Part 1: Basics of infection control in the time of COVID-19

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Disclosures

- I have no relevant financial relationships with the manufacturer(s) of any commercial product(s) and/or provider of commercial services discussed in this CME activity.
- I do not intend to discuss an unapproved/investigative use of a commercial product/device in our presentation.
- Slides utilized from AAP and CDC





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HTTPS://WWW.CDC.GOV/INFECTIONCONTROL/PROJECTFIRSTLINE/RESOURCES.HTML

16 inside infection control videos



View on Web Episode 9 [Video – 4:03] YouTube Episode 9 [Video – 4:03] Facebook Episode 9 Episode 9 Transcript [TXT – 4 KB]

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Episode 10: Why is Eye Protection Recommended for COVID-19?

View on Web Episode 10 [Video – 5:55] YouTube Episode 10 [Video – 5:55] Facebook Episode 10 Episode 10 Transcript [TXT – 5 KB]

INSIDE INFECTION CONTROL WHY ARE GLOVES RECOMMENDED FOR COVID-19? EPISODE 11
Episode 11: Why are Gloves Recommended for COVID-19?
View on Web Episode 11 [Video – 8:46] YouTube Episode 11 [Video – 8:46] Facebook Episode 11 Episode 11 Transcript [TXT – 7 KB]

Objectives

- Understand how COVID-19 is transmitted.
- Understand the rationale for infection control practices for COVID-19.

Coronavirus Disease 2019 (COVID-19): What we know

• The epidemiology of SARS-CoV-2 indicates that most infections are spread through close interactions with infectious individuals.

• Being within about 6 feet of, or in a shared poorly ventilated space with, an infected individual for an extended period increases the risk of transmission.



Asymptomatic and Pre-Symptomatic Spread

 SARS CoV-2 can spread before an infected individual shows symptoms – when they are "pre-symptomatic" – and even if they never show any symptoms at all – when they are "asymptomatic."

• Spreads mainly from **person to person through respiratory secretions** that are produced when an infected individual coughs, sneezes, or talks: they can land in the eyes, nose, or mouth of people nearby and can be inhaled into the lungs.



https://www.nist.gov/video/cover-smart-do-your-part-slow-spread



Quiet, nose breathing better than roaring

Speech particle emissions are heterogeneous

Particle emissions increase with voice loudness (amplitude)



Asadi 2019



Choir practice

1 person cold like symptoms 3 days prior 5 days after practice 6 members fever 53 of 61 at 2.5 hour choir practice infected Chairs spaced 6-10 inches apart Typically 122 members, some empty seats Snacks



Optimize Indoor Air Quality; Minimize Proximity to Others

- COVID-19 is more likely to spread in environments where individuals are close together and in spaces that are poorly ventilated.
- Ensure that care processes do not require people to be close together except when clinically necessary.
 - eg, review waiting area layouts and processes.
- Ensure that HVAC systems have been recently inspected and optimized.
- Review standards for air-exchanges in clinical spaces:
 - <u>https://www.cdc.gov/infectioncontrol/guidelines/environmental/appendix</u> /air.html
- Consider auxiliary filtration if appropriate.

Try to avoid aerosol-generating procedures (AGP) if possible

 Procedures that are likely to produce aerosols at potentially high concentrations can increase the risk for transmission to people in proximity to the patient. These procedures should be performed in airborne isolation (aka, "negative pressure") rooms with only essential staff present.

Data is limited regarding which procedures in healthcare setting are aerosol generating

Aerosol Generating and Non-Aerosol Generating Procedures

Complete List of Aerosol Generating Procedures	Examples of Non- Aerosol Generating Procedu
 ENT Surgery involving nose/sinus, 	 Thoracotomy/thoracostomy
pharynx, trachea*	 NG/OG tube placement
 Transsphenoidal surgery* 	Tympanostomy
 Bronchoscopy* 	Swallow study
 Airway procedures including tracheostomy, 	Tissue-based procedures: biopsy, drains
cricothyrotomy	Non-rebreather
 EGD including lower endocoscopy 	Routine tracheostomy dressing change
 Colonoscopy 	In line ET tube suction
• TEE	 Suctioning of oropharynx
 ECT utilizing BVM ventilation 	Modified barium swallow
 Endobronchial procedures 	Cesarean section
Dental Surgery	Pharmacologic stress test
 Intubation/extubation/CPR 	Dental cleaning and other routine dental
 Bag-valve mask ventilation 	procedures
 Standard nebulizer treatment 	 Management of epistaxis
 Non-invasive ventilation: CPAP/BiPAP 	 Oropharyngeal swab
 High frequency oscillating ventilation 	Chest PT
 Hi flow oxygen: Nasal cannula >15LPM 	• Vibrating mesh nebulizer, eg. "Aerogen"
• Suction: Deep, open ETT, tracheostomy	
Sputum Induction	
• NP swab	
 PFTs including spirometry and peak flow testing 	
 Treadmill Stress tests to maximal effort 	
• Autopsy	

