DENTAL INFECTION CONTROL: Are You Compliant
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COURSE OUTLINE

I. OSHA Bloodborne Pathogens Standard
II. CDC Guidelines
III. Influenza Virus Infections
   a. Symptoms and Diagnosis
   b. Treatment and Vaccination
   c. Management of the symptomatic dental patient
IV. CDC Recommendations for Infection Control- Protocols and Procedures
   a. Preventing Transmission of Bloodborne Pathogens
   b. Personal Protective Equipment
   c. Contact Dermatitis and Latex Hypersensitivity
   d. Dental Laboratory Exposure Risk and Safety
   e. Sterilization and Disinfection of Patient-Care Items
   f. Environmental Infection Control
   g. Dental Unit Waterlines, Biofilm, and Water Quality
   h. Special Considerations
V. Safety Instruments and Supplies

Why Is Infection Control Important in Dentistry?
- Both patients and dental health care personnel (DHCP) can be exposed to pathogens
- Contact with blood, oral and respiratory secretions, and contaminated equipment occurs
- Proper procedures can prevent transmission of infections among patients and DHCP

Modes of Transmission
- Direct contact with blood or body fluids
- Indirect contact with a contaminated instrument or surface
- Contact of mucosa of the eyes, nose, or mouth with droplets or spatter
- Inhalation of airborne microorganisms
Novel H1N1 Influenza Virus

■ Symptoms
  ◦ Fever
  ◦ Lethargy
  ◦ Lack of appetite
  ◦ Cough
  ◦ Runny nose
  ◦ Sore throat
  ◦ Nausea
  ◦ Vomiting
  ◦ Diarrhea

■ Diagnosis: a respiratory specimen is collected within first 4-5 days of illness (period of viral shedding); children may shed virus for $10 \leq 5$ days (specimen needs to be sent to CDC)

■ Treatment:
  o Palliative care
  o Antivirals
  o Oseltamivir (Tamiflu)
  o Zanamivir (Relenza)

H1N1 and underlying medical conditions

■ The following medical conditions put patients at increased risk of complications or death:
  ◦ Pregnancy
  ◦ Asthma
  ◦ Diabetes
  ◦ Immune suppression
  ◦ Heart disease
  ◦ Kidney disease
  ◦ Neurocognitive and neuromuscular disorders

■ Warning Signs Indicating Need for Urgent Medical Attention
  o Children
    ▪ Fast breathing or difficulty breathing
    ▪ Bluish or grey skin color
    ▪ ↓ fluid intake
    ▪ Severe/persistent vomiting
    ▪ Difficulty waking
    ▪ Being so irritable not wanting to be held
    ▪ Flu-like symptoms improve but then return with fever and worse cough
  o Adults
    ▪ S.O.B./difficulty breathing
    ▪ Pain/pressure in chest and abdomen
    ▪ Sudden dizziness
    ▪ Confusion
    ▪ Severe or persistent vomiting
    ▪ Flu-like symptoms improve but then return with fever and worse cough

■ Vaccination
  o If supplies are adequate:
    ▪ Pregnant women
    ▪ Household contacts and caregivers of those <6 mos.
    ▪ Healthcare and emergency personnel
    ▪ 6 mos.—24 years
    ▪ Adults 25—64 years with associated health risks
  o If supplies are limited:
- Pregnant women
- Household contacts and caregivers of those <6 mos.
- Healthcare and emergency personnel
- 6 mos.—4 years
- 5—18 years with associated health risks

Diagnosis: a respiratory specimen is collected within first 4-5 days of illness (period of viral shedding); children may shed virus for 10 ≤ days
  - Nasopharyngeal swab *
  - Nasal swab *
  - Throat swab
  - Nasal aspirates

Management
  - Self-isolate in their home for 7 days after the onset of illness or at least 24 hours after symptoms have resolved, whichever is longer.
  - Wear a face mask to reduce the risk of spreading the virus (cough, sneeze, talk or breathe); should use a handkerchief or tissues to cover any coughing.
  - Frequent hand washing with soap and water. Use alcohol-based hand gels (containing at least 60% alcohol) when soap and water are not available and hands are not visibly dirty.

