the lines should be maintained by adding an ICX tablet every time the water bottle is empty. Simply place a tablet into the bottle, fill the bottle, and attach it to the unit. When using a closed system, the handpiece and air/water syringe lines should be flushed (run into a sink) for 30 seconds at the end of each clinic session.

*Safety precautions.* The Sterilex Ultra product is an oxidizing agent. Read the instructions that come with material thoroughly before using. If they differ from what is contained in this manual, follow the instructions that come with the Sterilex. Avoid contact with skin and eyes. If the product gets into the eyes or on skin, flush thoroughly. Do not ingest. If swallowed, get immediate medical attention and drink large quantities of water.

## Review Questions

Light handles should be \_\_\_\_\_<sup>50</sup> when preparing a treatment room.

During surgery, the air/water syringe \_\_\_\_\_<sup>51</sup> be used to irrigate the mouth.

Surface disinfectants must be certified to be \_\_\_\_\_-cidal<sup>52</sup> to be used at UKCD for routine disinfection of treatment surfaces.

You are seeing a patient in the second floor clinic. How long (and when) should the waterlines be flushed?<sup>53</sup> Why?<sup>54</sup>

Closed water systems must be flushed for 3 minutes prior to each use (true, false).<sup>55</sup>

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<sup>50</sup> Covered with a barrier. Ideally, a purpose-built plastic sleeve should be used. During surgery, sterilizable handles or sterile covers are required.

<sup>51</sup> Should not

<sup>52</sup> tuberculocidal; these are also classified as “Intermediate-level” disinfectants by the EPA

<sup>53</sup> The handpiece and air/water syringe should be flushed for 3 minutes shortly before seeing the patient.

<sup>54</sup> Because research conducted at UKCD revealed that it took this long to

<sup>55</sup> False. Closed systems are chemically disinfected at UKCD and do not require flushing prior to patient use. They should be flushed for 30 seconds at the end of each clinic session, however.

## **Medical Waste**

Waste generated in the clinics of UKCD can generally be separated into regulated and non-regulated medical waste. Many studies have demonstrated that general medical waste from hospitals (similar to that generated by a dental facility) is no more infective than normal household waste. The CDC states that the “majority of soiled items in dental offices are general medical waste and thus can be disposed of with ordinary waste. Examples include used gloves, masks, gowns, lightly soiled gauze or cotton rolls, and environmental barriers (e.g., plastic sheets and bags) used to cover equipment during treatment.” While it is true that any item that has had contact with blood is potentially infective, the CDC further states that “treating all such waste as infective is neither necessary nor practical.”

Regulated medical waste, on the other hand, carries risk of infectivity and is subject to special rules governing storage, transportation, and disposal. Examples of such waste include extracted teeth, sharps (blades, burs, needles, carpules), excised tissues, and materials that are “soaked or saturated” with blood or bodily fluids or OPIM. Sharps should be placed in a purpose-built, color-coded, puncture-resistant container that is prominently marked with the universal biohazard symbol. Non-sharp regulated waste may be safely placed in a heavy gauge, leak-proof bag. Such bags should be securely closed prior to transport. Sharps containers should also have tight-fitting, secure lids that permit safe transportation to a disposal facility.

At UKCD, we have elected to err on the side of safety and treat all material that is contaminated with blood as regulated medical waste. This would include masks, gloves, disposable gowns, gauze, etc. All such waste is to be placed into the appropriate regulated medical waste containers (red cans or bags with the biohazard symbol on them) and disposed of by the housekeeping staff according to protocols described elsewhere. If you are in doubt as to whether a particular item should be placed in a regulated waste container, err on the side of caution and treat it as regulated waste.

Liquid waste (such as blood and liquid from evacuators and plaster traps) may be disposed of in the sanitary sewage system, unless this is contrary to local or state law. There is no evidence of any harm from this practice, and the sanitary sewage system is designed to deal with materials having a high bioburden. When disposing of such liquids, however, the DHCP must wear suitable PPE, including a face shield to prevent contact with the eyes or mouth in the event of splashes and spills.

