Module C

EPIDEMIOLOGY AND RISK OF INFECTION IN DENTAL SETTINGS

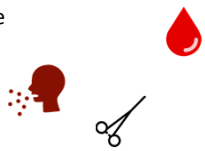
Statewide Program for Infection Control and Epidemiology (SPICE)
UNC School of Medicine

OBJECTIVES

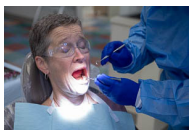
- Discuss the infectious process
- Review methods for controlling transmission of infection in dental settings
  - Standard Precautions
  - Transmission-based Precautions
- Describe steps for detecting and controlling outbreaks

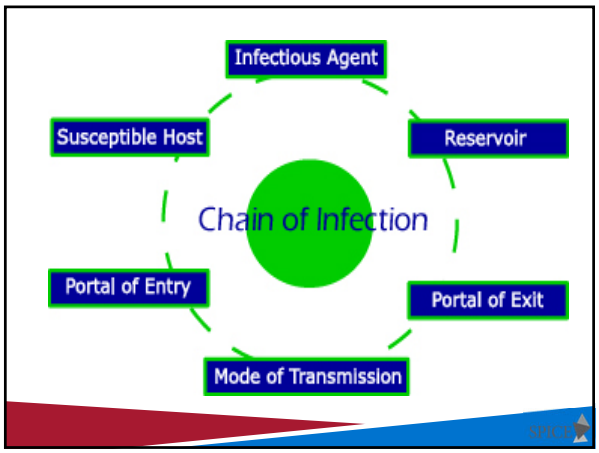
WHY IS INFECTION CONTROL IMPORTANT IN DENTISTRY?

- Patients and dental health-care personnel (DHCP) can be exposed to pathogens via:
  - Blood
  - Oral and respiratory secretions
  - Contaminated equipment



- Proper procedures can prevent transmission of infectious organisms among patient and DHCPs





INFECTIOUS AGENT OR "THE HARMFUL GERM"

- Bacteria (MRSA, VRE)
- Viruses (Influenza, Norovirus)
- Fungi (*Candida*, *Aspergillis*)
- Parasites (*Giardia,* pinworms)
- Arthropods (mites)
  - Infestations, not infections

RESERVOIR OR "HIDING PLACES"

Where germs live, grow, and increase in numbers

- A person
- Environment/Fomite
- An animal

PEOPLE AS RESERVOIRS

- Blood
- Skin
- Digestive tract
  - Mouth, stomach, intestines
- Respiratory tract
  - Nose, throat, lungs
- Urinary tract

PORTALS OF EXIT AND ENTRY

EXIT OR "THE WAY OUT"

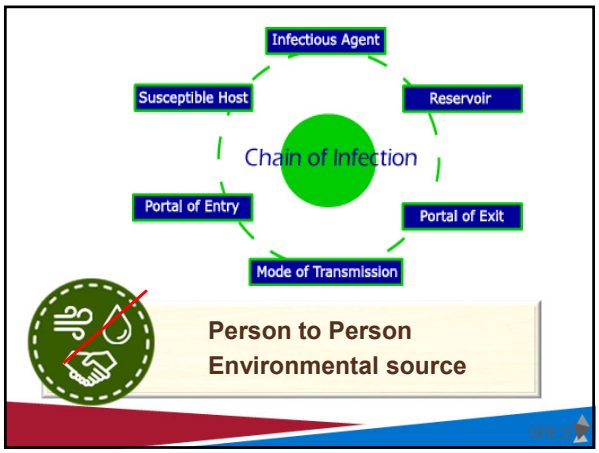
- Nose and mouth
  - Allows germs to leave in mucous droplets, and saliva or spit
- Gastrointestinal tract
  - Allows for germs to leave in stool and/or vomit
- Skin
  - Allows for germs to leave through direct contact, in blood, pus, or other liquids that come from the body.