It is uncertain if standard nebulizer treatments are aerosol generating

*High Risk aerosol generating procedures

Infection control methods

- Infection control practices are critical tools to protect people from infectious diseases, including COVID-19.
- Preventing exposures is especially important when vaccines and specific treatments are still being developed.
- Each component builds on the next and should be used together all the time.
 - Source Control
 - Visitor Exclusion
 - Screening and Triage practices
 - Environmental and Hand Hygiene
 - Personal Protective Equipment

Source control

- Source control should be practiced by everyone in the healthcare facility.
- Wear a mask to cover your nose and mouth any time you might be near other people.
 - Remember to mask even when you're not in patient care areas, eg, break rooms.
- Cloth masks should be worn by patients and visitors.
- Healthcare personnel should wear surgical masks while at work, and switch to respirators (eg, N95 or PAPR/CAPR) when caring for known or suspected COVID-19 patients.
- Limitation on parents/guardians

Triage and screening

Instruct patients before seeking care:

- •When to choose telehealth options
- •What to expect on arrival for in-person care
- •Report symptoms and exposures, wear a source control mask at all times

•Whether others are allowed to accompany them

- •Provide supplies for respiratory hygiene and cough etiquette (hand sanitizer, tissues, no-touch disposal receptacles).
- •Limit and monitor points of entry to the facility.
- •Prevent crowding of patients in shared areas.

•Limit the number of individuals in waiting areas

•Consider having patients wait in their cars or a separated area and call them when it's their turn to be seen

•Screen patients, visitors, and staff on arrival for symptoms consistent with COVID-19 or exposure to others with SARS-CoV-2 infection and ensure they are practicing source control.

Triage and screening continued

- Calling with concern for COVID-19
- Where those with likelihood of COVID-19 will be seen
- If scheduled well or follow up appointments screen positive can they be rescheduled or candidate for telehealth
 - Diagnosed with or symptoms concerning for mild COVID-19 within 10 days prior to appointment, or have exposure to someone with COVID-19 within 14 days of the appointment
- Screen again for symptoms on arrival (healthcare providers, visitor, parents, patients)
- Visual alerts for masking, hand hygiene, distancing
- Easy access to masks and hand hygiene

Environmental hygiene

- SARS-CoV-2 belongs to a family of viruses that are inactivated by standard hospital disinfectants and detergents. The virus has a lipid envelope, a fatbased external layer that is disrupted by detergents and by chemicals such as alcohols and disinfectants. When this outer layer is damaged, the virus is not able to cause an infection.
- Routine practices for hand hygiene and environmental cleaning and disinfection are effective against SARS-CoV-2.
- Check HVAC, airflow
- ?Physical barriers Plexiglass

Personal protective equipment (PPE)

•Review correct use-donning, doffing

•PPE for care of patients with suspected or confirmed COVID-19:

•**Respirator (N95, PAPR)**: Filters out particles in the air so they're not inhaled. Provides a barrier against splashes to the nose and mouth; keeps the person wearing them from breathing out infectious particles.

•Eye protection: Blocks splashes that may land in the eyes. Coverage needed straight in front of you, and on the sides of your face. If reusable, they need to be cleaned and disinfected before reuse.

•Gown: Protects clothes from contact with soiled surfaces and makes removal easier.

•Gloves: Makes removing infectious material from hands easier. Hand hygiene is necessary before and immediately after glove use.

Personal Protective Equipment (PPE) continued

- Your PPE only works best if used correctly every time.
- An N95 that doesn't have a good seal on your face, or gloves that aren't removed carefully immediately after use, defeat the purpose of PPE.
- Ensure your health care facility provides adequate training and opportunity for practicing donning and doffing of PPE, as outlined in their IPC policy.
- Using personal protective equipment (PPE):
 - Step-by-step donning and doffing PPE,
 - Signage outlining donning and doffing steps, and
 - Video walking through donning and doffing process.
 - https://www.cdc.gov/coronavirus/2019-ncov/hcp/using-ppe.html

COVID-19 Personal Protective Equipment (PPE) for Healthcare Personnel



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

USE SAFE WORK PRACTICES TO PROTECT YOURSELF AND LIMIT THE SPREAD OF CONTAMINATION

- Keep hands away from face
- Limit surfaces touched
- · Change gloves when torn or heavily contaminated
- Perform hand hygiene

