Infection Control Update for 2020
Protect Yourself!
Protect Your Patients!

Nebraska Dental Hygienists’ Association
April 24, 2020

Catherine Draper, RDH, MS
- Adjunct faculty member
  - Foothill College, Biological and Health Sciences Division
  - Los Altos Hills, CA
- Clinical practitioner
  - Mountain View, CA
- Managing editor, Journal of Dental Hygiene
- Library reference associate
  - Stanford Health Library/Stanford Healthcare
  - Palo Alto, CA
- No disclosures

Significance of Infection Control…..

Today’s Topics
- Discuss current knowledge of the SARS-CoV-2 virus
- Discuss current strategies for breaking the chain of transmission for SARS-CoV-2
- Discuss standard precautions and transmission-based precautions
- Describe the types of PPE required for the provision of emergency patient care and implications for the future
- Discuss sources of information and guidance
The way we were......

UCSF Website Pre-COVID-19

UCSF 2020

Infection Control
- Goal of any Infection Control Program
  - Reduce disease transmission risk among patients and healthcare workers

Significance of Infection Control
- Surgical complications affect ~ 7 million people annually
- HAI’s – Healthcare Associated Infections
- *Establishing a culture of safety!
  - Reduces infection ~ patients and staff!
  - Facilitates good communication!
  - Even more critical in a pandemic!
The novel virus, SARS-CoV-2 has similar characteristics to the virus responsible for the 2002-2004 SARS epidemic.

A. True
B. False

What we know
- SARS-CoV-2 is the virus
- ‘Novel’ RNA virus from the corona family
  - SARS (2002-04), MERS (2012-)

What we know
- SARS-CoV-2
  - First reported 12/31/19 Wuhan, China
  - ‘Wet’ market origins
  - Travel from China continued until 1/31/20

SARS-CoV-2 Life Cycle
- "Spiked" RNA virus covered in oily lipid
- Enters body through nose, mouth, eyes
- Attaches to ACE2 receptors in the airways and other tissues

SARS-CoV-2 Life Cycle
- Fuses oily membrane with the target cell
- Releases RNA
- Viral copies made
- Infects adjacent cells
- Expelled through viral laden droplets and aerosols

What we know
- Infection triggers immune response
- Fever > 100.4 F
- Antibody response
  - IgM disappears after 21 days
  - IgG released – remains elevated post infection
- Cytokine storm = Acute respiratory distress syndrome and multi-organ failure
What we know

- SARS-CoV-2 = Higher morbidity and mortality rate
  - 2002-04 SARS infected ~8,000 people in 26 countries, 774 deaths
  - 2020 SARS-CoV-2 ~20% more infectious
  - 500,600 infections, 18,770 deaths in USA alone – data from 4/17/20
  - Case mortality rate ~ 3%, similar to Spanish flu pandemic 1918
    - 10-20x higher than seasonal influenza

SARS-CoV-2 Reproduction Number ~ estimated 2 – 3.0 versus influenza ~1.3

Graphic courtesy of The Conversation

What we know

- Easily spread!
  - Person to person
  - Close contact (within 6’)
  - Respiratory droplets infected person inhaled into the lungs
  - Cough, sneeze, speaking

What we know

- May be spread from asymptomatic persons!

  Case study: Transmission of 2019-nCoV Infection from and Asymptomatic Contact in Germany; New England Journal of Medicine. 2020 Jan 30

Super-spreading Events

- Biogen International Leadership Conference, Boston, MA; 2/26-27/20; 99 cases in MA alone
  
- Pacific Dental Conference Vancouver, CA; 3/6-8/20; cases across Canada; at least one dentist died from complications
  
- Funeral in Albany, GA; 2/29/20; over 600 positive cases throughout Georgia
What we know

- COVID-19 is the disease
- Fever >100.4 F or higher
- Coughing
- Shortness of breath
- Muscle aches
- Malaise

- Presentation of symptoms: 2-14 days post exposure
- Post COVID-19 ~ isolation of a minimum of 3 days
- Refer to CDC guidelines

Testing

- Polymerase Chain Reaction test (PCR)
- Saliva test – Rutgers FDA EUA approval 4/13/20

- Antibody testing
- Tests for exposure of past infection ~ IgG antibodies

SARS-CoV-2 Chain of Infection

- Modes of Transmission
- Direct contact with droplets
- Indirect transmission through aerosols
- Portal of Entry
- Respiratory tract
- Mucous membranes
- Susceptible Host
- Testing

Public Health Measures
- Social distancing
- Self-isolation
- General use of masks in public
- Hand hygiene
- Decontamination of household and high-touch surfaces

COVID-19 Occupational Risk ~ OSHA

- HCW performing aerosol generating procedures on known or suspected COVID-19 patients
- HCW entering spaces of known or suspected COVID-19 patients
- Workers with frequent or close contact to known and unknown COVID-19 carriers
- Workers with minimal contact with co-workers or the public

Reducing our occupational risk!