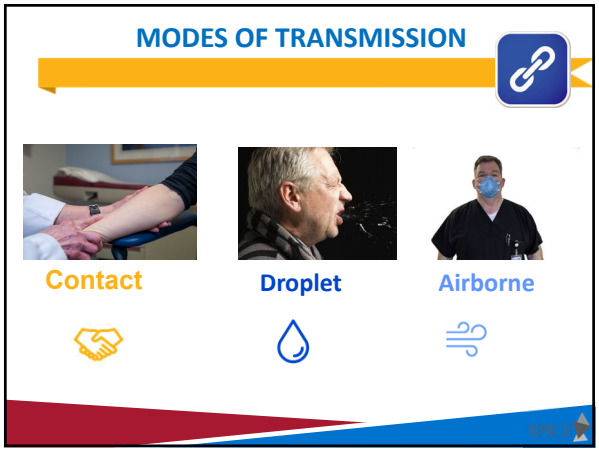
ENTRY OR "THE WAY IN"

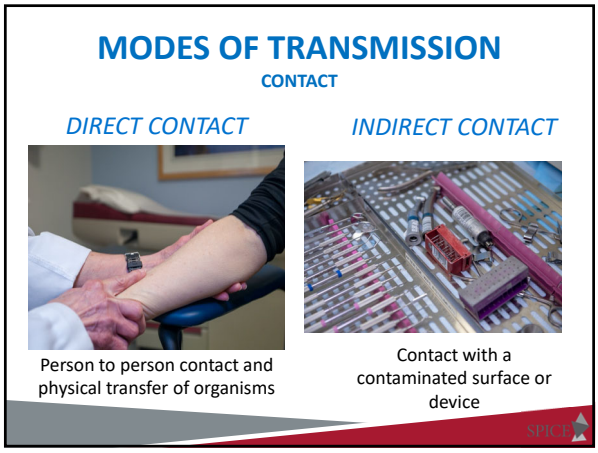
- Nose and mouth
  - Allows germs to enter in mucous droplets, and saliva or spit
- Gastrointestinal tract
  - Allows for germs to enter via ingestion
- Skin
  - Allows for germs to enter through direct contact, with blood, pus, or other liquids that come from the body.

SUSCEPTIBLE PERSON

- Age
- Stress
- Fatigue
- Poor Nutrition
- Chronic Illnesses
- Not properly vaccinated
- Open cuts, skin breakdown
- Medications


Infectious Agent
Reservoir
Portal of Exit
Mode of Transmission
Portal of Entry
Susceptible Host
Chain of Infection
Person to Person
Environmental source


MODES OF TRANSMISSION
Contact
Droplet
Airborne


MODES OF TRANSMISSION
CONTACT
DIRECT CONTACT
INDIRECT CONTACT
Person to person contact and physical transfer of organisms
Contact with a contaminated surface or device

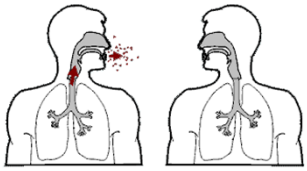
MODES OF TRANSMISSION

Droplet – an infectious agent travels as a very large particle over a short distance by air current (usually 3-6 feet)

Droplets may arise from speaking, coughing or sneezing
Need to be relatively close

MODES OF TRANSMISSION

Airborne – infectious agent travels as very small particles over long distances by air current



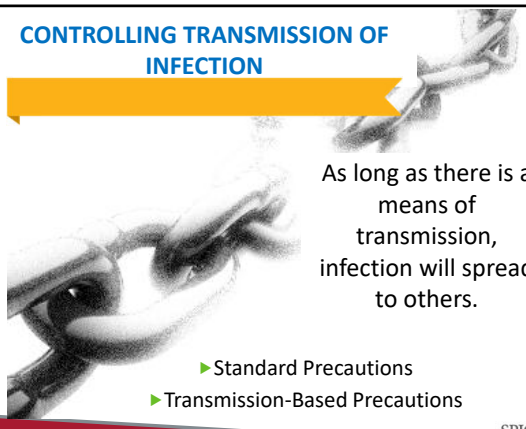
Small respiratory droplets, that can remain infective for long periods of time are dispersed when an infected person coughs, sneezes, laughs or speaks.
May spread thru ventilation systems

KNOWLEDGE CHECK

The Chain of Infection Includes which of the following:

1. Infectious agent, reservoir, mode of transmission and isolation precautions
2. Susceptible host, portal of entry, OSHA rules, medical waste
3. ✓ Mode of transmission, infectious agent, susceptible host, reservoir, portal of entry and portal of exit
4. None of the above

CONTROLLING TRANSMISSION OF INFECTION



As long as there is a means of transmission, infection will spread to others.