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 ALL PPE**

BECOME CONTAMINATED AND IMMEDIATELY AFTER **REMOVING ALL PPE**

PERFORM HAND HYGIENE BETWEEN STEPS IF HANDS



























PRIOR TO PROVIDING CARE OF A KNOWN OR SUSPECTED COVID-19 PATIENT (USE OR RE-USE OF N95 MASK DURING YOUR SHIFT)



AFTER COMPLETING CARE OF A KNOWN OR SUSPECTED COVID-19 PATIENT OR AT THE END OF YOUR SHIFT





Allagash Brewing Co 📀 @AllagashBrewing · Mar 24, 2020

As a brewery, we always plan to have extra materials on hand—which works out well when we have friends in need. We happened to have a number of extra masks, so we're donating them to our friends at Barbara Bush Children's Hospital.



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Show this thread



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Charlie Baker 🥝 @MassGovernor

No days off. Thanks to some serious teamwork, Massachusetts is set to receive over 1 million N95 masks for our front-line workers. Huge thanks to the Krafts and several dedicated partners for making this happen.



 (\mathbf{i})

7:23 AM · Apr 2, 2020

C \uparrow Share this Tweet 19.6K Q 4.5K

PPE Reuse

- Practices for extended use (more than 1 patient encounter) and reuse of PPE should be defined in the facility's IPC policy and will be driven by the patient(s) for whom care is provided and the procedures performed:
 - When caring for an asymptomatic patient with unknown status: Masks, eye protection, and gowns may be used all day if not soiled or contaminated. If some or all of these items are reusable, these items might be able to be sanitized at the end of the day and reused. If used, gloves should be changed between patients.
 - When caring for a patient with a COVID-19-compatible illness: Gloves and gown should be removed and disposed of between patients. Eye protection (goggles and/or face shields) should be sanitized between patients. Masks should be changed between patients unless covered by a face shield or another mask.
 - When performing an aerosol-generating procedure (AGP): When performing AGPs, the highest available level of PPE should be used. PPE reuse should follow policies for the care of patients with a COVID-19–compatible illness.

American Academy of Pediatrics. Guidance on the Use of PPE for Pediatric Care in Ambulatory Care Settings During the SARS-CoV-2 Pandemic. Accessed January 13, 2021. https://services.aap.org/en/pages/2019novel-coronavirus-covid-19-infections/clinical-guidance/guidance-on-the-use-of-personal-protective-equipment-ppe-for-pediatric-care-in-ambulatory-care-settings-during-the-sars-cov-2-pandemic/

Strategies for Optimizing the Supply of PPE

- Consider these options and **implement them sequentially**.
- Understand current PPE inventory, supply chain, and <u>utilization rate</u>.
- Train health care personnel on PPE use and have them demonstrate competency with donning and doffing any PPE ensemble that is used to perform job responsibilities.



https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/burn-calculator.html

Contingency and Crisis Capacity Strategies

PPE	Contingent Capacity Strategies	Crisis Capacity Strategies
All PPE	 Selectively cancel elective and non- urgent procedures and appointments for which PPE is typically used by health care providers. Decrease length of hospital stay for medically stable patients with COVID-19. 	 Cancel all elective and non-urgent procedures and appointments for which PPE is typically used by HCP.

Contingency and Crisis Capacity Strategies, cont

PPE	Contingent Capacity Strategies	Crisis Capacity Strategies
N95 Respirators	 Temporarily suspend annual fit testing. Use N95 respirators beyond the manufacturer-designated shelf life for training and fit testing. Extend the use of N95 respirators by wearing the same N95 for repeated close contact encounters with several different patients. 	 Use respirators beyond the manufacturer designated shelf life for health care delivery. Use respirators approved under standards used in other countries. Implement limited re-use of N95 respirators. During times of crisis, it may be needed to practice limited re-use on top of extended use. Use additional respirators beyond the manufacturer-designated shelf life that have not been evaluated by NIOSH. Prioritize the use of N95 respirators and facemasks by activity.

Contingency and Crisis Capacity Strategies, cont

PPE	Contingent Capacity Strategies	Crisis Capacity Strategies
Face Masks	 Place facemasks in a secure and monitored site. Provide facemasks to symptomatic patients upon check-in at entry points. Implement extended use of facemasks. Restrict facemasks for use by HCP, rather than asymptomatic patients (who might use cloth face coverings) for source control. 	 Use facemasks beyond the manufacturer-designated shelf life during patient care activities. Implement limited re-use of facemasks. Prioritize facemasks for selected activities such as essential surgeries, activities where splashes and sprays are anticipated, prolonged face-to-face contact with an infectious patient, and aerosol-generating procedures. When no facemasks are available: use a face shield that covers the entire front (that extends to the chin or below) and sides of the face with no facemask.