Hierarchy of controls

- Adapted from CDC
Disease Transmission in Dentistry

- Patient to dental staff
- Dental staff to patient
- Patient to patient
- Even more critical today!

Pathogens in the Oropharyngeal Cavity

- Hepatitis B and C viruses (HBV, HCV)
- Human immunodeficiency virus (HIV)
- Herpes simplex types 1 and 2 (HSV)
- Staphylococci and streptococci bacteria
- Mycobacterium tuberculosis
- Influenza and SARS-CoV-2 and many more...

Modes of Transmission in the Dental Setting

- Direct contact with blood and oral fluids including droplets from patients
- Contact with environmental surfaces or instruments contaminated by the patient
- Contact with airborne infectious particles

Modes of Transmission in the Dental Setting

- Inhalation of airborne microorganisms
  - Droplet nuclei can extend 6 feet from source
  - May remain airborne for an extended periods of time
    - 30 minutes to 3 hours

Airborne Particles

- Aerosols
  - Stay airborne for an extended period of time before settling on a surface
  - Smaller than 5 micrometers in diameter
  - Splatter
    - Airborne particles larger than 50 micrometers
    - Ejected forcibly from the site until landing on a surface
- SARS, measles, and herpes viruses have been identified in splatter and droplets back to the 1970's

JADA April 2004

COVER STORY
Aerosols and splatter in dentistry
A brief review of the literature and infection control implications

BACKGROUND
Infectious aerosols and splatter have long been recognized as potential vehicles for the transmission of disease in the healthcare setting. However, the role of these agents as a source of infection has been largely overlooked. Recent studies have demonstrated that aerosols and splatter can remain airborne for extended periods of time, allowing for the transmission of pathogens over long distances. The airborne particles can contaminate surfaces and objects, creating a risk for cross-contamination. The implications of these findings highlight the need for improved infection control strategies in dental settings to minimize the transmission of infectious agents.
Aerosol Generating Devices in Dentistry
JADA April 2004

- Ultrasonic and sonic scalers
- Air polishing
- Air/water syringes
- Tooth preparation with an air turbine handpiece
- Tooth preparation with an air abrasion device

- Greatest source of aerosols
- Nearly equal to USS
- Nearly equal to USS
- Minimal contamination if rubber dam used
- Bacterial contamination unknown, extensive particle contamination

SARS-CoV-2 Viral Distribution

- Study from 2 hospital wards in Wuhan
- Contamination greater in ICU than general wards
- Virus widely distributed
- Floors
- Computer mice
- Trash cans
- Bed rails
- Up to 4 meters (~6 feet) from patients


SARS-CoV-2 Viral Distribution

- Aerosol and surface stability study
- Comparison of SARS-CoV-2 to SARS-CoV-1
  - Aerosol and fomite transmission plausible
  - Virus remains viable in aerosols for ~3 hours and surfaces up to 72 hours
  - Dependent on viral load
  - Results mirror SARS-CoV-1
- Differences in high viral loads in upper respiratory tract and asymptomatic shedding of virus


Indirect contact???
Is it infectious??
Viruses survive longer on non-porous surfaces than on porous surfaces
Can be identified on surfaces for more than 7 days
Intact virus necessary for infection
Infectivity reduces as envelope begins to degrade
Survive best in warm, moist environments

SARS-CoV-2 Viral Distribution

- Saliva and SARS-Cov 2
- SARS-CoV 2 detected in saliva samples of 11/12 hospitalized patients
  - Includes secretions from nasopharynx and lungs
- Advantages for salivary testing over nasal swabs
- Underscores need for early testing/early isolation
  - Availability of Rutgers saliva test
- Increased awareness of pathogenicity of dental aerosols!


Guidelines versus Statutes
Who is in charge???