### ***Handling of Biopsy Specimens and Extracted Teeth***

The following procedures shall be followed when handling human tissue or biopsy specimens:

- during transport, the tissue specimen must be contained in a purpose-built, leakproof container labeled with the biohazard symbol
- if the outer surface of the specimen container is visibly contaminated, it should be cleaned and disinfected, and the container placed in an impervious bag (labeled with the biohazard symbol)
- during surgery, a second assistant or some other DHCP must open the container to allow the specimen to be deposited; the unsterile outer surface of the container should not be touched by the operator or surgical assistant (if this occurs, the individual must remove gloves, wash hands, and reglove before resuming surgery)
- the unsterile biopsy container should not be placed on the sterile drape or in proximity to sterile instruments
- instruments (such as tissue forceps) which touch the biopsy container are no longer considered sterile and must not touch sterile instruments or the patient's tissues

The following procedures should be followed when dealing with extracted teeth:

- extracted teeth should be disposed of as medical waste unless returned to the patient or used for educational purposes
- before being used for educational purposes, extracted teeth should be heat-sterilized (unless they contain amalgam)
- such teeth must be cleaned and placed in a leakproof and puncture-proof container marked with biohazard symbol
- extracted teeth containing amalgam shall not be placed with medical waste that is to be incinerated
- the CDC is not clear as to how amalgam-containing teeth should be disposed of or sterilized for educational use
- in the absence of clear recommendations, high-level disinfection (using sodium hypochlorite or similar agent) shall be used to disinfect teeth to be used for preclinical courses

## Medical Waste

- Nonregulated
  - General waste = residential waste
  - Examples:
    - Gloves
    - Masks
    - Gowns
    - Lightly soiled gauze or cotton rolls
    - Environmental barriers
  - Discard in regular trash
- Regulated
  - A limited subset of all medical waste
  - Requires special storage, handling, and disposal
  - Examples of regulated waste:
    - Gauze saturated with blood
    - Extracted teeth
    - Sharps
    - Human tissue

Figure 7: Regulated and nonregulated medical waste (from CDC Guidelines; note that UKCD protocols are stricter, calling for all blood-contaminated material to be treated as regulated medical waste).

### Non-sharp medical waste must be disposed of in designated receptacles containing special red bags

All bags and receptacles must be clearly marked with biohazard sign. Biohazard trash bags are for regulated medical waste only. They will be disposed of nightly by the housekeeping crew. They are sterilized and disposed of. Such bags are NEVER placed in the regular trash or a dumpster.



Sharps container could be easily kicked over and should not be left here

Figure 8: Regulated waste must be properly disposed of.

## Laboratory Precautions

Dental impressions and prostheses shall be considered contaminated with BBF. Therefore, special precautions must be taken when working with these materials. In the laboratory, all DHCP shall follow the following protocols:

- PPE must be worn when handling or working with items, until they have been disinfected
- All impressions and prostheses shall be disinfected in the clinical unit ***before being transported to the laboratory*** using an EPA-registered disinfectant of at least intermediate activity (tuberculocidal). This includes the student laboratories on the second and third floors.
- dental lab supervisory personnel should consult with manufacturers regarding the stability of specific impression materials in the presence of disinfectants
- when materials (such as impressions) are sent to off-site laboratories, a note should be included that describes the disinfectant protocol used
- all disinfectants should be used for the time recommended by the manufacturer
- it may be convenient to place the impression in an impervious container or bag after treatment (while still wet with the disinfectant), if this is acceptable according to the manufacturer of the impression material
- clean and heat-sterilize all heat tolerant materials used intraorally (e.g., impression trays, facebow forks)
- the CDC recommends following manufacturers' recommendations regarding instruments and materials that become contaminated but do not normally contact the patient. This would include laboratory burs, polishing points, rag wheels, articulators, laboratory workpans, and lathes/chucks. Heat-tolerant items should be heat-sterilized. If heat-intolerant, items should be cleaned and disinfected with a disinfectant possessing tuberculocidal activity.
- if ultrasonic cleaners are used to clean prostheses or other items which are to be inserted in the patient's mouth, they must first be placed in a sealed, impervious receptacle containing cleaner. The clinic unit manager of laboratories will take steps to ensure that the receptacles used are of such a design that they remain impervious during operation of the ultrasonic device.
- the ultrasonic cleaners in the laboratories will be drained and cleaned daily. If the holding tank or reservoir is removable and heat tolerant, it shall be heat-sterilized. If not, it shall be disinfected using an EPA-registered tuberculocidal disinfectant.

