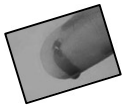
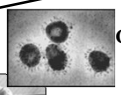
Infection Control Update: During and After COVID-19







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Disclosures:
Consultant: Hu-Friedy Group, Inc.
Consultant: Coltene/SciCan, Inc.

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Updated COVID-19 Data, Status, & Trends

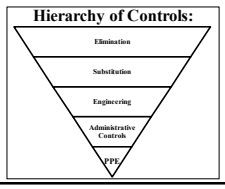
2

OSHA Guidance for Preparing Workplaces for COVID-19

https://www.osha.gov/Publications/OSHA3990.pdf?...

(3/2020)

- **How a COVID-19 outbreak could affect workplaces**
- **DHCP placed in *High*-to-*Very High* COVID-19 risk groups**
- **Develop infectious disease preparedness and response plan**
- **Basic infection control measures (hand hygiene, respiratory etiquette)**
- **Develop, implement, & communicate about workplace protections**
- **Policies and procedures – identification, isolation of sick people**
- **Implement workplace controls**
  - **follow existing OSHA standards**
  - **safe work practices**
  - **PPE**
  - **administrative controls (respiratory protection plan, training, universal source control, etc)**



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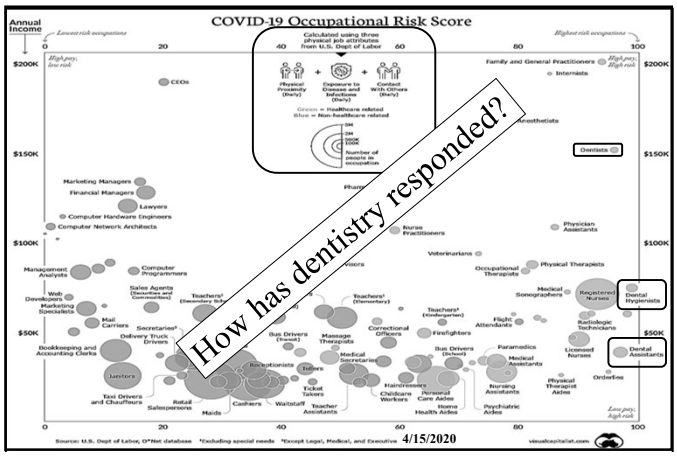
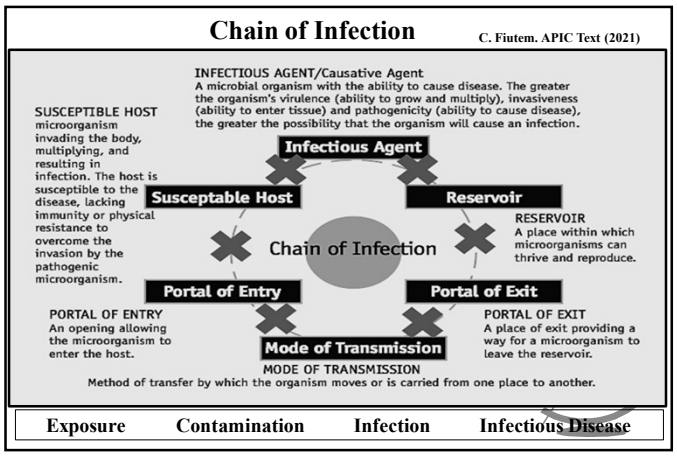

COVID-19 Occupational Risk Score
Annual Income
How has dentistry responded?
4/15/2020

4


Chain of Infection
C. Fiutem. APIC Text (2021)
INFECTIOUS AGENT/Causative Agent
A microbial organism with the ability to cause disease. The greater the organism's virulence (ability to grow and multiply), invasiveness (ability to enter tissue) and pathogenicity (ability to cause disease), the greater the possibility that the organism will cause an infection.
SUSCEPTIBLE HOST
microorganism invading the body, multiplying, and resulting in infection. The host is susceptible to the disease, lacking immunity or physical resistance to overcome the invasion by the pathogenic microorganism.
Infectious Agent
Susceptable Host
Reservoir
Chain of Infection
RESERVOIR
A place within which microorganisms can thrive and reproduce.
Portal of Entry
Portal of Exit
PORTAL OF ENTRY
An opening allowing the microorganism to enter the host.
PORTAL OF EXIT
A place of exit providing a way for a microorganism to leave the reservoir.
Mode of Transmission
MODE OF TRANSMISSION
Method of transfer by which the organism moves or is carried from one place to another.
Exposure
Contamination
Infection
Infectious Disease

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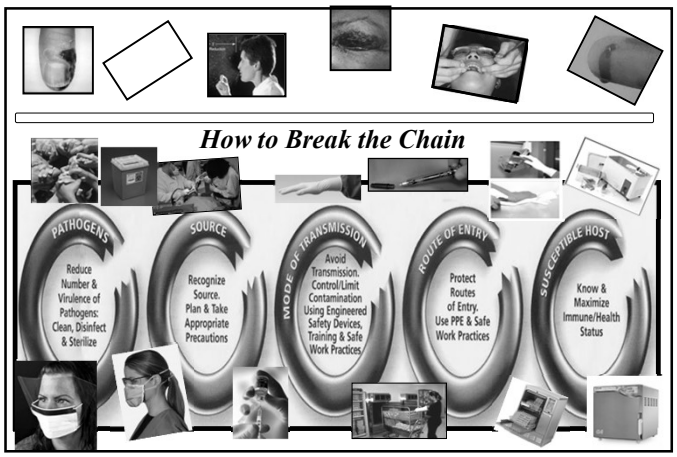
How to Break the Chain
PATHOGENS
Reduce Number & Virulence of Pathogens: Clean, Disinfect & Sterilize
SOURCE
Recognize Source. Plan & Take Appropriate Precautions
MODE OF TRANSMISSION
Avoid Transmission. Control/Limit Contamination Using Engineered Safety Devices, Training & Safe Work Practices
ROUTE OF ENTRY
Protect Routes of Entry. Use PPE & Safe Work Practices
SUSCEPTIBLE HOST
Know & Maximize Immune/Health Status

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Current Status of CDC Dental Infection Control Guidelines

- Comprehensive; documented HC risks & precautions
  - Principles of infection prevention have not changed
  - COMPLIANCE issues, not the ineffectiveness of current recommendations

- ☞ No evidence to support changes to 2003 guidelines
- ☞ Summary of basic infection prevention expectations for safe care in all dental settings
  - Based on Standard Precautions
  - Supplements existing CDC recommendations (not a replacement)
  - Provides links to references & additional resources + checklists

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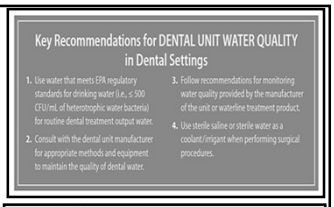
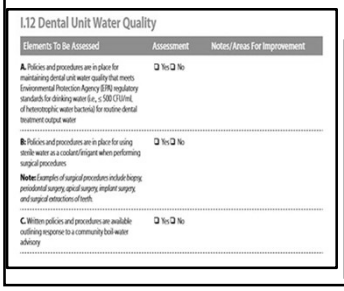
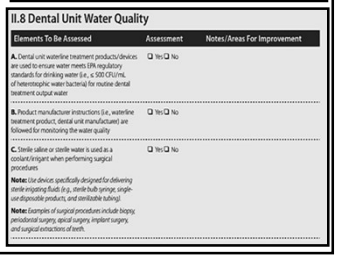
2016 CDC Dental Infection Control Guidelines







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Critical Importance of Hand Hygiene (HH)

- ➢ 60-70% HAI related to improper hand washing & care - outbreaks of pt-to-pt transmission from HCW hands
- ➢ New strategies & product types
- ➢ CDC 2002 comprehensive hand hygiene guidelines
- ➢ CDC 2003 & 2016 IC recommendations for dentistry
- ➢CDC update: hand antiseptics with methanol

- ➢Documented hospital HH issue: *Increasing tolerance of E. faecium to hand hygiene alcohol antiseptics*

Boyce. AJIC (2013); JAM. Dent Econ (2016); Pidot. Sci Trans Med (2018); FDA (7/2/2020); MMWR (8/5/2020)

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III. Hand Hygiene

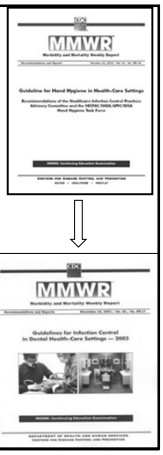
A. General Considerations

1. **Perform hand hygiene with either a non-microbial or antimicrobial soap and water when hands are visibly dirty or contaminated with blood or other potentially infectious material.**

   If hands are not visibly soiled, an alcohol-based hand rub can also be used. Follow the manufacturer's instructions.

2. **For oral surgical procedures, perform surgical hand antisepsis before donning sterile surgeon's gloves**

MMWR 2003; 52(RR-17):1-66.