Treatment
  - Palliative care for uncomplicated febrile illness
    - Non-aspirin, anti-pyretic medications
    - Acetaminophen
    - Non-steroidal anti-inflammatory medications
  + Antiviral medications
    - All hospitalized patients
    - Patients at higher risk for seasonal influenza complications

Post-Exposure Prophylaxis
  - Utilized when there is close contact by high risk individual with a person who is a confirmed, probable, or suspected case of novel influenza A (H1N1) virus infection during the infectious period (one day before symptoms to up to 7 days after illness develops; longer for children)
  - Also considered in health care personnel with unprotected close contact exposure
  - Oseltamivir (Tamiflu) or Zanamivir (Relenza)
  - 10 day course of treatment after the last known exposure

Pre-exposure Prophylaxis
  - Only utilized in limited circumstances
  - If ongoing occupational risk for exposure follow normal infection control guidelines
  - Antivirals administered during the potential exposure period and continued for 10 days after the last known exposure to a person with novel (H1N1) influenza virus infection during the case’s infectious period.
    - Hospitalized individuals
    - Long-term care facilities
    - Individuals living in close quarters
    - Individuals at risk for flu-related complications

Bloodborne viruses such as hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV)
  - Are transmissible in health care settings
  - Can produce chronic infection
  - Are often carried by persons unaware of their infection
Potential Routes of Transmission of Bloodborne Pathogens
- Patient to DHCP
- DHCP to patient
- Patient to patient

Personnel Health Elements of an Infection-Control Program
- Establish Referral Arrangements that ensure prompt and appropriate medical services
  - Preventive
  - Occupationally related
  - Postexposure management and follow-up
- Refer DHCP for Immunizations
- Consider
  - latest recommendations
  - individual medical history
  - risk for occupational exposure
  - DHCP may use prearranged OR their own health-care professional
- Post-Exposure Report
  - Date and time of exposure
  - What, where, when, how, what device
  - Route of injury, biologic material involved, volume and duration of contact
  - Source patient
  - Health status about the exposed person
  - Management details
- Medical Office Evaluation
  - Evaluate Exposure source
    - Assess risk of infection using available information
    - Test known sources for HBsAg, anti-HCV, and HIV antibody (consider using rapid testing)
    - For unknown sources, assess risk of exposure to HBV, HCV, or HIV infection
    - Do not test discarded needles or syringes for virus contamination
  - Evaluate Exposed Person
    - Assess immune status for HBV infection (i.e., by history of hepatitis B vaccination and vaccine response)
  - Give post exposure prophylaxis (PEP) for exposures posing risk of infection transmission
  - PEPl ine: The National Clinicians’ Post-Exposure Prophylaxis Hotline Phone: 1-888-448-4911 Hours: 24 hours / 7 days a week
  - If PEP is indicated or being considered, efficacy is time sensitive: first dose should be given as soon as possible. Optimal time to start PEP is within hours of exposure, rather than days. The Guidelines consider 72 hours post-exposure as the outer limit of opportunity to initiate PEP
  - Perform follow-up testing and provide counseling
  - Advise exposed persons to seek medical evaluation for any acute illness occurring during follow-up

Establish engineering controls and work practices to prevent injuries
- Evaluate Devices with Safety Features
  - At least annually and as available on the market
    - Identify
    - Evaluate
    - Select as appropriate
Needle Recapping and Disposal
- Do not direct the point of a needle toward the body
- Do not bend, break, or remove needles before disposal
- Needle recapping and/or removal—using mechanical device or one-handed technique

General Safety Measures
- Eyewash station
- First-aid kit
- Emergency action plan
- Fire prevention plan
- Job Safety and Health Protection poster
- Written inventory of hazard chemicals, along with current Material Safety Data Sheets
- Hazardous chemical containers labeled
- Spill kit
- Containers of compressed gases

Indications for hand hygiene
- Hands are visibly soiled
- After barehanded touching of objects likely to be contaminated
- Before and after treating each patient
- Before donning gloves
- Immediately after removing gloves

Hand Hygiene Definitions
- **Handwashing**
  - Washing hands with plain soap and water
- **Antiseptic handwash**
  - Washing hands with water and soap or other detergents containing an antiseptic agent
- **Alcohol-based handrub**
  - Rubbing hands with an alcohol-containing preparation
  - Should not be placed adjacent to sinks or flames
  - National Fire Protection Association amended guidelines
    - Dispensers spaced at least four feet apart
    - Maximum capacity of dispensers is 1.2 liters
- **Surgical antisepsis**
  - Handwashing with an antiseptic soap or an alcohol-based handrub before operations by surgical personnel

