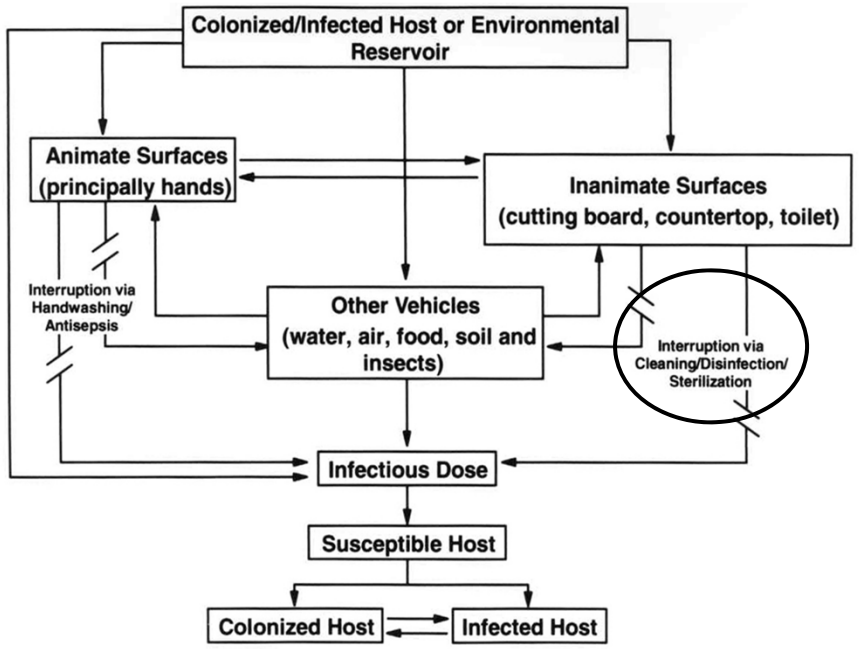
Module G

ENVIRONMENTAL ISSUES IN DENTAL PRACTICES

ENVIRONMENTAL ISSUES

- Housekeeping/Clinical Contact Surfaces
- Medical Waste
- Dental Unit Waterlines
- Laser plumes/surgical smoke

Rutala WA and Weber DJ (2010) Lautenbacch et al.(eds.) in Practical Healthcare Epidemiology



DEFINITIONS

Spaulding Classification of Surfaces:

1. **Critical** – Objects which enter normally sterile tissue or the vascular system and require sterilization
2. **Semi-Critical** – Objects that contact mucous membranes or non-intact skin and require high-level disinfection
3. **Non-Critical** – Objects that contact intact skin but not mucous membranes, and require low or intermediate-level disinfection

DISINFECTION LEVELS

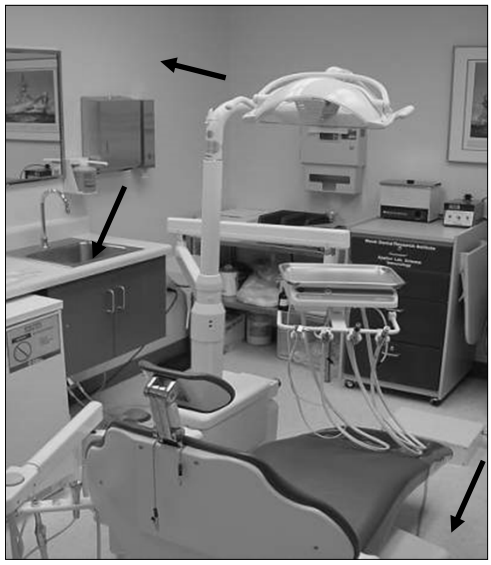
High – inactivates vegetative bacteria, mycobacteria, fungi, and viruses but not necessarily high numbers of bacterial spores

Intermediate – destroys vegetative bacteria, most fungi, and most viruses; inactivates *Mycobacterium tuberculosis*

Low - destroys most vegetative bacteria, some fungi, and some viruses. Does not inactivate *Mycobacterium tuberculosis*

CATEGORIES OF ENVIRONMENTAL SURFACES

HOUSEKEEPING SURFACES



MANAGEMENT OF HOUSEKEEPING SURFACES

No blood/body fluids present (non-clinical areas):

- Water and detergent and mop/cloth
- Clean mop/cloth and allow mop/cloths to dry OR use disposable mop

Presence of blood/body fluids (patient care areas):

- Wipe/mop surface with an EPA-registered disinfectant
- Do not re-dip contaminated wipes into disinfectant solution
- Cloth mops and disinfectant solution should be changed every 3 rooms or 60 minutes
- Micorfiber mops should be changed every room