- like all spaces, the laboratories shall be inspected weekly by the LSO for the clinical unit in charge of the particular laboratory.

## **Sterilization and Instrument Processing**

### **Instrument transport**

- Instruments should be in puncture-proof container that will prevent accidental percutaneous injuries during transport
- Contaminated fluids should not be allowed to leak; if spills occur, they must be reported and cleaned/disinfected ASAP
- Contaminated instruments should be transported to the ground floor using only the specially designated elevators located behind the main elevators (they are NOT to be transported in the elevators used by patients) OR in the regular elevator (but no occupants other than the DHCP transporting the instruments can be aboard the elevator if this is done)
- Carts used for this purpose should not be overloaded and should have a lip to prevent items from falling off cart
- They should be covered with one of the special covers available for this purpose
- Clean PPE must be worn when leaving the treatment area with a load of contaminated instruments

### **Instrument processing areas**

- All instruments should be processed in designated area
- Should be partitioned:
  - Receiving, cleaning, decontamination
  - Presterilization preparation and packaging
  - Sterilization
  - Storage
- These should be physically separate (ideally they should be separated by walls or partitions)

### **Instrument categories**

- Critical items shall be heat-sterilized
  - These penetrate soft tissue and bone
  - Dental handpieces are included in this group
- Semi-critical items shall be heat-sterilized unless heat-intolerant, then high-level disinfection mandatory
  - These touch mucosa and nonintact skin
  - LSO should forward list of all such items to Safety/IC Committee for file (IC Survey) Heat tolerant items should be substituted, if possible

### **Sterilization process**

- All sterilizing units must be registered with SIC
- Correct time/temperature settings must be used
- Gauges should be observed during operation
- Mechanical, chemical, and biological monitors should be used (per manufacturer's instructions) to monitor sterilization process
- Monitor each load with mechanical and chemical indicators
- Monitor weekly using biological indicators and control
- A log must be maintained of all biological tests
- Monitor each load that contains an implantable device
- Follow protocol in event of positive spore test
- Loads must be marked so that they can be identified in case of positive spore test

### **Instrument storage**

- After sterilization, the instrument packs must be placed in a clean, dry, covered storage area
- Should be marked with date to facilitate retrieval in case of positive spore test
- Storage is "event-related" – if packaging is intact, sterility is assumed

### **"Flash sterilization"**

- Normally, instruments should be packaged prior to sterilization
- So-called "flash sterilization" should be avoided and only employed as an emergency procedure
- If used, instrument should be dried in autoclave and taken immediately to area of use
- Transport aseptically and protect DHCP against burns from hot items

### **Protocol for positive spore test**

- Remove sterilizer from service
- Review process to identify possible operator error
- Retest unit with biological indicator and control
- If repeat test is negative and chemical/mechanical indicators OK, place unit back in service

- The exposure control coordinator (3-5786) and Ms. Sandy Marks of Central Sterilization shall be notified of all positive spore tests and other instances of possible autoclave malfunction