Personal Protective Equipment
- Wear surgical mask and eye protection with solid side shields or face shield during procedures likely to generate splashing or spattering of blood or other body fluids and/or projectiles
- Wear protective clothing that covers personal clothing and skin likely to be soiled with blood or OPIM
  - Change protective clothing if visibly soiled
  - Change immediately or as soon as feasible if penetrated by blood or OPIM
  - Consider storing gowns inside-out
- Remove all barriers before leaving work area
- **Gloves**
  - Minimize the risk of health care personnel acquiring infections from patients
  - Prevent microbial flora from being transmitted from health care personnel to patients
  - Reduce contamination of the hands of health care personnel by microbial flora that can be transmitted from one patient to another
Are not a substitute for handwashing!
- Medical gloves when a potential exposure exists
- Ensure that appropriate gloves in the correct size are readily accessible
- New gloves for each patient
- Remove promptly after use
- Remove when torn, cut or punctured
- Do not wash, disinfect, or sterilize surgeon's or medical gloves before use or for reuse
- Use puncture- and chemical-resistant utility gloves for cleaning instruments and housekeeping tasks involving contact with blood or OPIM
- Wear sterile surgeon's gloves when performing oral surgical procedures

Routes of Latex Exposure
- **Cutaneous**
  - Aided by perspiration, application of hand creams, powder in gloves
- **Mucous Membrane/Serosal**
- **Inhalation**
  - NRL proteins released from gloves can remain in the air for up to 12 hours!
- **Parenteral**

Reactions to NRL
- **Irritant Dermatitis**
- **Type IV-Delayed Hypersensitivity**
- **Type I-Immediate Hypersensitivity**
  - IgE-mediated anaphylaxis

Management of Anaphylaxis
- **Immediate:**
  - Stop allergen exposure
  - **Epinephrine:**
    - 0.3-0.5 mL I.M. 1:1000 dilution
    - Pediatric dose
      - 0.01 mL/kg 1:1000 epi
      - Repeat every 15 minutes, up to 3 doses
  - **Biphasic anaphylaxis**
    - Second-phase reaction that can occur up to 38 hours after initial reaction
    - 10 hours mean reaction time

Prevention of Anaphylaxis
- **Special considerations for treatment of latex allergic patients:**
  - **Appointment time**
    - Patients should ideally be treated as first patient of the day or 1st patient after lunch
    - This is especially important if powdered latex gloves are used in the office
  - **Operatory set-up**
    - Use non-latex gloves to set up operatory
    - “Latex Allergy” sign for the operatory to alert others
  - **Laboratory work**
    - Make sure to inform dental laboratories if a patient has a latex allergy
  - **Avoid use of latex-containing dental materials:**
    - Gloves
    - Rubber dams
    - Blood pressure cuff
    - Nitrous/O2 tubing
- Ortho elastics
- Prophy cups
- Bite blocks

Regulated Medical Waste Management
- Place sharp items in sharps container
  - Puncture resistant
  - Color-coded
  - Leakproof
  - Close container for handling, storage, transport, or shipping
- Pour blood, suctioned fluids or other liquid waste carefully into a drain connected to a sanitary sewer system, if local sewage discharge requirements are met and the state has declared this an acceptable method of disposal

Written Hazard Communication Program
- Hazardous chemical inventory
- Office labeling system
- Procedures for maintaining MSDS and making them available
- Precautions used to protect employees from hazardous chemicals
- How employees receive information and training

Classification of Patient Care Items
- Critical
- Semicritical
- Noncritical

Dental Laboratory Safety
- Coordination between dental office and lab
- Use of proper methods/materials for handling and decontaminating soiled incoming items
- All contaminated incoming items should be cleaned and disinfected before being handled by lab personnel (i.e., before entering the lab) and before being returned to the patient
- Potential Routes of Transmission
  - Direct contact (through cuts and abrasions)
  - Aerosols created during lab procedures
  - Inhaled or ingested
  - Patients can be at risk due to potential cross-contamination between dental prostheses/appliances
  - Potential for cross-contamination from dental office to lab and back to dental office
- Incoming Items
  - Rinse under running tap water to remove blood/saliva
  - Disinfect as appropriate
  - Rinse thoroughly with tap water to remove residual disinfectant
  - No single disinfectant is ideal or compatible with all items
- Outgoing Items
  - Clean and disinfect before delivery to patient
  - After disinfection: rinse and place in plastic bag with diluted mouthwash until insertion
  - Do not store in disinfectant before insertion
  - Label the plastic bag: “This case shipment has been disinfected with _____ for _____ minutes”
Heat Based Sterilizers
- Steam under pressure (autoclave)
  - Gravity under pressure
  - Pre-vacuum
- Dry Heat
  - Static air
  - Forced air
- Unsaturated Chemical Vapor
  - Alcohol/formaldehyde