- Guidance
  - Centers for Disease Control, ADA, ADHA, OSAP

Regulatory Authority
- OSHA, State OSHA, FDA, EPA
- State governor
- Board of Dentistry
- Local public health department

CDC Infection Control Guidelines

- CDC: Focus on prevention and reducing the spread of disease
  - Recommendations and guidelines
  - CDC Guidelines for Dental Health Care – Infection Prevention Summary 2016 and Checklist for Dental Settings
    - Interim Infection Prevention and Control Guidance for Dental Settings During the COVID-19 response

Fundamental Elements

- Administrative measures in place
- Infection prevention and education
- Dental healthcare personnel safety
- Program evaluation
- Standard precautions
- Dental unit water quality

Infection Control Guidelines

- Organization for Safety and Asepsis Procedures
  - Not-for-profit, professional organization
    - Programs promoting infection control practices and research
    - Publications and educational materials
Bloodborne Pathogens Standard

- Established - 1991
- Employer requirements to protect workers
- Anyone with occupational exposure risk
- Bloodborne pathogens HBV, HBC, HIV/AIDS, OPIM
- *Airborne pathogens
- 24 states, including California, have their own standards
- Cal-DOSH

Airborne Disease Transmission Standards (ATD) ~ Cal OSHA adopted 2009

- Standard Precautions updated 2007
- Hand hygiene
- Use of personal protective equipment
- Respiratory hygiene/cough etiquette
- Sharps safety (engineering and work practice controls)
- Safe injection practices
- Sterile instruments and devices
- Clean and disinfected environmental surfaces

Transmission Based Precautions vs Standard Precautions

When standard precautions are inadequate
- Used in addition to standard precautions
- Diseases spread through contact, droplet or airborne routes (active TB, measles, chicken pox and COVID-19)
- Airborne precautions- requires airborne infection isolation rooms (AIIR) negative air pressure and HEPA filtration
- No current data to determine whether standard precautions provide adequate protection during the provision of dental care during this pandemic

Respiratory Practice Protocol

- Added to Standard Precautions
- Implement measures to prevent the spread of respiratory infections from anyone in a health care setting with signs or symptoms of respiratory infections (active TB, measles, chicken pox and COVID-19).
- Post signs at entrances to respiratory infectious patient areas.
- Cover your cough when you cough or sneeze.
- Use tissues and throw them away after use.
- Wash your hands with soap and water after coughing or sneezing.
Respiratory Practice Protocol

- Provide tissues and no-touch receptacles for their disposal.
- Provide resources for performing hand hygiene in or near waiting areas.
- Offer masks to symptomatic patients when they enter the dental setting.
- Provide space and encourage symptomatic patients to sit as far away from others as possible.
- Educate DHCP on the importance of prevention measures when examining and caring for patients with signs and symptoms of a respiratory infection.

CDC Guidelines for COVID-19

- Dental settings have unique characteristics = additional infection control considerations
- Postpone elective procedures, surgeries, and non-urgent dental visits
- Proactive communication to both staff and patients – stay home when sick
- Know steps to take if a patient with COVID-19 symptoms enters your facility

Revisions as of April 7, 2020

- Description of risks to dental health care personnel (DHCP) when providing emergency care
- Recommendations for contacting patients prior to emergency dental care
- Recommendations for providing emergency dental care to non-COVID-19 patients including engineering controls, work practices and infection control considerations
- Potential exposure guidance
- Contingency and crisis planning

ADA Guidance on Dental Emergencies

- Dental emergencies
  - Potentially life threatening and require immediate treatment
- Urgent dental care
  - Management of conditions requiring immediate attention to relieve severe pain or infection
- Other urgent care
  - Extensive caries causing pain, temporary restorations in patients experiencing pain, suture removal

Engineering Controls

- Avoid aerosol generating procedures whenever possible
- Minimize handpiece use
- Minimize A/W syringe
- Use of USS not recommended
- Use HVE and dental dams

CDC Hazard reductions for emergency care
Looking to the future...
- Aerosol control
  - HVE systems such as the isolite®
  - External devices for aerosol reduction
- Antimicrobial rinses
  - Limited evidence on current product efficacy for SARS-CoV-2
- Improved air flow in treatment rooms
  - HEPA (high efficiency particulate air filter)
- Strategies for greater physical separation of operatories

Administrative Controls

Keep sick patients home
- Telephone screen all patients
- Signs and symptoms of respiratory illness
  - Fever
  - Cough
  - Shortness of breath
- Delay emergency dental care until fully recovered

Preparing to provide emergency care
- Health history review
- Inquire regarding the last use of: aspirin, acetaminophen, ibuprofen
  - Antipyretics can mask presenting signs/symptoms
- Assess patient’s temperature >100.4 F
  - Temperature will vary depending on the device
  - Non contact thermometers: infrared, tympanic

Preparing to provide emergency care
- Minimize time in reception area – wait in car
- Assess patient regarding presence of respiratory infection
- History of travel to areas of high transmission of COVID-19 within the last 14 days
- Are any family members/close contacts ill?
- Have any household members traveled to high transmission areas?