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Representative Hand Hygiene Product Features

- *Type of procedure performed (surgical vs. non-surgical)*
- *Cleaning capability*
- *Antimicrobial spectrum*
- *Water-based vs. alcohol-based preparations*
- *Residual antimicrobial effect on tissues (i.e. substantivity)*
- *Skin irritation potential*
- *Allergenicity*
- *Epithelial integrity after repeated use*
- *Acceptance by HCP*
- *Fragrances*
- *Type of delivery system*

Clinical Tips:

- Sensitive skin &/or fragrance allergies -- frequent use of scented agents can cause non-specific dermatitis or allergic rxs
- Use products developed, tested, & FDA-approved for health care facilities (i.e. frequent use)
- Essential roles for both handwashing & waterless antimicrobial products

Molinari & Nelson. Dent Adv 2015; 32(5):1-6

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- **Multiple Choices:**
  - **Non-antimicrobial soap**
  - **Antimicrobial (antiseptic) soap**
  - **Alcohol-based antiseptic**

⇒ **All effective against SARS-CoV-2**

- **Effects on Resident & Transient Microflora**

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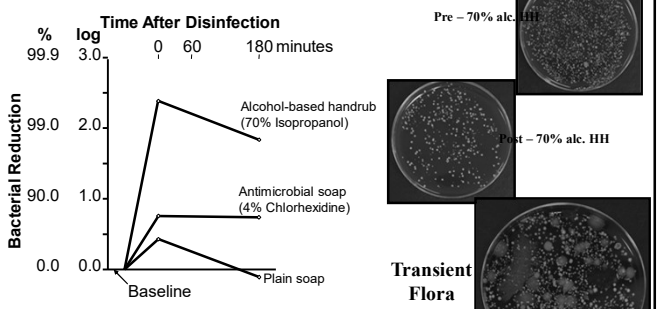
Ability of Hand Hygiene Agents to Reduce Bacteria on Hands



Normal Skin Flora

Transient Flora

Adapted from:
***Hosp Epidemiol Infect Control*, 2nd Edition, 1999.**

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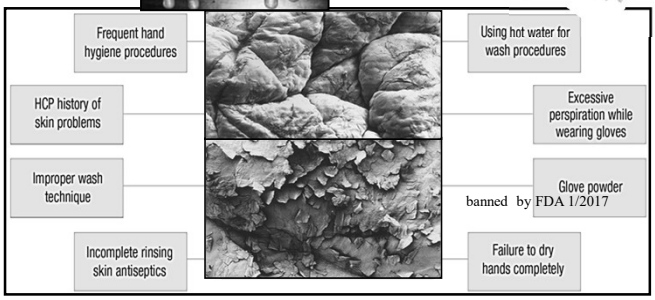
Irritation problems



Multiple water-based products available

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Pre-Procedural Mouth Rinses (PPMRs)

- **Long hx for PD & gingivitis; reduce bacterial load**
- **PPMRs previously used to protect patient from infection;**
  - **-- but now --- considered as protective measure for DHCP**
- **No direct evidence for preventing DHCP infections**
- **Clinical effectiveness to reduce viral loads or to prevent transmission ?**
  - **(*clinical studies* – Meethall, et al. JDR. May 2021)**
- **Can reduce microbial levels in dental spatter & aerosols**
- **ADA: "…biologic plausibility suggests hydrogen peroxide and PVP-I could be expected to be virucidal intraorally; may reduce SARS-CoV-2 viral load in dental aerosols"[1]**
  - ☛ **1% PVP-1; 1.5% HP; also studied CHG, Essential oils**

[1]Return to Work Interim Guidance Toolkit. ADA. Updated July 23, 2020.
CDC. Guidance for Dental Settings. (December 4, 2020)

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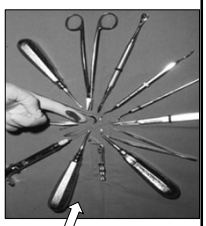
Sharps Safety

- CDC: ~385,000 sharps injuries among hosp'l- based HCP (1,000 injuries/day)
- Most exposures in dentistry are preventable
- Dental practice should have policies & procedures in place that address sharps safety
  - -- take precautions while using sharps
  - -- take precautions during cleanup
  - -- take precautions during disposal
- Sharps accident prevention - primary IC goal

CDC



Percutaneous injury
Mucous membrane exposure
Non-intact (broken) skin exposure
Bites

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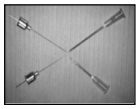
Characteristics of Percutaneous Injuries Among DHCP

- Declining frequency
  - -- improved awareness & precautions
  - -- increased cassette use
- Most incidents: burs, other solid sharps, & *NOT* hollow-bore needles
- Most occur outside patient's mouth
- Small amounts of blood
- Needles – 25, 26, 27, 30 gauge vs. larger medical needles





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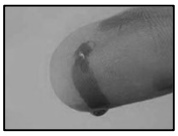
Does Practice Have A Post-Exposure Management Plan?

- Clear written policies and procedures
- Who will manage post-exposure process
  - Establish relationship in advance
  - Employee Health
  - Occupational Medicine
  - Emergency depts. / Urent Care
- Education of dental health care personnel (DHCP)
- Rapid access to:
  - Clinical care (evaluation c/in 2 hrs)
  - Referral mechanisms to qualified HCP
  - Rapid HIV test
  - Post-exposure prophylaxis (PEP)
  - Testing of source patients/HCP
  - Payment of services
  - Wait times to be evaluated
  - Availability of HBIG, HBV vaccine, & HIV PEP
  - Confidentiality!!!

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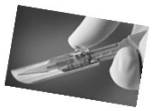
Needlestick Safety and Prevention Act (2000)

Federal OSHA standard requires:

- CDC estimates 88% all sharps injuries preventable
- Requirements of EMPOLYERS
  1. must provide/enforce use of engineering controls
     - sharps containers, blade removers, safety needles, needle recappers
  2. must implement/enforce work practice controls
     - update expose control plans (i.e. sharps containers, transporting contaminated insts)
  3. must solicit non-managerial input for evaluation of safer devices
     - documentation
  4. should maintain sharps injury records
     - maintain employee privacy & not kept in OSHA manual



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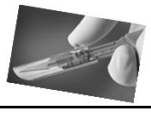
Needlestick Safety and Prevention Act (2000)

- Must reflect changes in technology use for prevention
- Document annual evaluation of safer sharps devices
- Employers + direct patient care personnel input
- Coordinate selection & evaluation of safer dental devices
- Screening criteria:
  - ✓ device safe to use on patients
  - ✓ safety features to protect from sharps injury
  - ✓ readily available for purchase
  - ✓ easy and practical to use
  - ✓ compatible with other equipment

(Upd. CDC. 1/26/2018)



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Evolution to Current Infection Control Precautions: From BBP to SARS-CoV-2

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Universal Precautions (1985)

- Set of infection control practices & procedures based on concept that all blood & other body fluids that might be contaminated with blood should be treated as infectious
- Hepatitis B Virus major occupational bloodborne pathogen (BBP) risk & target

Dental Category	Percentage Positive HBV Serologic Results
Oral Surgeons	30 – 38%
General dentists	17-18%
Dental hygienists	16.9%
Dental assistants	12.9%
Clerical (dual jobs)	8.9%
Lab technicians	14.2%
General population	2-4%

Ahtone, et al. JAMA (1983); Schiff, et al. JAMA (1986)

- Handwashing, PPE, work practice-, engineering-, administrative- controls

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STANDARD PRECAUTIONS (1991)

- Foundation of infection control –1st step in breaking chain of infection
- Combine precautions that include:
  - a. major components of universal precautions to reduce BBP risk
  - PLUS
  - b. body substance isolation (transmission precautions)
    - reduce risk of pathogen transmission from moist body surfaces
- Similar to universal precautions --- used for care of all patients regardless of diagnosis or presumed infection status
  - blood, body fluids, secretions, excretions except sweat, regardless of whether or not contain blood
  - non-intact skin
  - mucous membranes

CDC (1991; 2003;2020)

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Transmission – Based Precautions

- Important 2nd tier of IC in addition to *Standard Precautions*
  - for pts who may be infected/colonized c certain infectious agents
  - require additional control measures; used in hospital settings

✓ *Contact Precautions*—used for pts c known or suspected infections that represent increased risk for contact transmission by touching patient or items in room disease examples caused by heavy environmental contamination:
- MRSA, VRE, *Clostridium difficile* diarrheal illnesses, open wounds

✓ *Droplet Precautions*—used to prevent diseases caused by large respiratory droplets, generated by coughing, sneezing talking
- influenza, mumps, pertussis, bacterial meningitis, SARS

✓ *Airborne Precautions*—used to prevent transmission of infectious microbes that remain suspended in air & travel great distances due to small size (<5 μm); spread from one person to another
- pulmonary TB, measles, chickenpox, avian influenza, possibly SARS
- transmission typically not face-to-face
- airflow patterns c/in facility

APIC (2020)

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Hospital Contact Precautions

In addition to **Standard Precautions -**

- For patients known or suspected to be infected or colonized with important organisms that can be transmitted by direct contact with patient (hand or skin-to-skin contact that occurs when performing patient care), or patient's environment
- **MRSA, VRE, *Clostridium difficile*, open wounds**

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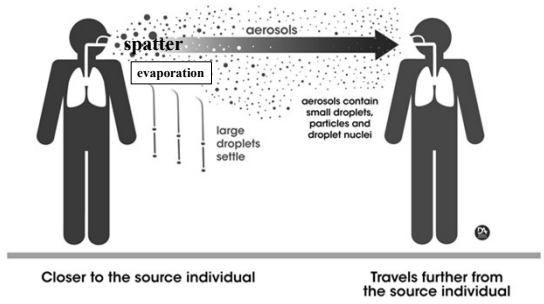
How is Airborne Disease Spread?