- Standard Precautions
- Transmission-Based Precautions

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CONTROLLING TRANSMISSION

Standard Precautions

- Hand hygiene ✓
- Use of personal protective equipment ✓
- Respiratory hygiene/cough etiquette ✓
- Safe injection practices
- Safe handling of potentially contaminated equipment

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THE BEST WAY TO STOP THE SPREAD OF INFECTION

Hand Hygiene

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THE BEST WAY TO STOP THE SPREAD OF INFECTION
HAND HYGIENE

- Good hand hygiene, including use of an alcohol-based hand rub and washing with soap and water is critical in reducing the risk of transmission of infections in any healthcare setting
- Use of an alcohol- based hand rub is recommended as primary mode of hand hygiene except when hands are visible soiled
  - Dirt
  - Blood,
  - Body fluids
  - Caring for patient with infectious diarrhea

Hand hygiene is discussed in detail in Module E, "principals of asepsis"

PERSONAL PROTECTIVE EQUIPMENT

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PERSONAL PROTECTIVE EQUIPMENT

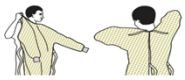
- Second component of Standard Precautions is Personal Protective Equipment (PPE)
- Wearable equipment that is intended to protect healthcare personnel from exposure or contact with infectious agent
- Examples:
  - Use of gowns to protect skin and clothing
  - Use of gloves in situations involving possible contact with blood, body fluids, non-intact skin and/or mucous membranes
  - Use of mouth, nose and eye protection during procedures likely to generate splashes or splatters of blood or other body fluids

SEQUENCE FOR PUTTING ON PERSONAL PROTECTIVE EQUIPMENT (PPE)

The type of PPE used will vary based on the level of precautions required, such as standard and contact, droplet or airborne infection isolation precautions. The procedure for putting on and removing PPE should be tailored to the specific type of PPE.

1. GOWN

- Fully cover torso from neck to knees, arms to end of wrists, and wrap around the back
- Fasten in back of neck and waist



2. MASK OR RESPIRATOR

- Secure ties or elastic bands at middle of head and neck
- Fit flexible band to nose bridge
- Fit snug to face and below chin
- Fit-check respirator

3. GOGGLES OR FACE SHIELD

- Place over face and eyes and adjust to fit

4. GLOVES

- Extend to cover wrist of isolation gown

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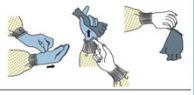
HOW TO SAFELY REMOVE PERSONAL PROTECTIVE EQUIPMENT (PPE) EXAMPLE 1

There are a variety of ways to safely remove PPE without contaminating your clothing, skin, or mucous membranes with potentially infectious materials. Here is one example. **Remove all PPE before exiting the patient room** except a respirator, if worn. Remove the respirator **after** leaving the patient room and closing the door. Remove PPE in the following sequence:

1. GLOVES

- Outside of gloves are contaminated!
- If your hands get contaminated during glove removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Using a gloved hand, grasp the palm area of the other gloved hand and peel off first glove
- Hold removed glove in gloved hand
- Slide fingers of ungloved hand under remaining glove at wrist and peel off second glove over first glove
- Discard gloves in a waste container



2. GOGGLES OR FACE SHIELD

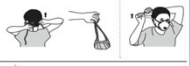
- Outside of goggles or face shield are contaminated!
- If your hands get contaminated during goggle or face shield removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Remove goggles or face shield from the back by lifting head band or ear pieces
- If the item is reusable, place in designated receptacle for reprocessing. Otherwise, discard in a waste container