Walls, blinds, drapes cleaned when dusty

CLINICAL CONTACT SURFACES

MICROBIAL SURVIVAL ON ENVIRONMENTAL SURFACES

Pathogen	Duration of persistence (range)
Candida albicans	1-120 days
Heamophilus influenzae	12 days
Mycobacterium tuberculosis	1 day – 4 months
Streptococcus pyrogenes	3 days – 6.5 months
Staphylococcus aureus	7 days – 7 months
Herpes simplex virus	Hours – 18 weeks
Coxsackievirus	2 weeks

Kramer *et al. BMC Infectious Diseases* 2006 **6**:130

SOURCES OF CONTAMINATION

- Contaminated gloves and hands of dental healthcare personnel
- Contaminated instruments or other inanimate objects
- Aerosol/splatter

MANAGEMENT OF CLINICAL CONTACT SURFACES

- Surface protection
- Disinfection

SURFACE PROTECTION OF CLINICAL CONTACT SURFACES

SURFACE CLEANING/DISINFECTION OF CLINICAL CONTACT SURFACES

- Use an EPA-registered disinfectant with a HIV/HBV or TB claim.
- Required for exposed clinical surfaces after treating an individual patient.
- Required at the end of the day.
- Pre-clean and disinfect the surface after contamination and before each use.
  - Spray-wipe-spray: using a liquid disinfectant/cleaner
  - Wipe-discard-wipe: using a disinfectant towelette

CLEANING RECOMMENDATIONS

Clean and disinfect surfaces using correct technique

- Clean to dirty
- Prevent contamination of solutions
  - Don’t use dried out wipes
- Physical removal of soil (elbow grease)
- Contact time
- Correct type of cleaning materials
- Wear appropriate PPE (gloves, gown, mask, eye protection)

LIQUID DISINFECTANTS

Disinfectant Agent	Use Concentration
Ethyl or isopropyl alcohol	70% - 90%
Chlorine (bleach)	100 ppm
Phenolic	UD
Iodophor	UD
Quaternary ammonium compound (QUAT)	UD
Improved/Accelerated hydrogen peroxide	0.5%, 1.4%

UD = Manufacturer’s recommended use dilution

OTHER ENVIRONMENTAL ISSUES

Blood and Body Fluid Spills

- Promptly clean and decontaminate
- Use appropriate PPE
- Decontaminate spills with dilute bleach solution (1:10 or 1:100) or an EPA-registered hospital disinfectant with a TB or HIV/HBV kill claim.

DISINFECTION OF COMPUTER KEYBOARDS

- All tested products were effective (>95%) in removing and/or inactivating the test pathogens (MRSA, *P. aeruginosa*). No functional/cosmetic damage after 300 wipes.
- Disinfectants included: 3 quaternary ammonium compounds, 70% isopropyl alcohol, phenolic, chlorine (80ppm)
- At present, recommend that keyboards be disinfected daily and when visibly soiled
- Use disinfectant wipes for one surface cleaning area one time

ENVIRONMENTAL ISSUES

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  - ► Medical Waste
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PUBLIC HEALTH IMPLICATIONS OF MEDICAL WASTE

Epidemiologic Evidence

- Only medical waste associated with infectious disease transmission is contaminated sharps.
- Reports of transmission of infectious agents by sharps occurred in health care setting.
- No evidence that a member of the public has ever acquired infection from medical waste.
- No infectious risks associated with any type of medical waste treatment method to include sanitary landfill disposal.

MEDICAL WASTE
PLAUSIBLE TRANSMISSION ROUTES

- Virtually nonexistent - respiratory, urinary or gastrointestinal tract or mucous membrane of the mouth, eyes, nose.
- Why? Chain of infection is incomplete
- Rare - "Sharps" have an intrinsic capability to disrupt the skin's integrity and introduce infectious agents.

THERE ARE TWO TYPES OF MEDICAL WASTE!

Medical Waste

- Any solid waste generated in the diagnosis, treatment, or immunization of human beings or animals
- Cost $0.55/lb to dispose

<u>Regulated</u> Medical Waste

- Any blood or body fluids in individual containers >20ml (about size of test tube)
- Microbiological waste
- Pathological waste
- Must be treated prior to disposal
- Cost $1.75/lb to dispose of

Adapted from Medical Waste Presentation by Bill Patrakis, NC DENR, Division of Solid Waste Management. http://portal.ncdenr.org/web/wm/sw/medicalwaste

BLOOD AND BODY FLUIDS

- Liquid blood, serum, plasma, other blood products, emulsified human tissue, spinal fluids, and pleural and peritoneal fluids
- Dialysates, urine, and feces are ***NOT*** blood or body fluids under this definition
- Possible methods of treatment – dispose of in commode, incineration, steam sterilization.