Spatter & aerosols occur when infected person coughs, sneezes, talks, breaths
or
During aerosol-generating procedures



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Airborne Material Definitions

Spatter:

- **Visible drops of liquid or body fluid expelled forcibly; settle quickly**
- **All visible material from patient's mouth during treatment**
  - **also referred to as "*splatter*" (Micik, et al.1969)**
- **>50 µm in diameter; behave airborne in ballistic manner**
  - **ejected forcibly from operating site; arc in bullet-like trajectory until they contact a surface or floor**
- **Main component of dental spatter is water**
  - **potentially infectious material from pt c/in water**

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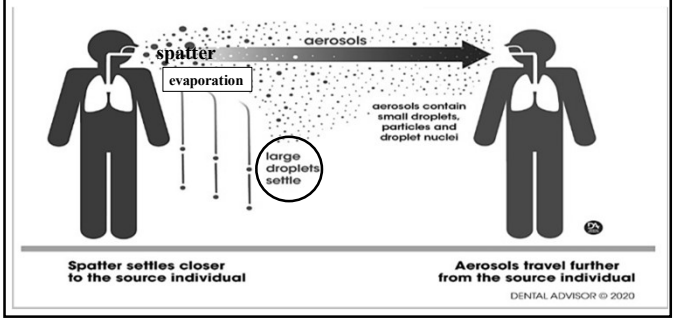

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Airborne Material Definitions

Droplets:

- 30-50 μ; intermediate in size between spatter and aerosols
- May contain microorganisms, but tend to quickly settle out
- **Potential infection risk generally limited to those in close proximity to droplet source**
- Short range transmission
- Droplets can still be infectious
  - sputum droplets from person c active TB evaporate - become aerosols
  - influenza (1985 study: documented high flu incidence in RDH's)
  - noroviruses

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Transmission – Based Precautions

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- airflow patterns c/in facility **APIC (2020)**

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Hospital Droplet Precautions

- Sign outside room to instruct visitors on precautions to take
- Masks for all coming into room; clean hands before leaving
- Wear regular/surgical mask in c/in 3-6 ft of patient
  - do not to get too close to others
  - pathogens can spread up to 3-6 ft.
- Cover mouth & nose c tissue when coughing/sneezing
  - throw the tissue in trash immediately
- Clean hands often: soap & water, or alcohol antiseptic
- Patient wears mask when transported from room

- influenza, mumps, pertussis, bacterial meningitis, noroviruses, SARS (2003)

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How is Airborne Disease Spread?

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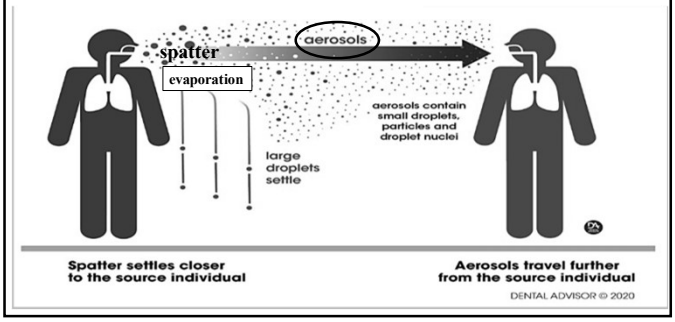

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Airborne Material Definitions

Aerosols:

- Also often referred to as "d**roplet nuclei"**
- Form from evaporation of larger droplets
- Respirable size (<5 µm) generated by humans & environmental sources
- Can remain airborne & viable for extended periods and distances (>10 ft) in indoor environments (SARS-CoV-2 6 ft or more)
- Airborne period dependent on size, weight, & air currents
- SARS-CoV-2 viral RNA in droplets <5 µm detected in air
- Aerosol transmission of infection can occur over extended distances/time
- **Generated in dentistry from handpieces, ultrasonic scalers, air water syringes**

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Aerosols vs. Droplets	Aerosol	Droplet
		
Diameter	< 5 µm	>5 µm
How long can it stay aloft?	Stays in air minutes to hours	Falls within seconds to minutes
How far can it travel?	Greater than 6 feet	Less than 6 feet
Efficiency of removal by masks and filters	Filtering more difficult	Filtered more easily
Where it deposits in respiratory system*	Inhaled into respiratory system; potential to be inhaled into the lower respiratory tract (bronchi & alveoli)	Sprayed onto body in form of contact transmission; tend to remain trapped in the upper respiratory tract (oropharynx — nose and throat)

*Recognition of aerosol transmission of infectious agents: A commentary
https://bmcinfectdis.biomedcentral.com/articles/10.1186/s12879-019-3707-y

CDC

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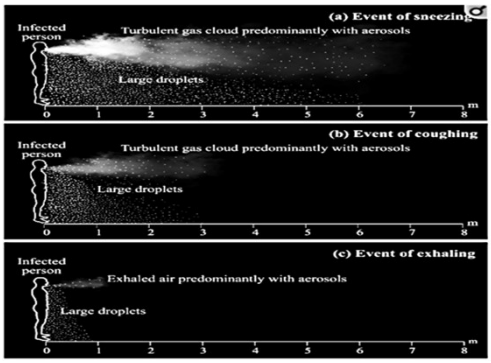
Trajectories of Droplets and Aerosols from Infected COVID-19 Patient



Jayaweera, et al. Environmental Res. 2020; 188:1-18

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APIC (2020)

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Airborne Precautions

- Hospitals – **Airborne Infection Isolation Room (AIIR)**
  - single patient room equipped with special air handling (negative pressure) and ventilation system.
- Specific requirements:
  - wear N95 respirator or higher when entering room
  - number of air exchanges to reduce risks:
    - new construction: 12 exchanges/hr
    - existing rooms: 6 exchanges/hr
  - pressure differential between room/adjacent areas with air pressure differential monitored
  - exhaust to outdoors or via HEPA filter
  - material for walls and floors
  - restricted entry (i.e. door closure)
- ***Airborne precautions for aerosol-generating procedures (AGP)***
  - **TB, measles, chickenpox, SARS (2003) – airborne transmission c/in a room – suggested, not proven**

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COVID-19 Is Not The Flu:

	COVID-19	Seasonal Influenza
Type of Disease	**Primarily pulmonary; also, can infect multiple organs/systems (lungs, cardiovascular; CNS, kidneys, etc.)**	**Pulmonary**
Target cell receptors	**ACEII receptors (present throughout body)**	**Sialic acid receptors**
Potential Infection Sequelae	**Possible severe long-term sequelae for severe symptomatic, mildly symptomatic, & asymptomatic disease**	**Pneumonia**
Ro: Infectivity Potential	**Exponential: Original strain: Ro = 2.79; Delta:5-6; Omicron: 7-8**	**Linear: Ro = 1–1.5**
Incubation Time	**1-14 days (typically 5-6 days) Omicron: ~ 3 days**	**1-4 days**
Hospitalization Rate	**19-20% (depending on multiple factors)**	**2% (primarily pneumonia)**
Case Fatality Rate	**3.1 % (8/13/20) 1.8 % (3/18/21) 1.78 % (7/21/21)**	**0.06-0.1% (2019-2020)**
Vaccine	**Yes**	**Yes (CDC/WHO)**

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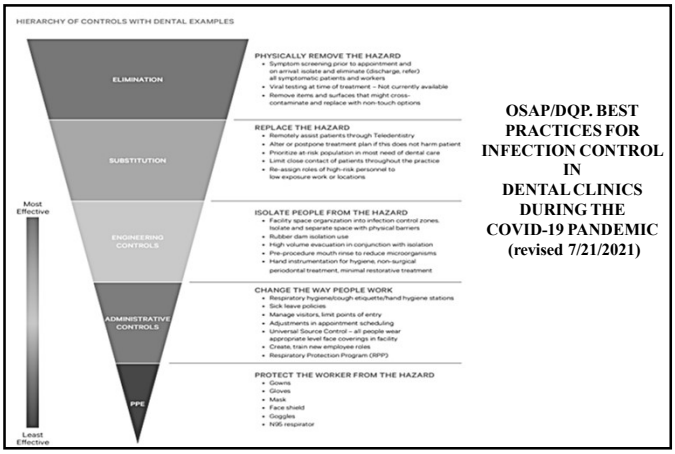

