

Agenda

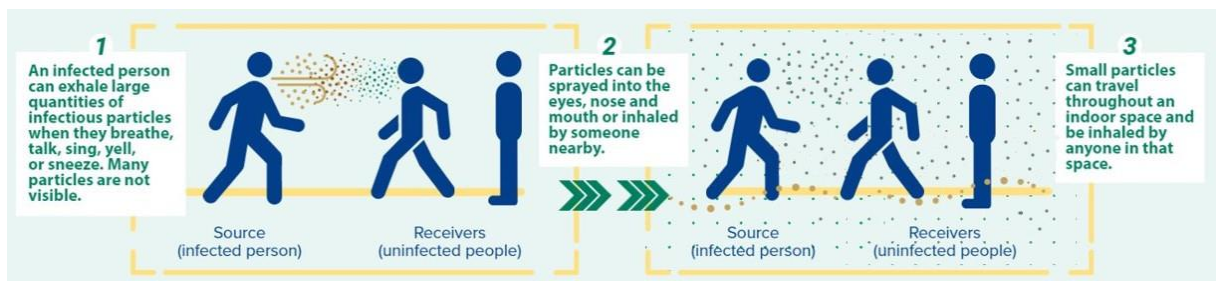
- I. How is COVID transmitted?
- II. How can ventilation and indoor air strategies be used on top of other interventions to minimize transmission?
- III. Example SNF Scenario: What Would You Recommend?
- IV. Discussion and Q&A

Note: We will not be discussing isolation practices in detail. Our focus today is on how ventilation practices can reduce transmission risk

Dominant Transmission Routes of COVID-19

- I. Inhalation of virus particles from close contact
- II. Inhalation of virus particles that have remained suspended in air and "built-up" because of poorly-ventilated indoor environments (not necessarily from close contact)
- III. Direct exposure to virus particles in the eyes, nose, or mouth from "splashes and sprays"

Virus Transmission Diagram



What Do We Mean By Ventilation?

- Introduction of fresh air into indoor space by natural or mechanical means
- “Ventilation” also refers to efforts to improve indoor air quality for a specific purpose, in this case to help reduce disease transmission risk through the air

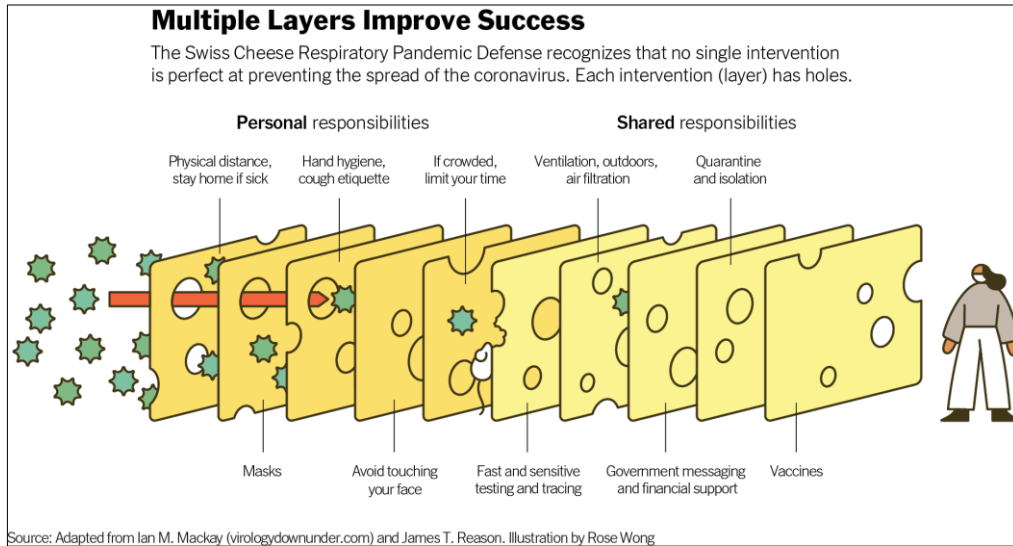
What Will Ventilation Help Most With?

I. Inhalation of virus particles from close contact

II. Inhalation of virus particles that have remained suspended in air and "built-up" because of poorly-ventilated indoor environments (not necessarily from close contact)

III. Direct exposure to virus particles in the eyes, nose, or mouth from "splashes and sprays"

"Swiss Cheese" Analogy



Cigarette Smoke Analogy



What Would Make the Smoke Go Away?