## **Dental Unit Waterlines, Suction Devices, and Surgical Irrigation**

There is strong evidence that biofilms form in the tubing of dental units (“dental unit waterlines” or DUW). The organisms are primarily derived from the water supply, but some may originate from patient flora. These organisms populate the inner surface of the tubing in a matrix-enclosed community. Biofilms are very difficult to eradicate. The health implications of these biofilms is not entirely clear. It has been reported that many dental units that have been tested do not meet minimum EPA standards for drinking water quality (i.e.,  $\leq 500$  CFU/mL of heterotrophic water bacteria). It is also clear that organisms from the biofilm are released into the tubing and will enter the patient’s oral cavity through the air/water syringe or handpiece irrigant.

There does not seem to be a universal consensus as to how to best deal with this problem. The CDC has recommended the following steps be taken:

- use water that meets EPA minimum drinking standards of  $\leq 500$  CFU/mL (this implies testing of the water supply)
- consult with the manufacturer of the dental unit regarding the best method to maintain acceptable water quality
- most of the units in the College system are manufactured by ADEC. The manufacturer recommends the following protocol be used:
  - flush the system for a minimum of 20-30 seconds before and after patient contact as follows: on the second and third floor clinics, there is a knob on the right hand side of the handpiece console next to the adjustment knob for water flow. The high-speed handpiece tube should be held over a sink or bucket and the knob pressed for 20-30 seconds to flush the lines. At the beginning of the day, this should be done for 2-3 minutes. Unfortunately, the flush knob does NOT automatically flush the air/water syringe, which must also be flushed (manually by depressing the water and air buttons and discharging water into sink for the same times listed above).
  - in the case of ADEC units with dedicated clean water systems, see below
- if your unit is using non-ADEC equipment, consult the manufacturer about testing and maintenance of antiretraction devices (these prevent fluid from sucked back into the dental unit). Our ADEC units are designed not to have this problem and should not require special maintenance.
- in the case of a boil water advisory, public water must NOT be used in dental units or for patient rinsing, drinking, or for handwashing by DHCP

- hands should be cleaned using alcohol-based handrubs or antiseptic soap and distilled/bottled water or an antiseptic toilette (e.g., alcohol swab)
- following lifting of the advisory, follow guidance of water company or health department regarding water lines; if no guidance is issued by these organizations, flush dental waterlines and faucets for 5 minutes before using for patient care; disinfect lines as recommended by the manufacturer

In case of a “boil water advisory” what steps must be taken?<sup>56</sup>

***ADEC Clean Water System Disinfectant Protocol (Graduate Periodontology and FPC and other units with closed water system)***

The following protocol is based on ADEC recommendations. An alternative is to use the special tablets available from ADEC (if these are used, follow instructions on package). Regardless of method used, only sterile water should be put in reservoir bottle.

- Each week, a fresh disinfectant solution should be mixed as follows:
  - disinfectant solution: one part household bleach plus nine parts tap water
  - to prepare the solution, use 75 ml or 2.5 oz of bleach and mix with 675 ml or 22 oz tap water
- Each day, the following protocol should be observed:
  - remove and empty the installed water bottle
  - hold handpiece tubings and syringe over a basin or bucket. Turn the unit on, wait a few moments, then operate the unit flush valve, syringe and foot control until the water is pumped from the system
  - turn off the unit
- Weekly procedures (perform at the beginning of the week)
  - make sure the system is purged of air and emptied as described above
  - fill and flush with disinfectant
    - make sure unit is off. Remove empty water bottle and fill with disinfectant. Shake it and let it stand for 10 minutes. Shake again and rinse twice with sterile water.

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<sup>56</sup> Tap water should not be used for handwashing or preparation of solutions to be used in patient care. The airwater syringe, ultrasonic scaler, and handpiece irrigation systems cannot be used unless the unit has a dedicated clean water supply. Patients should not rinse with tap water. Bottled or distilled water must be used.