OSAP/DQP. BEST PRACTICES FOR INFECTION CONTROL IN DENTAL CLINICS DURING THE COVID-19 PANDEMIC (revised 7/21/2021)

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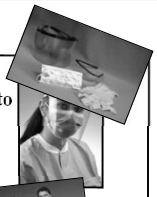
Personal Protective Equipment

- ✓ Major component of Standard Precautions
- ✓ Protects skin & mucous membranes from exposure to infectious materials in spray or spatter
- ✓ Proven effectiveness against microbial pathogens
- ✓ Should be removed when leaving treatment areas
- ✓ Employers must:
  - provide PPE in appropriate sizes
  - clean, launder, dispose of PPE
  - repair/replace PPE as needed
  - ensure PPE isn't worn outside of clinical areas

OSHA PPE 1910.132





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OSHA Recommended PPE (2021)

Care of patients in areas where community transmission of COVID-19 has subsided in the local area		Care of patients in areas where community transmission of COVID-19 continues in the local area	
Dental procedures not involving aerosol-generating procedures	*Dental procedures that may or are known to generate aerosols*	*Dental procedures not involving aerosol-generating procedures*	*Dental procedures that may or are known to generate aerosols*
• Work clothing, such as scrubs, lab coat, and/or smock, or a gown • Gloves • Eye protection (e.g., goggles, face shield) • Face mask (e.g., surgical mask,)	• Gloves • Gown • Eye protection (e.g., goggles, face shield) • At a minimum, face mask (e.g., surgical mask,) with face shield • NIOSH-certified, disposable N95 filtering facepiece respirator (or better) offers more protection to workers who may encounter asymptomatic or pre-symptomatic patients who can spread COVID-19 or other aerosolizable pathogens†	• Work clothing, such as scrubs, lab coat, and/or smock, or a gown • Gloves • Eye protection (e.g., goggles, face shield) • At a minimum, face mask (e.g., surgical mask,)with face shield • NIOSH-certified, disposable N95 filtering facepiece respirator (or better) offers more protection to workers who may encounter asymptomatic or pre-symptomatic patients who can spread COVID-19 or other aerosolizable pathogens†	• Gloves • Gown • Eye protection (e.g., goggles, face shield) • NIOSH-certified, disposable N95 filtering facepiece respirator or better†

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Are Appropriate Gloves Available?

Considerations	Examples
Material	- latex, vinyl, nitrile, chloroprene
Skin sensitivity	-allergies to latex or nitrile -hand perspiration
Size	-proper size, lightweight & pliable - snug fit without hand constriction -appropriate finger length -fits palm without compression **-ambidextrous vs. right- & left-fitted**
Tactile sensation	-grip -glove thickness -slipperiness of material when wet
Function	-non-sterile gloves for most procedures -sterile gloves for surgical procedures -utility gloves reprocessing & clean-up - FDA bans powdered medial gloves beginning on1/19/2017





Molinari & Nelson. TDA (2/2015)

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Are Hands Hurting When Wearing Gloves?

Hand & Wrist Risk Factors Associated with Dentistry

- ✓ Repetitive hand movements
- ✓ Awkward wrist positions
- ✓ Mechanical stresses to digital nerves (i.e. sustained grasping on instrument handles)
- ✓ Forceful treatment procedures in confined, small space
- ✓ Extended vibratory instrument use (i.e. handpieces, ultrasonic scalers)

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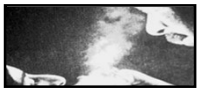
Representative Occupational Respiratory Infections

Disease	Etiology	Transmission
Tuberculosis	*Mycobacterium tuberculosis*	Droplet nuclei from coughing
Common cold	Rhinoviruses; Adenoviruses	Droplets from coughing/sneezing; contaminated surfaces
Influenza	Influenza viruses	Spatter & droplets from coughing; contaminated surfaces
Severe Acute Respiratory Syndrome	SARS Coronavirus-1 SARS-CoV-2	Airborne droplets; possible aerosols; contaminated surfaces
Pertussis	*Bordetella pertussis*	Droplets from coughing /sneezing
Legionnaires' Diseases	*Legionella pneumophila*	Breathing in mist or vapor containing bacteria; not spread person-to-person
Rubeola (Measles)	Rubeola virus	Aerosols from infectious persons

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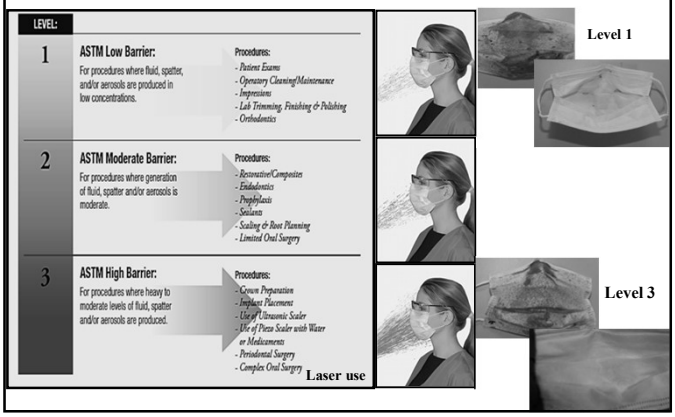
Masks: What to Wear & When

Molinari & Nelson. TDA (2014)



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OSHA Respiratory Protection Plan

If using N95 respirators, each employer must:

- Develop and implement written respiratory protection plan
- Medical surveillance – determine if employee is fit to wear a respirator
- Provide respirators when necessary to protect employees
- Training – proper use, limitations, disposal, hazards
- Fit test – initially and annually
- Provide medical evaluations at no cost to employees

OSHA Respiratory Protection Std 1910.134 (1998)

- Most N95 respirators are manufactured for use in construction & other industrial type jobs that expose workers to dust and small particles
  - regulated by the National Personal Protective Technology Laboratory (NPPTL) in the National Institute for Occupational Safety and Health (NIOSH),

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Understanding The Differences

Surgical Mask	N95 Respirator
	
• ASTM certified and FDA approved for surgery • Fluid resistance and provides protection against large droplets, splashes, and bodily fluids • Loosely-fitting • Unreliable filtration protection against smaller airborne • molecules Leakage during inhalation through mask's edges	• NIOSH evaluated, tested, and approved • Reduces exposure to large droplets and small aerosol • particles • Tight-fitting Must filter a minimum of 95% of airborne particlesagainst smaller • airborne molecules Minimal leakage when properly fitted and worn
• No fit testing requirement • No user seal check requirement • Disposable. Discard after patient encounter	• Fit testing requirement (initial & annual) • User seal check requirement • Ideally should be discarded after each patient encounter & after aerosol generating procedures **CDC**

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Fit Testing:

1. Qualitative fit testing
2. Quantitative fit tesing

User Respirator Seal Checks:

- **Check fit every time respirator is used**
- ***Positive Pressure User Seal Check*:** respirator user exhales gently while blocking the paths for air to exit the facepiece.
  - successful check is when the facepiece is slightly pressurized before increased pressure causes outward leakage.

- ***Negative pressure User Seal Check*:** respirator user inhales sharply while blocking the paths for air to enter the facepiece.
  - successful check is when the facepiece collapses slightly under the negative pressure that is created with this procedure

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Respirator Comparisons

N95 (95%) = FFP2 / P2 (94%)

N99 (99%) = FFP3 (99%)
N100 (99.97%) = P3 (99.95%)

KN95 (95%) = N95 (95%)

Respirator Standard	Filter Capacity (removes x% of of all particles that are 0.3 microns in diameter or larger)
FFP1 & P1	At least 80%
FFP2 & P2	At least 94%
N95	At least 95%
N99 & FFP3	At least 99%
P3	At least 99.95%
N100	At least 99.97%

KN95: theoretically, same std specifications as NIOSH N95 & EU FFP2 respirators
In practice, not necessarily true:
- **counterfeit products**
- **check for good face seal; padding for comfort; face straps c adequate strength & tension**

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FDA Revokes Emergency Use Authorizations for Certain Respirators and Decontamination Systems as Access to N95s Increases Nationwide

- **Revokes EUAs of all non-NIOSH-approved disposable respirators, including imported, disposable respirators, such as KN95s**
- **Also revoked EUAs for decontamination & bioburden reduction systems**

- "Early in the public health emergency, there was a need to issue emergency authorizations (EUAs) for non-NIOSH-approved respirators as well as decontamination and bioburden reduction systems to disinfect disposable respirators. Today, those conditions no longer exist. Our national supply of NIOSH-approved N95s is more accessible to our health care workers every day." (Dr. S. Schwartz, FDA)