Chemical Immersion Sterilization
- Use full strength on pre-cleaned instruments
- Most agents require 6-12 hours of uninterrupted contact time
- Re-use life varies with bioburden
- Unwrapped instruments subject to recontamination
- Sterilization cannot be monitored

Cleaning and Decontaminating
- Clean off all visible blood and other contamination before sterilization or disinfection
- Wear appropriate PPE when splashing or spraying is anticipated
- Manual Cleaning
  - Wear heavy-duty utility gloves
  - Wear appropriate PPE when splashing or spraying is anticipated
  - Soaking using detergent, detergent/disinfectant, or enzymatic cleaner
    - Prevents drying of patient material
    - Makes cleaning easier
    - Decreases time
    - Can decrease corrosion of instruments due to presence of rust inhibitors
- Automated cleaning equipment
  - Improves cleaning effectiveness
  - Decreases exposure to blood
  - Decreases handling of sharps

Consider work practice controls:
- Long-handled brush
- Utility gloves
- Clean instruments under water to decrease splatter
- Rinse with water afterwards

Preparation and Packaging
- Place internal chemical indicator in each package
  - If internal indicator cannot be seen from outside the package, also use external indicator (indicator tape)
- Place date of sterilization and ID of sterilizer used on outside of packaging material to facilitate retrieval of processed items in event of a sterilization failure

Sterilization Monitoring
- Monitor each load with mechanical and chemical indicators
- Use mechanical, chemical, and biological monitors according to manufacturer's instructions
Biologic Sterilization Monitoring
- Killing of the most heat resistant spores assures that sterilization has been achieved
- Most valid method- assesses the process directly
- Perform at least weekly using a biological indicator (BI) with a matching control
- Use a BI for every sterilizer load that contains an implantable device (IB)
  - Verify results before placing the device, whenever possible
- Biologic Sterilization Monitoring Laboratory Testing
  - BI strip is transferred aseptically into nutrient broth
  - Broth is incubated for up to 7 days
  - *G. stereothermophilus* at 55 to 60° C (131 to 140° F)
  - *B. atrophaeus* at 30 to 37°C (86 to 98.6° F)

Causes of Biologic Monitoring Failure
- Most failures due to operator error
- Improper
  - Precleaning
  - Loading
    - Overloading
  - Packaging
    - Wrong packaging material for sterilization method
    - Too many instruments per package
    - Excessive packaging material
  - Timing
  - Temperature
  - Pressure
  - Inadequate maintenance of sterilization equipment
  - Use of inappropriate equipment (e.g., household ovens, toaster ovens)

Surface Disinfection and Management of Regulated Medical Waste
- Use EPA-registered hospital disinfecting products
  - Routine: low- or intermediate-level disinfectant
  - Visibly contaminated with blood: intermediate-level
  - Spray-Wipe-Spray versus Wipe-Discard-Wipe

Categories of Environmental Surfaces
- Clinical contact surfaces
  - High potential for direct contamination from spray or spatter or by contact with DHCP’s gloved hand
- Housekeeping surfaces
  - Do not come into contact with patients or devices
  - Limited risk of disease transmission

Dental Unit Waterlines, Biofilm, and Water Quality
- For routine dental treatment use water that meets EPA regulatory standards for drinking water
  - <500 CFU/mL of heterotrophic water bacteria
  - 1995 ADA challenged manufacturers and researchers to deliver patient treatment water of 200 CFU/ml by the year 2000
- Consult with the dental unit manufacturer regarding periodic maintenance of anti-retraction mechanisms
- Use of self contained (independent) water systems without using chemical water treatment will have no effect on waterline biofilms.
- **Water Sources**
  - Municipal (tap water)
  - Distilled water
    - Ensures consistent delivery of water with known microbiological quality
  - Water treated with reverse osmosis
  - Independent Reservoirs
  - Sterile Water Systems
  - Filtration
  - Water purifiers
- **Dental Water Treatment Systems**
  - Commercial systems developed because it is unlikely that the water source in untreated, unfiltered dental unit waterlines meet minimal drinking water standards
    - Self contained water systems combined with water treatments (periodic or continuous chemical treatment)
    - Single chair or entire practice waterline systems that purify or treat incoming water to remove or inactivate microorganisms (nano-filtration, reverse osmosis, or UV irradiation, may include chemical agent)
  - Combinations
  - Cleaning agents can easily be introduced into the system.
  - Avoids interruptions in care during boil water advisory.
- **Chemical Products**
  - Chemical Products
  - Continuous use vs. intermittent use (a.k.a. shock tx)
  - Hydrogen Peroxide
  - Chlorine dioxide
  - Sodium hypochlorite
  - Chlorhexidine
  - Silver ions
  - Iodine
  - Ozone
  - Peracetic Acid
  - Acidic electrolyzed water
- **Monitoring Water Quality** - should be performed weekly
  - Water samples submitted and cultured at a microbiology lab or bioenvironmental engineering
    - Bacterial counts affected by:
      - Sampling method
      - Time (must be sent to lab ASAP)
      - Temp
      - Transportation
      - Culture medium
  - In-office self contained system
    - HPC Total Count Sampler by Millipore
    - Convenient
    - Easy to use
    - Certain phenotypes do not grow
    - Underestimates counts
    - Correct by factor of 1.5
Oral Surgical Procedures
- Surgical handscrub
- Use sterile saline or sterile water as a coolant/irrigant
- Use devices specifically designed for delivering sterile irrigating fluids
- Sterile gloves