3. GOWN

- Gown front and sleeves are contaminated!
- If your hands get contaminated during gown removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Unfasten gown ties, taking care that sleeves don't contact your body when reaching for ties
- Pull gown away from neck and shoulders, touching inside of gown only
- Turn gown inside out
- Fold or roll into a bundle and discard in a waste container

4. MASK OR RESPIRATOR

- Front of mask/respirator is contaminated — DO NOT TOUCH!
- If your hands get contaminated during mask/respirator removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Grasp bottom ties or elastics of the mask/respirator, then the ones at the top, and remove without touching the front
- Discard in a waste container



5. WASH HANDS OR USE AN ALCOHOL-BASED HAND SANITIZER IMMEDIATELY AFTER REMOVING

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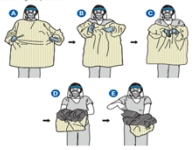
HOW TO SAFELY REMOVE PERSONAL PROTECTIVE EQUIPMENT (PPE) EXAMPLE 2

Here is another way to safely remove PPE without contaminating your clothing, skin, or mucous membranes with potentially infectious materials. **Remove all PPE before exiting the patient room** except a respirator, if worn. Remove the respirator **after** leaving the patient room and closing the door. Remove PPE in the following sequence:

1. GOWN AND GLOVES

- Gown front and sleeves and the outside of gloves are contaminated!
- If your hands get contaminated during gown or glove removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Grasp the gown in the front and pull away from your body so that the ties break, touching outside of gown only with gloved hands
- While removing the gown, fold or roll the gown inside-out into a bundle
- As you are removing the gown, peel off your gloves at the same time, only touching the inside of the gloves and gown with your bare hands. Place the gown and gloves into a waste container



2. GOGGLES OR FACE SHIELD

- Outside of goggles or face shield are contaminated!
- If your hands get contaminated during goggle or face shield removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Remove goggles or face shield from the back by lifting head band and without touching the front of the goggles or face shield
- If the item is reusable, place in designated receptacle for reprocessing. Otherwise, discard in a waste container

3. MASK OR RESPIRATOR

- Front of mask/respirator is contaminated — DO NOT TOUCH!
- If your hands get contaminated during mask/respirator removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Grasp bottom ties or elastics of the mask/respirator, then the ones at the top, and remove without touching the front
- Discard in a waste container

4. WASH HANDS OR USE AN ALCOHOL-BASED HAND SANITIZER IMMEDIATELY AFTER REMOVING ALL PPE

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USE OF PERSONAL PROTECTIVE EQUIPMENT (*PPE*)

- Three overriding principals related to personal protective equipment (PPE)
  - Wear PPE when the nature of the anticipated patient interaction indicates that contact with blood or body fluids may occur
  - Prevent contamination of clothing and skin during the process of removing PPE
  - Before leaving the patient's room or cubicle, remove and discard PPE

GLOVES:

DO

- Wear gloves to reduce risk of contamination or exposure to blood/other body fluids
- Clean hands before donning sterile gloves
- Cleans hands after removing gloves
- Cleans hands and change gloves between task (moving from one body site to another)
- Make sure gloves correct type and fit
- Follow facility policy

DON'T

- Re-use or wash gloves (except for utility gloves)
- Substitute glove use for hand hygiene
- Use non-approved hand lotions
- Use gloves if damaged or visible soiled
- Touch your face when wearing gloves
- Wear the same pair from one patient to another
- Wear gloves in the hall
- Forget to remove and dispose of appropriately

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CONTROLLING TRANSMISSION
RESPIRATORY HYGIENE/COUGH ETIQUETTE

- Third element of standard precautions is Respiratory Hygiene/Cough Etiquette
- Strategy designed to contain respiratory secretions:
  - Patients
  - Accompanying individuals who have signs and symptoms of a respiratory infection
- Initial point of encounter:
  - Triage
  - Reception area
  - Waiting rooms in emergency departments, outpatient clinics and physician offices