- take a disinfected bottle and add approximately 750 ml (25 oz) of the disinfectant solution
- hold handpiece tubings and syringe over a basin or bucket. Turn unit on, wait a few moments, then operate unit flush valve, syringe, and foot control until a steady stream of disinfectant solution begins flowing through the unit (15-20 seconds)
- then quit flushing and allow solution to remain in unit for at least 10 minutes (**never more than 30 minutes**)
- purge unit with air
  - install an empty bottle to the unit. Hold handpiece tubings and syringe over a basin or bucket. Turn unit on, wait a few moments, then operate unit flush valve, syringe, and foot control until disinfectant is purged from system.
- turn unit off, remove bottle and fill with sterile water
- hold handpiece tubings and syringe over a basin or bucket. Turn unit on, wait a few moments, then operate the unit flush valve, syringe, and foot control until a steady stream of water begins to flow (which should take about 20-30 seconds).
- Unit is now ready for use.

**Note: allowing the disinfectant solution to stand for longer than 30 minutes may damage the unit due to the corrosive nature of hypochlorite. ADEC specifically recommends that tap water be used to dilute the hypochlorite, because minerals in the water apparently somewhat neutralize the effect of the hypochlorite.**

## ***Dental Handpieces and Suction Devices***

Dental handpieces do not actually penetrate intact mucosa and are therefore classified as \_\_\_\_\_<sup>57</sup> items. Despite this, all dental handpieces **MUST** be cleaned, lubricated, and **heat-sterilized** between patients. At UKCD, the manufacturer's instructions must be followed regarding the manner in which this is to be done. No handpiece will be used in the UKCD clinics that is incapable of withstanding heat sterilization (unless it is a one-use disposable handpiece). Following use, high-speed handpieces should be run (with a bur in the chuck and with irrigant flowing) for approximately 20-30 seconds to clear the lines. Hold the handpiece over the sink or other container to catch the water. PPE should be worn during this procedure.

Suction devices used for surgery should be sterilized. If used for nonsurgical procedures, then single-use items are acceptable. If a saliva ejector is being used, the patient should be directed **NOT** to close his or her lips around the tips as this may result in material from the suction system entering the mouth. When possible, saliva ejector and high-volume evacuation (HVE) valves (the devices that the suction tips plug into) should be removable and sterilizable. This would be particularly if the treatment room is used for surgical procedures. If this is not feasible, the valves should be cleaned thoroughly with an intermediate-level EPA-registered hospital disinfectant.

Why should the patient **NOT** close their lips around the saliva ejector (as is commonly done)?<sup>58</sup>

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<sup>57</sup> semicritical

<sup>58</sup> Backflow from the saliva ejector can occur and microorganisms from the suction tubing will enter the patient's mouth, setting the stage for a potential infection.

## ***Parenteral Medications***

Parenteral medications pose special hazards as they are injected directly into the patient's body. To reduce the possibility of contamination, single-dose vials should be used whenever possible. If multi-use vials are used, the medications should be "drawn up" at a site distant from the actual treatment area. Prior to drawing up medications, the diaphragm (rubber top) should be thoroughly wiped with 70% alcohol and permitted to dry or wiped dry with a sterile gauze sponge. The vial should be kept stored in a secure, locked area where it is not subject to aerosols, etc., that might contaminate the top. Therefore, such vials should never be kept in treatment rooms or near ultrasonic cleaners in sterilization areas.

You are preparing to see a patient for extraction of wisdom teeth in the Oral Surgery Clinic. You have been instructed to draw up 25 mg of promethazine from a multi-use vial. Prior to drawing up the medication, you should \_\_\_\_\_<sup>59</sup>(phrase).

You are asked to review the drug inventory in the Graduate Periodontology Clinic and find that the most commonly used sedative is midazolam. It is ordered in multi-use vials containing 50 ml. Ideally, these vials should be replaced with \_\_\_\_\_<sup>60</sup> (2-3 words) when re-ordering.