Tools for Optimizing the Supply of PPE

PPE Burn Rate Calculator

https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/burn-calculator.html

- Spreadsheet-based model that will help health care facilities plan and optimize the use of PPE for response to COVID-19.
- Enter the number of full boxes of each type of PPE in stock (gowns, gloves, surgical masks, respirators, and face shields) and the total number of patients at your facility.
- The tool will calculate the average consumption rate, also referred to as a "burn rate," for each type of PPE entered in the spreadsheet.
- This information can then be used to estimate how long the remaining supply of PPE will last, based on the average consumption rate.
- NIOSH PPE Tracker app
- https://www.cdc.gov/niosh/ppe/ppeapp.html
 - Mobile app that calculates average PPE consumption rate or "burn rate." The app estimates how many days a PPE supply will last given current inventory levels and PPE burn rate.

Hand hygiene

- Hand hygiene, which includes using alcohol-based hand sanitizer or washing your hands with soap and water, is a way to prevent delivering infectious material from the environment to your eyes, nose, or mouth, where respiratory viruses can cause infections.
- The virus that causes COVID-19 is inactivated by detergents like soap and water, and by the alcohol in alcohol-based hand sanitizer.

Dramatic Drop in Common Viruses Raises Question: Masks Forever?

44 children's hospitalized hospitalizations for respiratory Illnesses down 62%



FIG. Respiratory and Nonrespiratory Illness at Children's Hospitals During the COVID-19 Period. Trends in respiratory and nonrespiratory encounters over time are shown. The first statistically significant decrease in the observed-to-expected ratio of respiratory illnesses occurred on March 17, 2020.

Antoon. J Hosp Med. Published Online First March 8, 2021. DOI: 10.12788/jhm.3608 | 10.12788/jhm.3608

Influenza-Associated Pediatric Deaths by Week of Death, 2017-2018 season to 2020-2021 season



Minnesota Department of Health Weekly Influenza & Respiratory Activity Report for Week Ending March 13, 2021 | WEEK 10



MDH Weekly Influenza & Respiratory Illness Activity Report: Week Ending March 13, 2021 | WEEK 10 (state.mn.us)

Masking recommendations evolving as pandemic progresses



U.S. Surgeon General 🤣 @Surgeon_General · Feb 29 Seriously people- STOP BUYING MASKS!

They are NOT effective in preventing general public from catching #Coronavirus, but if healthcare providers can't get them to care for sick patients, it puts them and our communities at risk! bit.ly/37Ay6Cm

Asymptomatic/presymptomatic Higher NP viral load early

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U.S. Surgeon General 🕗 @Surgeon_General · Apr 14 Wearing a cloth face covering correctly can help prevent the spread of #COVID19 to others. When you go out on essential trips, follow these "do's." If you have a child, remember those under age 2 should NOT wear a face covering.

More via @CDCgov: cdc.gov/coronavirus/20...



Wearing a mask that fits tightly to your face can help limit spread of the virus that causes COVID-19

In lab tests with dummies, exposure to potentially infectious aerosols decreased by about 95% when they both wore tightly fitted masks



CDC.GOV



Medical procedure mask with medical procedure mask knotted ear loops and tucked-in sides

bit.ly/MMWR21021

Other effective options to improve fit include:

Mask fitter



Nylon covering over mask

MMWR

2 medical masks not recommended

https://www.cdc.gov/coronavirus/2019-ncov/your-health/effective-masks.html

Closing

- Winter and typical flu season is almost behind us.
- Rigorous infection control continues to be crucial for protecting our healthcare workforce in the coming months.
- Upcoming sessions will focus on:
 - Scenarios around PPE
 - Continued discussion of infection prevention and control transmission precautions

Resources

- American Academy of Pediatrics COVID-19 Guidance and Resources
 - <u>COVID Town Halls</u>
 - Practice Management Tips
 - Discounts on PPE and COVID-19 Supplies
- <u>Centers for Disease Control and Prevention</u>
 - Standard Precautions
 - Transmission-Based Precautions
 - <u>Clinical Questions about COVID-19: Questions and Answers</u>
- Project Firstline

Additional references

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Thank you

Thanks to Maine AAP and Dee Kerry for inviting me to speak and directing me to the resources from AAP ECHO and CDC Project FirstLine

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