Emergency Patient Care Follow-up
- CDC Interim Guidance 4/7/20
- Importance of post treatment follow-up call 48 hours after emergency care
- Identify any health changes related to COVID-19
- Refer patient to healthcare provider
- Follow-up to staff – CDC Potential Exposure Guidance
- Keep sick staff members at home!
- Screen all DHCP for fever and respiratory symptoms. If they are ill, put on a facemask and leave the workplace.
Looking to the future….
- Prescreening patients on the phone
- Stagger appointments
- Keep patients in cars until treatment rooms are ready
- Allow for adequate disinfection time in schedule
- Limit persons in the office to patients only
- Hand hygiene upon entry and exit
- Regular temperature monitoring
- Follow-up calls for possible COVID-19 cases

What is the correct PPE???
- Remember, we are only providing emergency care at this time.
- Aerosol generating procedures should be at the very minimum.
- Guidelines for what future routine and preventive care will look like, are being developed – ADA, State Dental Boards, CDC, OSHA
- In the meantime – Assess the hazard and select the appropriate PPE!
Polling question!
I wash my hands with soap and water for at least 20 seconds before beginning to prepare for my work day, before and after lunch and at the end of the day.
A. Always
B. Most of the time
C. I rely on hand sanitizer throughout my work day.

Why soap???
- Soap molecules = Hydrophilic head + hydrophobic tail
- Hydrophobic tails of the soap molecules wedge into the lipid membrane and pry it apart
- Sanitizer versus soap?
  - Need 60% ethanol
  - Destabilize lipid membrane
  - Do not remove microorganisms from the skin easily

Hand Hygiene Review
- Soap and water handwash
  - Beginning of the day
  - Before and after lunch
  - End of the day
- Wash thoroughly at least 20 seconds with soap and water
- Surgical procedures: 2-6 minutes

Alcohol Hand Sanitizers
- Application is key!
  - Use a generous amount
  - Cover your hands with sanitizer
  - Must be 60% ethanol
- Allow the sanitizer to dry!!
- Remember – alcohols are flammable!
- Store away from high temperatures/flame

Emergency Care PPE
- Gloves, gown, eye protection (goggles and face shield)
  - N95 respirator – use surgical mask and face shield if N95 is unavailable
  - Disposable respirators removed and discarded after exiting the care area.
  - Eye protection must be cleaned and disinfected
  - Remove and discard the gown in a dedicated container for waste before leaving the patient care area.
  - Cloth gowns should be laundered after each use

Airway Protection
CDC Interim Guidelines
- “Surgical masks protect mucous membranes of the mouth and nose from droplet spatter, but they do not provide complete protection against inhalation of airborne infectious agents”
Surgical masks
- Rated for bacteria filtration efficiency (BFE)
- Particle filtration efficiency (PFE)
- Higher percentage = higher filtration efficiency
- Fluid resistance
- Know your product!

N95 Particulate Respirator
- Surgical N95 respirator
- N= non oil aerosols, blocks ≥95% of .3 micron particles
- ASTM Level 2 – 3
- Moderate to high fluid resistance
- BFE and PFE ≥ 98%
- ASTM 1
- Low fluid resistance
- BFE and PFE ≥ 95%
- Fluid resistance

Mask Removal
- Mask should remain on following procedures that create aerosols
- Grasp the elastic for removal
- Do not handle the outside of the mask!

Face Shields
- Provide additional protection from spray and splatter
- Worn in combination with N95 respirator OR surgical mask
- Are not regulated as a medical device
- Must be disinfected after each use

Eye Protection
- Goggles
- Glasses with side shields
- Loupes with side shields

Polling Question!
My current PPE (gown, lab coat) meets the requirements for adequate protection from aerosols, spray and splash created during patient care.