MICROBIOLOGICAL WASTE

- Cultures and stocks of infectious agents (e.g. Microbiology laboratory)
- Possible methods of treatment – incineration, autoclaved, or chemical disinfectants (bleach 1:5)

PATHOLOGICAL WASTE

- Human tissues, organs, and body parts removed during surgery or autopsy.
- Only method of treatment – incineration.

DISPOSAL OF SHARPS*

- Rules do not require treatment before disposal
- Must be packaged in a container that is rigid, leak-proof when upright, and puncture resistant
- Can be disposed of with general solid waste
  - Some landfills do not accept sharps

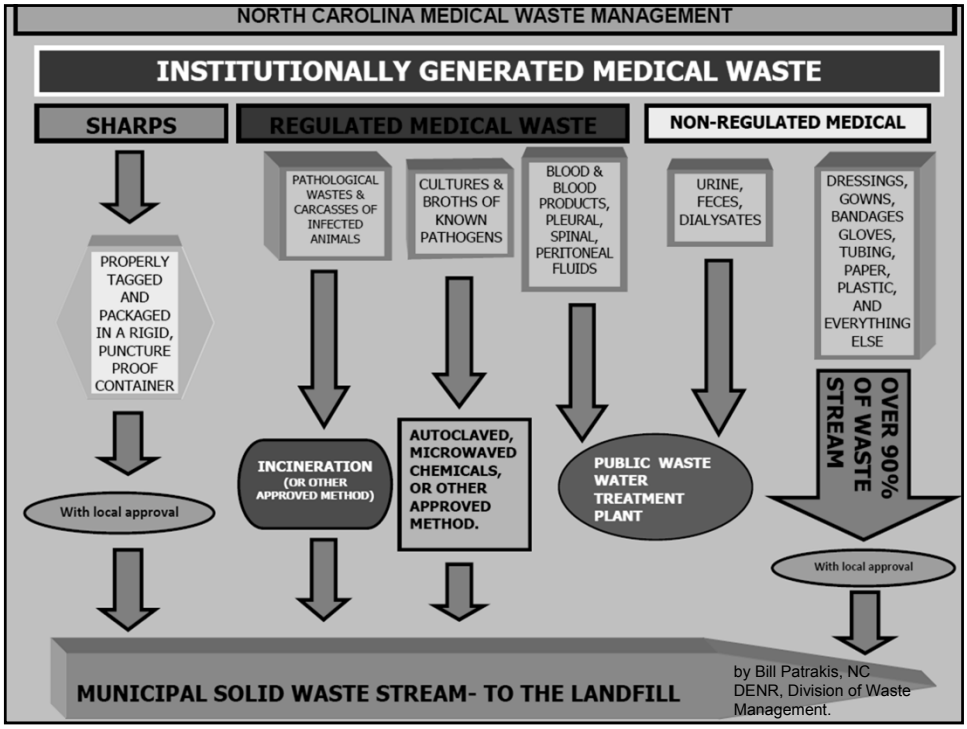
* Sharps: Needles, Needles with syringes, Needles with vacationers, blades (scalpels), contaminated broken glassware

NOT DEFINED AS REGULATED MEDICAL WASTE

- Dressings and bandages (even blood soaked), sponges, disposable instruments, used gloves, and tubing
  - Disposed of as general solid waste
- Household waste including injections administered at home is not included in medical waste rules.

OCCUPATIONAL HEALTH AND SAFETY ADMINISTRATION

- OSHA specifies certain features of the regulated waste containers, including appropriate tagging meant to protect waste industry workers.
- OSHA rules are intended to minimize employee exposure to bloodborne pathogens. OSHA does not address disposal.
- OSHA definition of regulated waste may include waste such as bloody gauze, blood saturated dressings, used gloves, or tubing.



EXTRACTED TEETH

- Do not incinerate extracted teeth containing amalgam; must be recycled.
- Clean and disinfect before sending to lab for shade comparison.
- Can be given back to patient.

HANDLING EXTRACTED TEETH IN EDUCATIONAL SETTINGS

- Remove visible blood and debris.
- Maintain hydration.
- Autoclave (teeth with no amalgam).
- Use Standard Precautions.