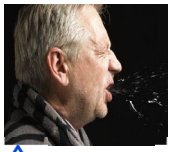
RESPIRATORY HYGIENE/COUGH ETIQUETTE

- Post signs at entrances
- Provide tissues and no-touch trash cans for disposal in waiting areas
- Provide hand hygiene product in waiting areas
- Offer mask to symptomatic patients
- Encourage ill patients to sit away from others

Process must be in place year round and not just during influenza season

CONTROLLING TRANSMISSION
TRANSMISSION BASED PRECAUTIONS


Contact


Droplet


Airborne

CONTROLLING TRANSMISSION

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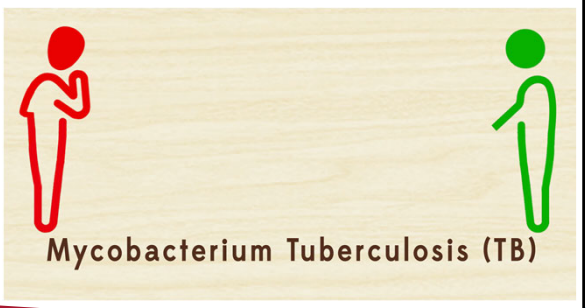


CONTROLLING TRANSMISSION
MYCOBACTERIUM TUBERCULOSIS

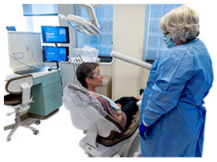
- *Mycobacterium tuberculosis* (TB) is spread from person to person via the air
- Droplet nuclei can be spread when a person:
  - Speaks
  - Sneezes
  - Coughs
- Within 2-12 weeks the body's immune system usually prevents further multiplication and spread
- Can remain alive for years, this condition referred to as "latent TB infection"

CONTROLLING TRANSMISSION

- Risk of TB transmission in dental settings is low.
- DHCPs trained to recognize the signs and symptoms of TB
- Only one documented case of transmission of TB.
- Tuberculin skin test conversions among DHP are rare

CONTROLLING TRANSMISSION

- Assess patient's history for TB
- Defer elective treatment for suspected or known active TB patients
- Wear surgical face mask or N-95 respirator
- Patient should be:
  - Separated from others
  - Given surgical mask
  - Provided with tissues
  - Referred to proper facility



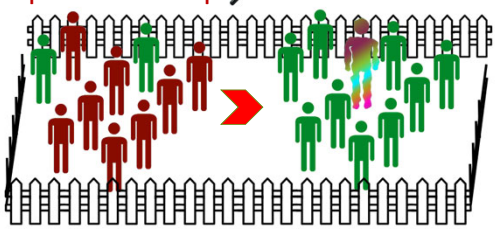
KNOWLEDGE CHECK

What is the single most effective way to prevent the spread of infections?

1. Using PPE
2. Cleaning patient care equipment
3. Hand Hygiene
4. Coughing into the crook of elbow or tissue

OUTBREAK INVESTIGATION

The goal of the investigation is to control and prevent the spread of further disease



OUTBREAKS STEPS

- Verify diagnosis
- Establish case definition
- Review for cases – case search
- Create a line listing
- Make an epi-curve
- Develop hypothesis
- Test hypothesis
- Control measures
- Evaluate control measures
- Disseminate information

OUTBREAK INVESTIGATION

Know Who to Call for Assistance

- Your Supervisor/Manager
- Local Health Department
- North Carolina Division of Public Health
  919-733-3419
- Statewide Program for Infection Control and Epidemiology (SPICE) spice@unc.edu
  919-966-3242

KNOWLEDGE CHECK

Who should be notified of a suspected or known communicable disease outbreak?

a) Risk Management
b) Administration/Director
c) Local Health Department
✓ All of the above

SUMMARY

Discuss the "chain of infection"

Review **standard** and **transmission-based** precautions for controlling transmission of infections in dental settings

Describe the steps for **detecting** and controlling outbreaks

QUESTIONS?