It is best to draw the medications up in the treatment room and leave the multi-use vial near the chair, in case more of the agent must be given.<sup>61</sup> (True or false))

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<sup>59</sup> wipe the top of the vial off with 70% alcohol and then dry with a dry gauze sponge.

<sup>60</sup> single dose vials

<sup>61</sup> False. The vial should be kept AWAY from treatment room in order to reduce the chance for contamination of the diaphragm surface due to aerosols generated during surgery.

***Biopsy Containers (see also section on Medical Waste)***

Biopsy containers must be kept tightly sealed, as they usually contain formalin or some other toxic tissue preservative. They must be clearly marked with the universal biohazard symbol. During surgery, it is helpful if a second assistant can open the vial while the operator or first assistant drops the specimen into the container. This prevents the surgical team from touching the surface of the vial. Such contact will: 1) contaminate the outer surface of the vial (which must be disinfected with a tuberculocidal disinfectant before sending to the laboratory) and 2) contaminate the surgeon's gloves with whatever organisms are on the surface of the container. These organisms can then be introduced into the patient's mouth or biopsy site.

The surgeon and assistant must not \_\_\_\_\_<sup>62</sup> the biopsy container during the procedure.

If the outer surface of the container is touched, it must be \_\_\_\_\_<sup>63</sup>(1 word) with a \_\_\_\_\_<sup>64</sup>(2 words)

***Extracted Teeth.***

Extracted teeth should be considered medical waste and disposed of in puncture-proof sharps containers. Before being used for educational purposes, extracted teeth must be heat-sterilized (unless they contain amalgam). If amalgam restorations are present, the teeth should be soaked for a prolonged period in hypochlorite or some other high-level disinfectant..

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<sup>62</sup> touch

<sup>63</sup> disinfected

<sup>64</sup> tuberculocidal disinfectant

## Quality Assurance, Program Evaluation, and Outcomes Assessment

Various assessment methods are used to ensure that the treatment delivered at UKCD is safe and effective. With regard to infection control, a number of outcomes are monitored and used to apply corrective measures where necessary. These are described below.

- Standardized protocols and training materials
  - all IC protocols used in the College must be approved by the Safety and Infection Control Committee
- Active oversight by Safety and IC Committee
  - meetings with UKDCB or separately, as may be required
  - monthly report to Dean and Executive Dean
- Ongoing quality assurance program consisting of:
  - evaluation and testing of new devices that may reduce chances for cross-infection (responsibility resides with SIC and Safety/IC officer, but actual testing will normally be delegated to others)
  - documentation of all instances of post-treatment infection that may be linked to the dental workplace
  - documentation of all occupational exposures
    - with immediate analysis of incident to identify correctable causes or needed change in protocol
    - all exposures and disposition (changes to protocol) disseminated in monthly Safety/IC Newsletter
  - installation of local safety and infection control officers (LSOs) who are responsible for monitoring compliance with IC protocols and hand hygiene in each clinical unit area
  - unannounced walk-through inspections by teams consisting of LSOs from other areas and Safety/IC Officer (or designee)
- Citation system in which LSO or other designated personnel can issue citations to DHCP who are not in compliance with IC plan
  - corrective action will be applied to those who receive more than 3 citations per year
  - ***such action may include mandatory IC training and/or revocation of clinical privileges by the Associate Dean for Clinical Affairs***
- Active immunization program
  - annual review of immunization records conducted to ensure that all DHCP are immunized as recommended
- Comprehensive postexposure control plan consisting of:
  - documentation, incident analysis, and corrective action