FDA In Brief (June 30, 2021)

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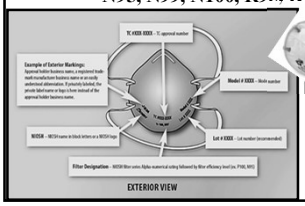
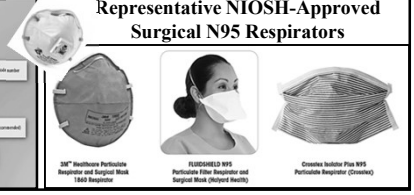
Counterfeit Respirators / Misrepresentation of NIOSH-Approval (CDC/NIOSH)

How to identify a NIOSH-approved respirator:

1. **An approval label on or c/in respirator packaging**
2. **Abbreviated approval on the Filtering Facepiece Respirator (FFR) itself**
3. **Verify approval number on *NIOSH Certified Equipment List* or *NIOSH Trusted Source* to determine if respirator is NIOSH approved**
4. **NIOSH-approved FFRs will always have one of following designations:**
   - ☛ **N95, N99, N100, R95, R99, R100, P95, P99, P100**



Representative NIOSH-Approved Surgical N95 Respirators



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Respirator Fit Testing

- **Qualitative fit testing (QLFT)**
  - ✓ inexpensive & simple
  - ✓ determines the brand and respirator size of the user
  - ✓ cannot determine limit of protection-factor or numerical results
  - ✓ chances of user deception

Main difference: quantitative testing objectively measures the amount of leakage (quantity), while qualitative testing relies subjectively on the user's taste and smell to detect leakage

- **Quantitative fit testing (QNFT)**
  - ✓measures precise amount of leakage into any tight-fitting facepieces
  - ✓instead of relying on bitter-tasting chemicals & your senses, this test is performed by a machine calculating the measurements
  - ✓facepiece is attached to a probe, which is connected to the measuring machine by a hose

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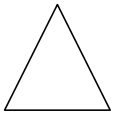
Powered Air-Purifying Respirators

- N95 respirator alternative – higher protection level
  - – higher air purifying factor (APF)



N95 = APF 10

PAPR under chin = APF 25

PAPR with shroud = APF 1000

Source: Honeywell

Source: 3M

- Fit testing not required (by most manufacturers)
  - – but wearers must be trained on use
- Less taxing for breathing ?
- Less skin irritation ?

https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/powered-air-purifying-respirators-strategy.html

Courtesy of M. Govoni

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Universal Source Control – New Term for Dentistry Applies to Everyone!

- DHCP should wear face mask ***at all times*** while they are in a dental setting.
  - ☛ Meetings/training
  - ☛ Break room – when not eating
- When DHCP are not engaged in direct patient care activities - can take off respirator and switch to a cloth face mask

UNIVERSAL SOURCE CONTROL	YES	N/A	SOURCE
Universal Source Control measures have been implemented to reduce exposure to potentially infectious co-workers or visitors			CDC, ADA, ADHA
• Every employee will wear facemasks when in the dental office. A plan has been developed for break and lunch times.	☐	☐	CDC, ADHA
• Cloth masks may be utilized by non-clinical staff for source control.	☐	☐	
• When not involved in direct patient care, clinical staff may utilize a cloth mask for source control.	☐	☐	
• Surgical masks or respirators provide a higher level of protection and are required when performing patient clinical procedures.	☐	☐	
• Respirators with exhalation valves are NOT recommended for source control. If this type of respirator is the only option for source control, the exhalation valve should be covered with a facemask that does not impact the fit of the respirator.	☐	☐	



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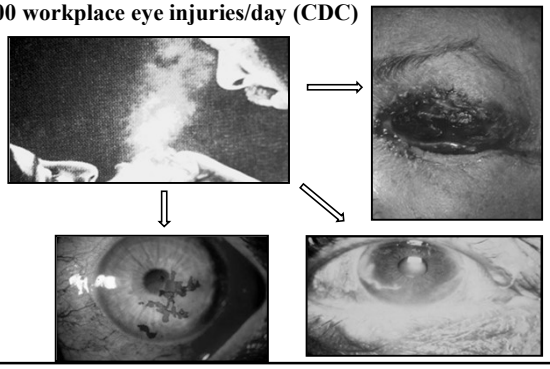
Spatter, Droplets, Aerosols: Rationale for Occupational Eye Protection

~2,000 workplace eye injuries/day (CDC)



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Protective Eyewear

- **OSHA adopted ANSI Z87.1 Std - required**
- **High impact resistance; Side shields**
- **Sufficient size to cover and protect eyes**
- **Desirable: no fogging, scratch resistant**
- **Face shields effective: provide added protection from airborne organisms**
- **Face shields or goggles; contour form around eyes**
- **Disposable eyewear available**
  - **Compatible with disinfectants?**




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Face Shields

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Guidance for Preparing Workplaces for SARS-CoV-2 and COVID-19

Implement workplace controls – "use hierarchy of controls"

- **Engineering controls** involve isolating employees from workplace hazards
  - high-efficiency air filters
  - increasing workplace ventilation rates
  - installing physical barriers (i.e. clear plastic sneeze guards)
  - specialized negative pressure ventilation for aerosol - generating procedures

OSHA (3/2020)
https://www.osha.gov/Publications/OSHA3990.pdf?...

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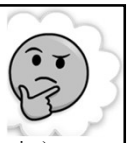
Improving Air Quality



- Consult HVAC specialist to:
  - Increase filtration efficiency
  - Increase percent of outdoor air supplied (may be more expensive)
  - Limit use of demand-controlled ventilation during occupied hours and up to 2 hours post occupancy
- Properly maintain ventilation system (moving air from clean area to contaminated area)
- Apply hospital precautions to dental facilities as much as possible
- Consider use of portable HEPA air filtration unit
- Consider upper-room ultraviolet germicidal irradiation (UVGI) as adjunct to higher ventilation rates.

CDC. Guidance for Dental Settings (December 4, 2020)

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ASHRAE EPIDEMIC TASK FORCE

(American Society of Heating, Refrigerating and Air-Conditioning Engineers)

Core Recommendations for Reducing Airborne Infectious Aerosol Exposure (Jan 6, 2021)

MERV = Minimum Efficiency Reporting Value

2. **Ventilation, Filtration, Air Cleaning**

2.1 Provide and maintain at least required minimum outdoor airflow rates for ventilations specified by applicable codes and standards

2.2 **Use combinations of filters and air cleaners that achieve MERV 13 or better for air recirculated by HVAC systems**

2.3 Only use air cleaners for which evidence of effectiveness and safety is clear

2.4 Select control options, including standalone filters and air cleaners, that provide desired exposure reduction while minimizing associated energy penalties

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What is the best MERV rating to use?

MERV Rating	Description	Application	Typical Air Filter Material
MERV-1 to MERV-4	**Basic filter** Blocks carpet fibers and lint, but unable to block out much else.	• Light Residential • Window/Split AC	• Fiberglass • Washable aluminum • Synthetic mesh
MERV-5 to MERV-8	**Typical filter** Blocks out common dust, pollen, and some mold spores.	• Typical Residential • Typical Commercial	• Pleated cotton • Polyester
MERV-9 to MERV-12 **(Filters down to 1.0–3.0 μ particle size)**	**Better filter** Blocks out most mold spores, smog, fine dust, and pet dander.	• Allergies • Better Residential • Better Commercial	• Pleated cotton • Microfine fiberglass • Usually 2" thick or more
MERV-13 to MERV-16 **(Filters down to 0.3–1.0μ particle size)**	**Superior filter** Blocks out bacteria, viruses, smoke, and other microscopic particles	• Severe Allergies • Hospitals • Smoking Lounges	• Pleated cotton • Microfine fiberglass • Usually 4" thick or more

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Engineering Controls: Filtration and UVGI

- HVAC modifications
  - Filtration
  - Air exchanges
- Air purification
  - HEPA filtration units
  - Upper Room UVGI
- Barriers for facilities with open floor plans

(CDC. MMWR (7/2/2021)
Portable HEPA cleaners + universal masking reduced simulated SARS-CoV-2 aerosol exposures by up to 90%

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Examples of Dental Aerosol Control Possibilities?