A. Yes  
B. No
Coats, Jackets, Gowns

- General work attire/scrubs are *not* PPE
- Barrier to work or street clothes
- Shield skin from spray and splash of fluids during treatment
- Decide on disposable versus cloth gowns
- Coverage from neck to below the knees
- PPE worn only treatment or laboratory area
- Changed daily or when visibly soiled
- Disposable or laundered according to OSHA guidelines

Are you a walking reservoir of pathogens?

- Pathogenic splatter and aerosols land everywhere
- Develop a plan for shoes and scrubs to limit contamination
- No special instructions on laundering contaminated clothing
- Warm water, soap
- Practice hand hygiene after handling dirty laundry

A word about shoes....

Hand Protection

- Gloves
  - Must be FDA approved for patient care
  - *Are not a substitute for hand hygiene!*
  - *Gel in – gel out with every use!*

Choose the right glove for the task!

- Routine procedures = Non-sterile exam gloves
- Surgical procedures = Sterile gloves

Choose the right glove for the task!

- Chemical resistant utility gloves for instrument processing and disinfection tasks
Order Matters

**Donning PPE**
- Hand hygiene
- Gown
- Mask
- Eye protection
- Face shield
- Gloves

**Doffing PPE**
- Gloves
  - Remove non dominant hand then the dominant hand
- Face shield
- Eye protection
- Gown
- Mask
  - Remove by the elastic
- Hand hygiene

Review of Standard Precautions

Cross Contamination in Dentistry

- Transfer of oral fluids, pathogenic debris from a patient to:
  - Surfaces
  - Equipment
  - Dental materials
  - DHCP hands and skin
  - Another person

Photo credit: OSTAP saliva were red

Cross Contamination

- **Direct** Cross Contamination
  - Reusing contaminated objects/instruments

- **Indirect** Cross Contamination
  - Handling objects with contaminated gloves; failure to disinfect objects between patients

Polling Question

The SARS-CoV-2 virus has a similar resistance to disinfectant products (germicides) as the bacterium responsible for tuberculosis (*mycobacterium tuberculosis*).

A. SARS-CoV-2 is more resistant to germicides than other airborne pathogens

B. SARS-CoV-2 is easily broken down by germicides

Surface Disinfection

- **Do we need to do anything different??**
  - SARS-CoV-2 is a lipid virus and is very susceptible to germicides
  - Establish SOPs
  - Use surface barriers to protect clinical contact surfaces
  - Clean and disinfect clinical contact surfaces with an EPA-registered hospital disinfectant (intermediate-level) after each patient
  - Follow IFUs
  - EPA N List Disinfectants Against SARS-CoV-2
Surface Disinfectants
- EPA registered
- Low level (effective against HIV/HBV)
  or
- Intermediate level (effective against mycobacterium tuberculosis)

Surface Disinfectants
- Clean it first!
  - Biofilm inactivates disinfectant
- One step or two step?
  - Observe the disinfection time!
  - Allow time for the product to dry!
  - Follow the directions!

Environmental Surfaces
- Barriers versus Surface Disinfection
  - Disposable barriers changed between patients
  - Establish your office protocol
  - Follow the protocol!

Barriers
- Difficult to clean surfaces
- Clean and disinfect at the end of the day

Single use items
Cross Contamination Challenges!

Next steps....
- Discuss strategies to limit cross contamination.
- Review sterilization SOP's
- Are all instruments in sealed packages, dated?
- Is your lab area in compliance with standard precautions?
- Have you purged all water lines?
- Refer to your water filtration system IFUs
- Complete the CDC Infection Prevention Checklist for Dental Settings
- Identify areas for improvement
- Plan for training before reopening the practice

Addressing Patient Concerns
- Use of infection control protocols as recommended by the CDC
- Describe the social distancing measures in place
- Describe the prescreening process for patient care
- Describe the sterilization process
- Stay in touch with your patients through the closure!

Conversation starters.....

Infection Control Questions
- Check for regular updates ~ daily!
- Evaluate your sources of information critically!
- Center for Disease Control
  - www.cdc.org
- Occupational Safety and Health Administration
  - www.osha.gov
- State Board of Dentistry
- Public Health Department
- Organization for Safety and Asepsis Procedures
  - www.osap.org
CE Zoom Code: 2020Infection

- Thank You for attending!
- Please refer to the many resources in your handout for evidence-based information

- drapercatherine@fhda.edu