- annual training and monthly newsletter reminding all DHCP of postexposure plan
- convenient medical testing, treatment, and follow-up provided
- Instrument processing and sterilization
  - ongoing monitoring of sterilization
  - labeling of instruments to permit easy identification of kits by load in event of sterilization failure
  - written sterilization failure protocol
- Surveillance
  - unusual infections (whether DHCP or patients) reported to Safety and Infection Control Committee so that prompt epidemiologic investigations may be initiated when needed (and carried out with input from School of Public Health)
  - water quality monitored quarterly or more often as needed
  - implantable device/material log (see below) to permit rapid identification and notification of patients receiving implantable materials (in event of FDA recall)

### ***Implantable Device Registry***

Clinical science has greatly expanded our options for treatment of lost or missing tissues. This includes the implantation of various grafts and other forms of implants. Unfortunately, such devices have the potential to transmit disease or act as substrates upon which organisms can colonize. Additionally, patients may experience allergic or other reactions to the materials contained in the implant. Although such materials undergo testing to ensure safety, problems may occur nevertheless. Therefore, it is mandatory that institutions or surgeons be able to identify all patients who received a certain type of implant or graft. This would permit rapid identification in the event of a recall. At UKCD, we have established such a registry. Any clinical unit in which surgical implantation occurs are required to maintain an electronic and hard copy registry for any implant or graft used. The registry must be specific to that type and brand and must contain salient information such as date and circumstances of placement, lot number, amount, etc. A blank log form can be found in Appendix E. Each month, a copy of the form must be forwarded to the Office of Clinical Affairs. Each unit must maintain a comprehensive electronic and hard copy files of all such implants and such files will be maintained indefinitely. Appropriate steps must be taken to back up this data so that it is not lost in the event of computer malfunction.

## **Appendices**

- A. CDC's Guidelines for Infection Control in Dental Health-Care Settings  
2003***
- B. Sample Clinic Inspection Form***
- C. Safety / IC Citation Form***
- D. Sterilization Monitor Log***
- E. Implantable Device Registry Form***
- F. LSO and Unit Manager Roster***

**Appendix A: CDC Guidelines for  
Infection Control – 2003**

**Insert Copy of CDC Guidelines Here**

## **Appendix B: Clinic Inspection Form**

**Appendix C: Safety / Infection Control**  
**Violation Report**

## Safety / Infection Control Violation Report

Name of reporting LSO: \_\_\_\_\_

Name of violator: \_\_\_\_\_

Date: \_\_\_\_\_

Location: \_\_\_\_\_

Nature of violation:

Route to:

- Clinic Unit Manager
- Safety and Infection Control Committee
- Associate Dean for Clinical Affairs

Sanctions (including revocation of clinical privileges) may be applied as deemed necessary by the Associate Dean for Clinical Affairs.

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## **Appendix D: Sterilization Monitor Log**