Vaniman Vanguard
Gold Mobile

OCTOdent Extraoral Aerosol Suction

Extra-oral suction units may:
- Capture pathogens, contaminants
- Have built-in sterilization and HEPA filtration
- Ultraviolet germicidal irradiation
- Provide backdraft source capture
- Have adjustable suction arms

Aerosol Terminator

ADS Extraoral
Dental Suction System

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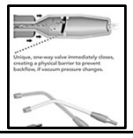
Steps to Reducing Aerosols in Dentistry: Documented Controls

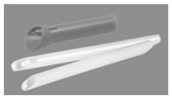
- Dental aerosols can include, viruses, blood, supra- & subgingival organisms
- Use of **rubber dam** can greatly reduce saliva & blood contamination
- **HVE** shown to reduce aerosols by more than 90% from operative site*
  - Must have large opening (usually 8 mm or more)
  - Attached to evacuation system that will remove up to 100cu ft air per min.
  - System capacity can be a factor in HVE effectiveness

*Micik RE et. al. Studies on dental aerobiology, I: bacterial aerosols generated during dental procedures. *J Dent Res*. 1969; 48: 49-56

Safe-Flo™ Saliva Ejectors and Valves



Palmero HVEsolo



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Newer Technologies and Designs in HVE Tips

Ivoclar Vivadent - ReLeaf

These devices may facilitate greater:
- Isolation
- Retraction
- Illumination
- Visualization
- Patient comfort
- Ergonomics
- Moisture-free working field

Also can:
- Prevent aspiration of foreign body
- Be used by single operator

DryShield

HVE Solo: Palmero

Zirc – Mr. Thirsty

Autoclavable
Evacuator Tip: Palmero

Xuctiondental.com

Zyris - Isovac

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To minimize risk, adopt a bundle of approaches

- No "magic bullet:" no single approach/device can completely minimize the risk of infection
- One step will reduce the risk of infection by a certain percentage, each additional step added to the 1st will reduce the remaining risk, until such time as the risk is minimal
- Described as a **layering of protective procedures**
  - needs to be followed in reducing potential danger from dental aerosols

JADA

Harrel, SK, Molinari, JA, Aerosols and splatter in dentistry: A brief review of the literature and infection control implications, 4, 2004
https://jada.ada.org/article/S0002-8177(14)61227-7/fulltext

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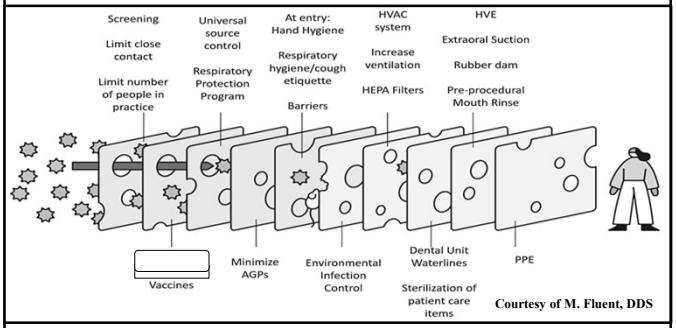
✓ Layering of IC steps needed to reduce potential risks



Courtesy of M. Fluent, DDS

Refer to: 1. Meethil, et al, J Dent Res (May 2021)
2. Araujo, et al. J Am Dent Assoc (June 2021)

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AVAILABLE STERILIZATION METHODS

- **Steam under pressure (autoclaves)**
  - **Gravity Displacement (P-C OCM; Tuttenaur)**
  - **Steam Flush Pressure Pulse (M-11)**
  - **Fractionated Vacuum (Bravo; Statclave)**
  - **Steam Injection Pressure Pulse (Statim; M-3)**
- **Prolonged dry heat**
- **Plasma Sterilization**
- **Unsaturated chemical vapor**

- **Ethylene oxide**
- **Chemical (cold) sterilization**

Heat – stable items

Heat – labile items

JAM

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Is sterilization equipment properly monitored and records maintained?

- CDC recommends weekly biological monitoring
  - In case of a positive spore test
    - Remove the sterilizer from service
    - Do not use the sterilizer until inspected and working properly

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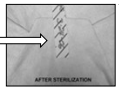
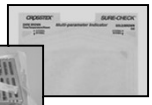
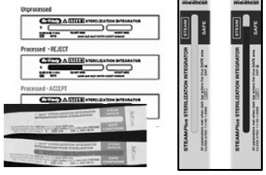
Monitoring Indicators & Integrators

Class I (Process Indicators)
Class II (Bowie-Dick Indicators)
Class III (Temperature Specific Indicators)
Class IV (Multi-Parameter Indicators)
Class V (Type) (Integrating Indicators)

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Are chemical indicators and BIs used & correctly interpreted ?

Yay! heat sterilization accomplished


Boo! failed cycle


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Error	Problem
Improper instrument cleaning and potentially compromise the sterilization process	Biological and other debris can shield adherent microbes and potentially compromise the sterilization process
Improper packaging	Examples: wrong type material for method; too many items in package; excessive amounts of wrap material
Overloaded sterilizer	Can prevent thorough contact of sterilizing agent with all items in unit
Inadequate Maintenance	Critical area; example issues include worn gaskets and seals
Improper sterilization equipment	Use of non-FDA approved equipment

Sterilization Process Problems

Person in Charge !!

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Wet or Dry Packaged Instruments?

- Need to dry instruments thoroughly prior to packaging & sterilization
- Sterilizers calibrated to remove only the amount of moisture they introduce into chamber
- What is a "wet pack:" moisture on/in pack when removed from autoclave
  - relatively common problem; multiple causes
  - can cause contamination issues; excessive moisture can act as pathway for microbes

Representative Causes	Reasons for Cause
Dense instrument set	Steam cannot readily escape
Overloading sterilizer chamber	Insufficient space for steam to penetrate & escape
Wet instruments or packaging going into sterilizer	Insufficient drying of packaging
Not following medical device IFUs	Some IFUs require dry times
Insufficient cooling times allotted for sterilized items	Transporting hot items to cool surfaces or environment can result in condensation

3M Healthcare (2017)

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Instrument Reprocessing: Then and Now

Procedure	Representative 1980 Practice	Representative 2018 Practice
Manual instrument cleaning	Often primary method	Minimal
Chemical (i.e. cold) sterilization	Common glutaraldehyde use	Minimal or no use in practice
Ultrasonic cleaning	Used in conjunction with manual	Often primary method
Instrument washer	Not available	Increasing presence in practices
Biological monitoring for heat sterilization	Very few practices spore testing; infrequent intervals	Weekly spore testing required by regulatory agencies
Checks for cleaning processes prior to sterilization	Visual inspection of instruments	Visual inspection + artificial soil test strips for ultra-sonics and instrument washers

Molinari. Dent Today (2/2019)

Spaulding Classification (1970's)

Category	Definition	Examples in Dentistry	Comments
Critical	Penetrate soft tissue, contact bone, enter into or contact the bloodstream or other normally sterile tissue.	Surgical instruments, periodontal scalers, scalpels, surgical dental burs	Have the greatest risk of transmitting infection—clean and heat sterilize.
Semicritical	Contact mucous membranes or nonintact skin, but will not penetrate soft tissue, contact bone, or enter into or contact the bloodstream or other normally sterile tissue.	Dental mouth mirror, amalgam condenser, reusable dental impression trays, dental handpieces."	Have a lower risk of transmission—clean and heat sterilize. If a semicritical item is heat-sensitive, it should, at a minimum, be processed with high-level disinfection.
Noncritical	Contact with intact skin.	Radiograph head/cone, blood pressure cuff, facebow, pulse oximeter.	Pose the least risk of transmission of infection—clean and disinfect or use disposable barrier protection.

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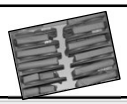
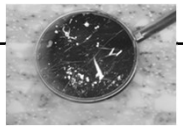
Cassette Advantages



Time Savings	One cassette holds all instruments for a specific procedure together from chairside procedure through reprocessing while eliminating certain manual steps from the process.
Improved Safety	Minimized handling of contaminated instruments during processing for re-use, which decreases chances of sharps injuries.
Better Organization	Standardized procedures that are color coded for easy identification and organization.
Decreased Contamination Potential	Proper spacing of instruments during reprocessing provides optimal environment for cleaning and sterilization.
Streamlined Workflow	Promotes proper flow of dirty to clean during instrument reprocessing. Easy break down after patient appointment and simple patient prep.
Increased Instrument Longevity	Protects instruments from damage during reprocessing while keeping them in place from chairside to storage to reduce the possibility of misplaced instruments.

Vol. 34, No. 5, Sept./Oct., 2017 THE DENTAL ADVISOR



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Instrument Processing Area Flow Process

Insts. placed in puncture-resistant covered container or locked cassette at point-of-use, then transported

IN

Contaminated Area

Clean Area

Receiving Cleaning ⇨ Preparation packaging ⇨ Heat sterilization ⇨ Monitoring ⇨ Storage

sharps container available

OUT

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Cleaning Instruments: Options

"Cleaning is the first step in every decontamination process" **(CDC)**

Mechanical (Hand Scrubbing)

Ultrasonics

Inst Washer / Disinfectors

Not FDA-regulated medical devices

Recommended Monitoring Cleaning:

1. **Foil test**
2. **Artificial soil strips**

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Sterilized Wrapped Instruments

Keeping Instruments Wrapped Until Patient Treatment

The Pay – off : Patients Note Sterile Packages (Perception & Reality)

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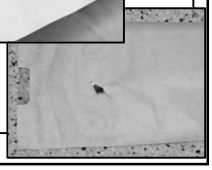
Package Labeling & Inspection Before Use

Event-related storage

- "contents sterile unless package is opened or damaged, please check before using."
- Stored in clean, dry location in manner to prevent contamination during storage
- Relies on proper storage and handling of packs
- Inspect packages for integrity & dryness before opening
- If compromised, clean, package, re-sterilize
- Most commonly recommended

Time (Date)-related storage

- Package expiration date
- Establishes time limit for sterile storage
  - Based on manufacturer IFU



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Are Clinical Contact Surfaces Covered or Cleaned & Disinfected Between Patients?