HANDLING BIOPSY SPECIMENS

- Place biopsy in sturdy, leak proof container
- Avoid contaminating the outside of the container
- Label with a biohazard symbol

MEDICAL WASTE CONCLUSIONS

- Medical Waste: Not considered infectious, thus can be discarded in regular trash
- Regulated Medical Waste: Poses a potential risk of infection during handling and disposal

REGULATED MEDICAL WASTE MANAGEMENT CONCLUSIONS

- Properly labeled containment to prevent injuries and leakage
- Medical wastes are “treated” in accordance with state and local EPA regulations
- Processes for regulated waste include autoclaving and incineration

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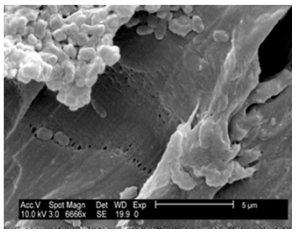
DENTAL WATERLINE QUALITY

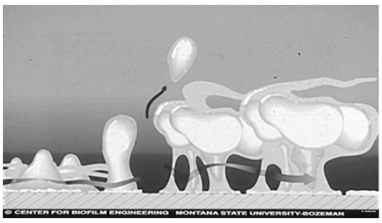
- Colony counts in water from untreated systems can exceed 1,000,000 CFU/mL

  CFU=colony forming unit
- Untreated dental units cannot reliably produce water that meets drinking water standards
- Limited pathogen potential
- Few reports of waterborne infections
- Exposing patents to water of uncertain microbiological quality is inconsistent with the infection control principles

DENTAL UNIT WATERLINES AND BIOFILM

- Microbial biofilms form in small bore tubing of dental units
- Biofilms serve as a microbial reservoir





DENTAL WATER QUALITY

For routine dental treatment, meet regulatory standards for drinking water.*

* <500 CFU/mL of heterotrophic water bacteria

AVAILABLE DUWL TECHNOLOGY

- Independent reservoirs
- Chemical treatment
- Filtration
- Combination

MONITORING OPTIONS

- Water testing laboratory (UNC School of Dentistry)
- In-office testing with self-contained kits
- Follow recommendations provided by the manufacturer of the dental unit or waterline treatment product for monitoring water quality (weekly or monthly)

Reference: www.ada.org

STERILE IRRIGATING SOLUTIONS

- Use sterile saline or sterile water as a coolant/irrigator when performing surgical procedures
- Use devices designed for the delivery of sterile irrigating fluids

SPECIAL CONSIDERATIONS

- Dental handpieces and other devices attached to air and waterlines
- Saliva ejectors
- Single-use (disposable) Devices
- Pre-procedural mouth rinses

DENTAL HANDPIECES AND OTHER DEVICES ATTACHED TO AIR AND WATERLINES

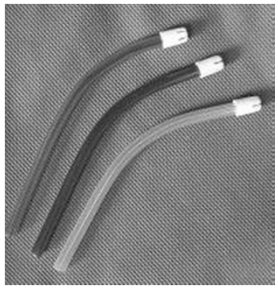
- Clean and heat sterilize intraoral devices that can be removed from air and waterlines
- Follow manufacturer's instructions for cleaning, lubrication, and sterilization
- Do not use liquid germicides or ethylene oxide

COMPONENTS OF DEVICES PERMANENTLY ATTACHED TO AIR AND WATERLINES

- Do not enter patient's mouth but may become contaminated
- Use barriers and change between uses
- Clean and intermediate-level disinfect the surface of devices if visibly contaminated

SALIVA EJECTORS

- Previously suctioned fluids might be retracted into the patient's mouth when a seal is created
- Do not advise patients to close their lips tightly around the tip of the saliva ejector



SINGLE-USE (DISPOSABLE) DEVICES

- Intended for use on one patient during a single procedure
- Usually not heat-tolerant
- Cannot be reliably cleaned
- Examples: Syringe needles, prophylaxis cups, and plastic orthodontic brackets, sterile irrigation water
- FDA Law prevents reuse or reprocessing of "labeled" single use patient products or devices

PREPROCEDURAL MOUTH RINSES

- Antimicrobial mouth rinses prior to a dental procedure
  - Reduce number of microorganisms in aerosols/spatter
  - Decrease the number of microorganisms introduced into the bloodstream
- Unresolved issue–no evidence that infections are prevented

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LASER/ELECTROSURGERY PLUMES AND SURGICAL SMOKE

- Destruction of tissue creates smoke that may contain harmful by-products
- Infectious materials (HSV, HPV) may contact mucous membranes of nose
- No evidence of HIV/HBV transmission
- Need further studies

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