Handling of Biopsy Specimens
- Place specimen in a sturdy, leakproof container labeled with the biohazard symbol
- If container is visibly contaminated, clean and disinfect the outside or place it in an impervious bag labeled with the biohazard symbol

Handling of Extracted Teeth
- Dispose of teeth as regulated medical waste unless returned to the patient

Handling of Extracted Teeth for Educational Purposes or Sent to Laboratory
- Clean and place teeth in leakproof container, labeled with a biohazard symbol, and maintain hydration for transport
- Heat-sterilize teeth that do not contain amalgam

Dental Laboratory
- Dental prostheses, appliances, and items used in their making are potential sources of contamination
- Handle in a manner that protects patients and DHCP from exposure to microorganisms
- Have separate receiving and disinfecting area established

Methicillin-Resistant S. Aureus
- Modes of transmission
  - Hands are main transmission mode
  - Infected/colonized patient or HCW
  - Transfer between facilities
- Management of risk
  - Low risk in healthy individuals
  - Proper hand hygiene is fundamental
  - CA-MRSA
  - Wash hands
  - Routinely wash and change linens
  - Maintain a clean environment

Tuberculosis: Signs and Symptoms
- Productive cough
- Pleuritic chest pain
- Fatigue
- Fever
- Night sweats
- Weight loss
- Dyspnea
- Hemoptysis
Transmission of Tuberculosis
- Organism present in sputum and possibly saliva
- Transmitted via droplet formation
  - Coughing, sneezing, talking
  - Handpiece or ultrasonic aerosol
- Disease contraction depends on
  - Number of organisms inhaled
  - Immune status of the host
- Incubation weeks to decades

Tuberculosis Infection Control Program
- Annually assess community profile and irsk (obtain information from state and local health departments)
- Ensure DHCP are screened for latent TB infection and Tb disease (Tuberculin skin test, blood assays)
- Develop protocols for detecting and managing patients, including protocols for referrals for medical assessment and urgent dental treatment

Patients Known or Suspected to Have Active TB (IB)
- Evaluate the patient away from other patients and DHCP
- When not being evaluated, the patient should wear a surgical mask or be instructed to cover mouth and nose when coughing or sneezing
- Defer elective dental treatment until the patient is noninfectious
- Refer patients requiring urgent dental treatment to a previously identified facility with TB engineering controls and a respiratory protection program (airborne infection isolation rooms, N95 filtering face piece respirator)
INFECTION-CONTROL INTERNET RESOURCES

CDC
Guidelines for Infection Control in Dental Health-Care Settings 2003
http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5217a1.htm

Issues in Healthcare Settings
http://www.cdc.gov/ncidod/dhp/index.html

Guideline for Hand Hygiene in Health-Care Settings
http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5116a1.htm


Hepatitis B
http://www.cdc.gov/ncidod/diseases/hepatitis/b/index.htm

HIV/AIDS
http://www.cdc.gov/hiv/dhap.htm

Tuberculosis
http://www.cdc.gov/tb

Management of Occupational Blood Exposures
http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5011a3.htm

National Institute for Occupational Safety and Health
http://www.cdc.gov/niosh/topics/dentistry/

OSHA

Dentistry

Bloodborne Pathogens and Needlestick Prevention

FDA

Center for Devices and Radiological Health
http://www.fda.gov/cdrh/consumer/index.html

EPA

Antimicrobial Pesticides
http://www.epa.gov/oppad001/ad_info.htm

OSAP
Organization for Safety and Asepsis Procedures
http://www.osap.org/

USAF Dental Evaluation & Consultation Service (DECS)