-- Cleaning

-- Sanitization

-- Disinfection

-- Sterilization

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Environmental Surface Asepsis: Historical Role of Hospital Surfaces in HAI

- Surface contamination important role in MO transmission: MRSA, VRE, noroviruses, *C. difficile*, & *Acinetobacter*
- Challenge: to repeatedly eliminate surface contamination
- HBV & HCV transmission: contact with environmental surfaces; outbreaks among hemodialysis unit pts & staff
- Is SARS-CoV-2 transmitted from contaminated surfaces?

Weber, Rutala, et al. AJIC (2010) Bond, et al. Lancet (1981): Otter, et al. AJIC (2013) Paintsil. JID (2014); Van Doremalen N, et al. NEJM.3/2020)

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Microbial Persistence on Dry Inanimate Surfaces

Microorganism	Duration of Persistence
COVID-19 (SARS-CoV-2)	2-3 days (plastics/ s. steel surfaces) 24 hrs (cardboard) Van Doremalen N, et al. NEJM.3/2020)
Staphylococcus aureus, incl. MRSA	7 days – 7 months
Enterococcus sp. (incl. VRE)	5 days – 4 months
Escherichia coli	1.5 hrs. – 16 months
Influenza viruses	1 – 2 days
Rhinoviruses	2 hrs – 24hrs
Herpes simplex viruses (HSV)	4 hrs. – 8 wks.
Hepatitis B Virus (HBV	> 1 wk. (in blood)
Hepatitis C Virus (HCV)	16 hrs. – 6 wks. (in blood)
Hepatitis A Virus (HAV)	2 hrs. – 2 months
HIV	few minutes

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Categories of Patient Items

-- Critical

-- Semi-Critical

-- Noncritical

Categories of Environmental Surfaces

-- Clinic Contact Surfaces: (light handles, switches, tray) may be touched frequently with gloved hand during pt care, or may become contaminated with blood / OPIM

-- Housekeeping Surfaces: (floors, walls, sinks) do not come into contact with devices used in dental procedures; cleaned on regular basis

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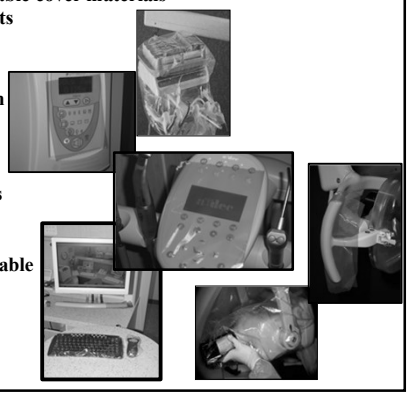
Surface Covers:

a. Use appropriate disposable cover materials
b. Change between patients



Advantages

1. Prevents contamination
2. Protects difficult-to-clean surfaces
3. Less time-consuming
4. Reduces chemical use
5. More eco-friendly choices

Disadvantages

1. Need varied sizes / types
2. Can have non- biodegradable plastics
3. Esthetically undesirable?
4. Additional costs over chemical sprays ?

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Properties of an IDEAL Surface Disinfectant

- broad antimicrobial spectrum
- rapidly lethal for all microbial forms
- excellent cleaner: not affected by organic matter
- non-toxic; -allergenic; easy to use
- compatibility c treated surfaces
- residual effect on treated surfaces
- odorless
- environmentally friendly

Additional considerations:

- surface wipes can dry out during use
- must remain wet on treated surfaces to be effective
- clean surfaces before initiating use of new disinfectant type

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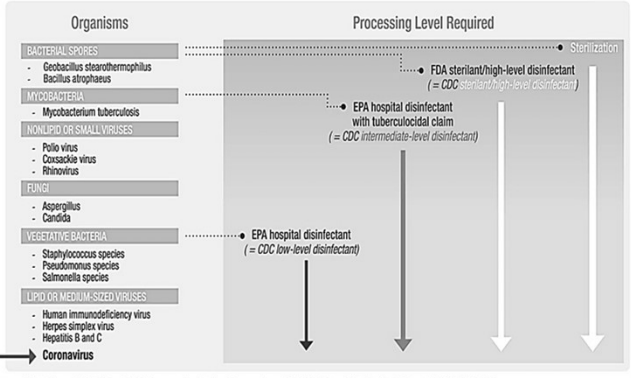
What to look for in a disinfectant



Adapted from: CDC. Guidelines for infection control in dental health-care settings – 2003. Morbidity and Mortality Weekly Report. 2003;52(RR-17)1-66.

87

List N: Disinfectants for Use Against SARS-CoV-2

https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2

"All products on this list meet EPA's criteria for use against SARS-CoV-2, the virus that causes COVID-19." (EPA. 4/2/2020)

1. Finding a Product

- enter **the first two sets** of **EPA registration number** into EPA search bar. example, if EPA Reg. No. 12345-12 is on List N, you can buy EPA Reg. No. 12345-12-2567 and know you're getting an equivalent product Can find number by looking for the EPA Reg. No. on product label.

2. Using Other Products

- if can't find a product on list to use against SARS-CoV-2, look at a different product's label to confirm it has an EPA registration number and that human coronavirus is listed as a target pathogen.

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Does dental unit water meet EPA regulatory standards for drinking water?

- ❒ Use water that meets regulatory standards for drinking water
  - (< 500 CFU/ml of heterotrophic water bacteria) for routine dental treatment output water
- ❒ Dental Water from units can be 100's - 1000's times more contaminated than incoming tap water
- ❒ Most untreated dental unit water samples:
  1,000 - 10,000 CFU (some >1,000,000 CFU documented CDC (2003)

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Health Facility Reservoirs as Potential Sources of Waterborne Infections

- **Potable & hospital water systems**
- **Showers**
- **Sinks**
- **Faucet aerators**
- **Nebulizers**
- **Ice and ice machines**
- **Eyewash stations**
- **Dialysis water**
- **Hydrotherapy tubs**
- **Endoscopes**

hospitals outbreaks predominantly linked to water sources

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Characteristics of Representative Waterborne Hospital Outbreaks in Patients

Reservoir	Microorganism	Contamination/ Transmission	Pt. Population	Infection Type	Study Type
Bathing tub drain	*Ps. aeruginosa*	Contaminated tub water from drain	Leukemia pts.	Bloodstream, UTI, pneumonia	Outbreak – strong causation
Dialysis water supply	*Burkholderia cepacia*	Improper cleaning; RO connection leak	Hemodialyis pts.	Bacteremia	Outbreak – strong causation
Heater-cooler unit for cardiac surgery	*Mycobacterium chimaera*	Airborne – unit water tank contamination	Open-heart surgery pts.	Endocarditis; bloodstream & graft infections	Outbreak- strong causation
Hospital water system	*L. pneumophila*	Contaminated water supply	Immune-compromised pts.; Elderly pts	Pneumonia	Multiple case series- strong causation
Potable water	*M. avium*	Contaminated water	Pts with AIDS & non-AIDS	Disseminated infection	Outbreak– strong causation
Sink	*Serratia marcescens*	Contaminated soap & bottles	NICU infants	Eye, respiratory, blood, rectum	Outbreak- strong causation

Kanamori, et al. Clin Infect Dis 2016; 62:1423-1435

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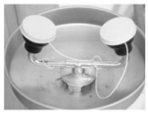
Eyewash Stations

Health Effects from Contaminated Water in Eyewash Stations

Eyewash stations used in workplaces must be maintained to prevent injury and illness to workers. This InfoSheet provides updated information on eyewash station hazards.