**Appendix E: Implantable Device/Graft  
Registry Form**



**Appendix F: LSO and Clinic Unit  
Manager Roster**

**Local Safety/Infection Control Officers (LSOs)  
University of Kentucky College of Dentistry**

Revised 5 20 2004

Clinical Unit	Unit Manager	email/phone/pager	Local Safety IC Officers	email/phone/pager
Predocloral clinics	T McConnell	<a href="mailto:tamcco1@uky.edu">tamcco1@uky.edu</a> 7-4809	T McConnell	<a href="mailto:tamcco1@uky.edu">tamcco1@uky.edu</a> 7-4809
Kentucky Clinic	T Raybould	<a href="mailto:tprayb1@uky.edu">tprayb1@uky.edu</a> 3-6513	J Burt & E. Turner	<a href="mailto:jburt0@uky.edu">jburt0@uky.edu</a> 3-4817 <a href="mailto:eturn0@uky.edu">eturn0@uky.edu</a> 7-6029
Kentucky Clinic S	T Raybould	“	S Fraley	<a href="mailto:sfral2@email.uky.edu">sfral2@email.uky.edu</a> 7-9272
Kentucky Clinic N	T Raybould	“	D Lewis	<a href="mailto:dmlewi4@email.uky.edu">dmlewi4@email.uky.edu</a> 3-5562
Family Care Ctr	T Raybould	“	D Meek	<a href="mailto:drdonna23@hotmail.com">drdonna23@hotmail.com</a> 288-4076 288-4084
OMFS	J Van Sickels	<a href="mailto:vansick@uky.edu">vansick@uky.edu</a> 3-6101	D Durham	<a href="mailto:dmdurh2@uky.edu">dmdurh2@uky.edu</a> 3-5740
Orofacial Pain	J Okeson	<a href="mailto:okeson@uky.edu">okeson@uky.edu</a> 3-5358	M Herrington	<a href="mailto:mrharr0@uky.edu">mrharr0@uky.edu</a> 3-5500
Orthodontics <sup>65</sup>	T Kluemper	<a href="mailto:gtklu1@uky.edu">gtklu1@uky.edu</a> 7-2171	P Hicks	<a href="mailto:ephick0@uky.edu">ephick0@uky.edu</a> 3-6520
Pediatric Dentistry	J Mink	<a href="mailto:jmink1@uky.edu">jmink1@uky.edu</a> 3-5556	see KY Clinic	
Periodontology	M Thomas	<a href="mailto:mvthom0@uky.edu">mvthom0@uky.edu</a> 3-6810	C Huffman	<a href="mailto:cehuff0@uky.edu">cehuff0@uky.edu</a> 3-5557
Radiology	D Falace	<a href="mailto:dfalace@uky.edu">dfalace@uky.edu</a> 3-5279	P Jaquith	<a href="mailto:jpjaqu1@qx.net">jpjaqu1@qx.net</a> 3-6331
Faculty Clinic	C Thomas	<a href="mailto:cathom1@uky.edu">cathom1@uky.edu</a> 3-5486	G Jarboe	<a href="mailto:gsjarb2@uky.edu">gsjarb2@uky.edu</a> 3-5831
Public Health	R Mullins	<a href="mailto:mraynor@uky.edu">mraynor@uky.edu</a> 3-6444	P Dominique	<a href="mailto:padomi0@uky.edu">padomi0@uky.edu</a> 3-6400
Facilities Maintenance	M Florence	<a href="mailto:maflor01@uky.edu">maflor01@uky.edu</a> 3-5789	M Florence	<a href="mailto:maflor01@uky.edu">maflor01@uky.edu</a> 3-5789
Custodial Svcs	M Florence	<a href="mailto:maflor01@uky.edu">maflor01@uky.edu</a> 3-5789	M Florence	<a href="mailto:maflor01@uky.edu">maflor01@uky.edu</a> 3-5789
Sterilization	S Marks	7-1459	S Marks	<a href="mailto:smark2@uky.edu">smark2@uky.edu</a> 7-1459
Ceramics Lab	A Chaney	<a href="mailto:alchan1@yky.edu">alchan1@yky.edu</a> 7-6505	A Chaney	<a href="mailto:alchan1@yky.edu">alchan1@yky.edu</a> 7-6505

<sup>65</sup> Includes Orthodontic Faculty Practice located in Kentucky Clinic

<i>Prosthodontic Lab</i>	R Dennis	<a href="mailto:rldenn2@uky.edu">rldenn2@uky.edu</a> 3-5969	R Dennis	<a href="mailto:rldenn2@uky.edu">rldenn2@uky.edu</a> 3-5969
<i>Research</i>	J Novak	<a href="mailto:mjnova2@uky.edu">mjnova2@uky.edu</a> 3-5159	Amelia Buell	<a href="mailto:abuel2@email.uky.edu">abuel2@email.uky.edu</a> 3-4923
<i>Staff Support Svcs</i>	B Short	<a href="mailto:rbshor2@uky.edu">rbshor2@uky.edu</a> 7-1491	Keith Shelton	<a href="mailto:keshel2@email.uky.edu">keshel2@email.uky.edu</a> 7-1491

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