- **Improper maintenance contain MO's**
- **Activated weekly (15 mins)**
- **Reduce microbial contamination**
- **Follow manufacturer's IFUs**

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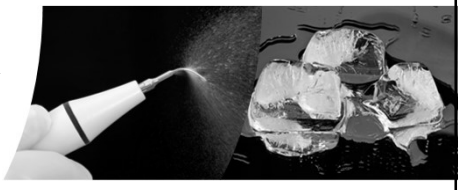
Dental Water Contamination Sources

- Treatment Plant
- Reservoir Bottles
- Exposed Tubing
- Quick Disconnect
- Handpiece Connectors
- Patient Oral Cavity



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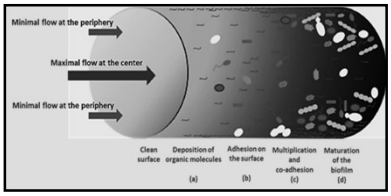
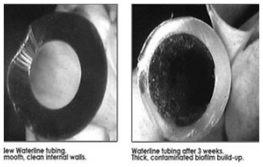
Slide 93

IR3 Thesse references are to websites where the images were pulled from, but are not actual permissions. Not sure how legal will look at this, but suggest that we have other images available to drop in. The lower left scaler is an image that Crosstex purchase from Shutterstock, so we can take that one.
Ilene Russo, 12/15/2020

Rapid Growth of Microbes in DUWL Biofilm

- Narrow lumens
- System design: dead legs; control blocks
- Surface-to-volume ratio:
  - ☛ smaller cylinder diameter
  - ☛ surface area for colonization by same volume of water
- Tubing materials conducive to biofilm growth
- Very little flow at hydrodynamic boundary
- Low volume of water used
- Water warms to room temp
- Intermittent usage





Hu-Friedy & J. Chandler (2018)

Barbot, et al. (2012) 'Update on infectious risks associated with dental unit waterlines', FEMS Immunology

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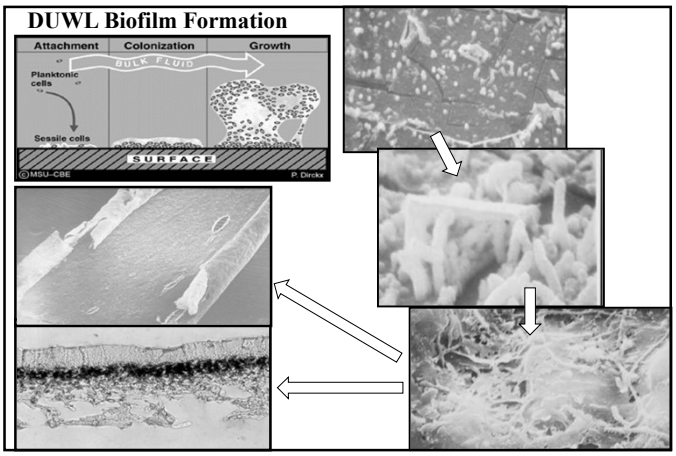
DUWL Biofilm Formation



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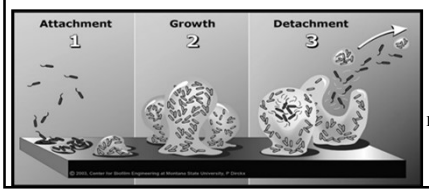
Biofilm Characteristics

- ☛ Highly complex microbial structural entity
- ☛ Organisms provide nutrients to each other
- ☛ Exists in all environments, including water and solids
- ☛ Microorganisms grow very well in stagnant water
- ☛ Flushing does not reliably improve dental water quality
- ☛ Most MO's from public water supply; not high risk for healthy persons
- ☛ Increasing # of immune compromised dental pts
  - waterborne microbes as "opportunistic pathogens"
  - *Pseudomonas sp*. *Legionella*, non-tubercle mycobacteria (NTM)



From: Molinari and Harte. *Practical Infection Control In Dentistry* (2010)

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Documented DUWL Infection Reports (1987-2017)

Microbial Etiology	Dental Facility	Outcome/Impact
Ps. aeruginosa	Dental practice	Gingival infections in 2 immune compromised patients after restorative treatment[1]
L. pneumophila	Dental practice	Fatal infection in 82-yr old patient[2]
M. abscessus	Pediatric dental practice	Odontogenic infections after pulpotomies using tap water (20 children)[3]
M. abscessus	Pediatric dental practice	Odontogenic infections after pulpotomies using tap water (72 children)[4]
L. pneumophila	Hospital dental clinic	Fatal infection in elderly, immune compromised patientt[5]

- Biofilm thrives in moist & warm environments: DUWL perfect environment
- Microbial counts can be >200,000 CFU/mL within 5 days of DUWL installation

1Martin. Brit Dent J 1987;163:545-557
2Ricci, et al. Lancet 2012;379:684
3Peralta, et al. MMWR 2015;65:355-356
4Hatzenbeuhler, et al. J Ped Inf Dis 2017; 6: e116-e122
5Schonning, et al. J Hospl Inf 2017;96:89-92

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Treating Dental Unit Waterlines

Complete DUWL systems include use of <u>antimicrobial cleaner</u> + <u>maintenance product</u>

CLEANING with registered antimicrobial KEY to removing microbial deposits
- also termed "shock" chemical
- does not come in contact with mucosal tissues

MAINTENANCE product prevents waterborne organisms from attaching, colonizing, proliferating in tubing
- can come in contact with mucosal tissues

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Representative DUWL Products

- FDA-cleared & EPA-registered products available
- When used ***<u>properly</u>*** can provide high-quality water for patient care

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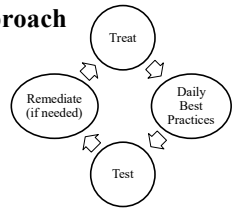
Complete DUWL Approach



- Planning & Treatment of your water
  - Decide what type of product(s) work best
  - Ensure that product IFU's are being followed
  - Basic IC principles used
  - Ensure source water is clean
- Follow daily best practices
  - Follow MIFUs for daily & weekly maintenance
  - Do not use waterline heaters
  - When recommended, shock all waterlines to remove biofilm
  - Flush lines at the beginning/end of day for at least 2-3 minutes
  - Flush lines for 20-30 seconds between each patient
  - Sterile water/saline when irrigating open surgical sites and cutting bone during surgical procedures
- Monitoring system in place to ensure protocol is effective

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Monitoring Options

- Recommended by ADA to monitor effectiveness of tx's
- Water testing laboratory (multiple commercial choices)
- In-office testing with self-contained kits
- Follow recommendations provided by manufacturer of DUWL treatment product for monitoring water quality (i.e. IFU)
- Remediate any failed water tests results
  - Shock lines and review treatment protocols to ensure they are being properly executed

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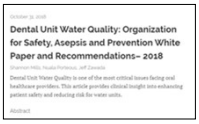
Clinical Monitoring of DUWL: OSAP White Paper

Recommended the following:

- Periodic monitoring & inspection at least monthly after installation of treatment devices, or initiation of new protocols
- When monitoring shows acceptable counts for 2 consecutive monthly cycles, can reduce testing frequency (not less than every 3 months)
- When a dental unit exceeds action limit, treat according to MIFU, and re-test immediately after


Dental Unit Water Quality: Organization for Safety, Asepsis and Prevention White Paper and Recommendations– 2018

Mills S, Porteous N, Zawada J; OSAP: October 31, 2018
https://osapjdics.scholasticahq.com/article/5075-dental-unit-water-quality-organization-for-safety-asepsis-and-prevention-white-paper-and-recommendations-2018

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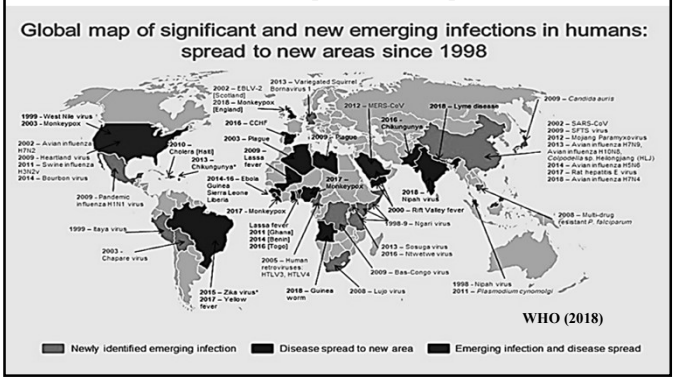
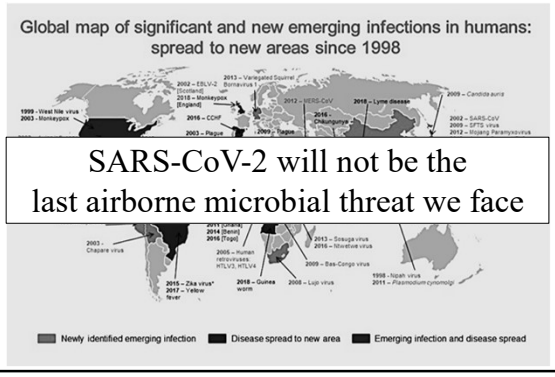
Microbes continue to evolve and adapt in order to survive and thrive -- sometimes at the expense of susceptible human hosts



103

Microbes continue to evolve and adapt in order to survive and thrive -- sometimes at the expense of susceptible human hosts



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Microbes continue to evolve and adapt in order to survive and thrive -- sometimes at the expense of susceptible human hosts

We must constantly remain aware of impending infectious disease threats which may challenge our current infection control precautions

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Science

The One Where Facts Matter More Than Opinions

Thank You

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