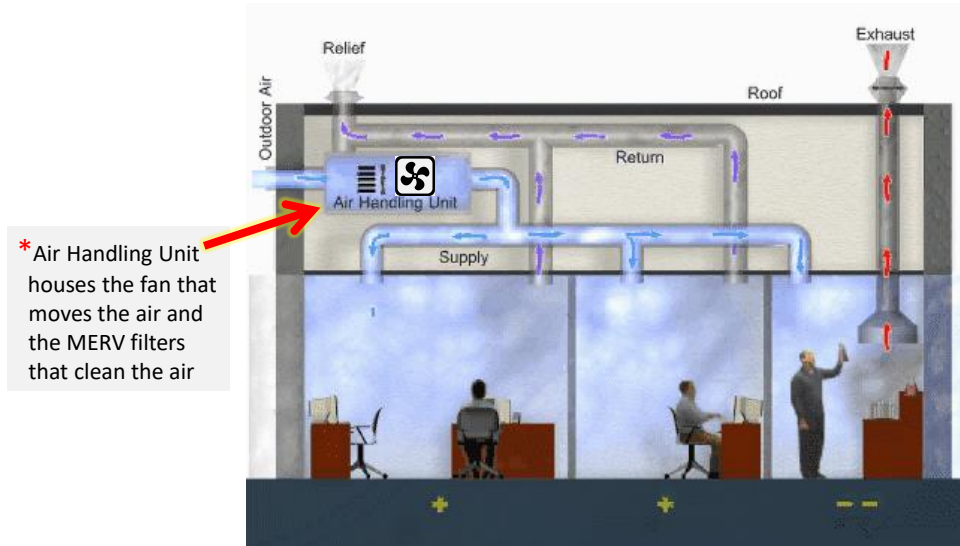
- I. **Isolation/Separation** of the "smoker" from others
- II. **Exhaust/Remove** the smoke from the indoor space
- III. **Dilute** the smoke with outdoor air, opening the windows, etc.
- IV. **Filter** out the smoke particles in the air with air filter/HEPA filter

Fundamental Principles

Exhaled virus will behave like invisible smoke in the air. Regardless of circumstances in a SNF, the same best practices apply:

- I. Isolate known or suspected positives
- I. Exhaust/direct "dirty" air directly to the outside if possible
- II. Dilute indoor air in facility with mechanical/natural ventilation as much as possible
- III. Filter indoor air that is being recirculated and use portable filters to supplement other strategies

Mechanical Ventilation System Diagram



Air Handling Unit on Roof



Making Recommendations to SNFs

- Recommendations will be based on specific conditions are in each SNF
- Questions to ask:
 - Do you have mechanical ventilation system or rely only on natural ventilation (opening windows and doors)?
 - Do you have recirculated air? Is it filtered?
 - Do you use portable air cleaners?
- Observations:
 - Can air from red/yellow areas travel to other areas?
 - How do you see fans/air cleaners being used?

Isolation/Containment

- Isolation is a crucial component of any ventilation strategy
- Due to its importance and the challenge in explaining it in a short amount of time, we will hold a future webinar solely dedicated to this topic
- Will include techniques to achieve and test negative pressure, eliminating air recirculation, PPE requirements, and policies for entering/exiting isolation areas, etc.

If you want to review existing regulations around isolation in healthcare settings to prevent airborne disease transmission, please review the following resource:

[Aerosol Transmissible Diseases Standard](#) (pg. 16)

Exhaust/Move “Dirty” Air to the Outside

- Exhaust “dirty” air directly to the outside whenever possible
 - Bathrooms fans direct air directly outside (run constantly)
- Use fans in windows to direct “dirty” air outside
 - Applies to fan use more generally
 - Clean → Dirty → Outside



Dilution

- Bring in as much fresh air as possible from the outside to dilute and reduce the concentration of virus particles suspended in air
- Maximize outdoor air being brought in by mechanical ventilation system, run system on extended hours/continuously
- If no HVAC system, open windows & doors and place fans near windows/doors to promote fresh air entering SNF
- Ceiling fans do not dilute indoor air, they are not bringing fresh air in

Maximizing Outdoor Air Explained

- Ventilation systems supply buildings with a mixture of fresh and recirculated air
- They can be adjusted to supply more fresh air
- They can also be adjusted to run continuously



Maintenance

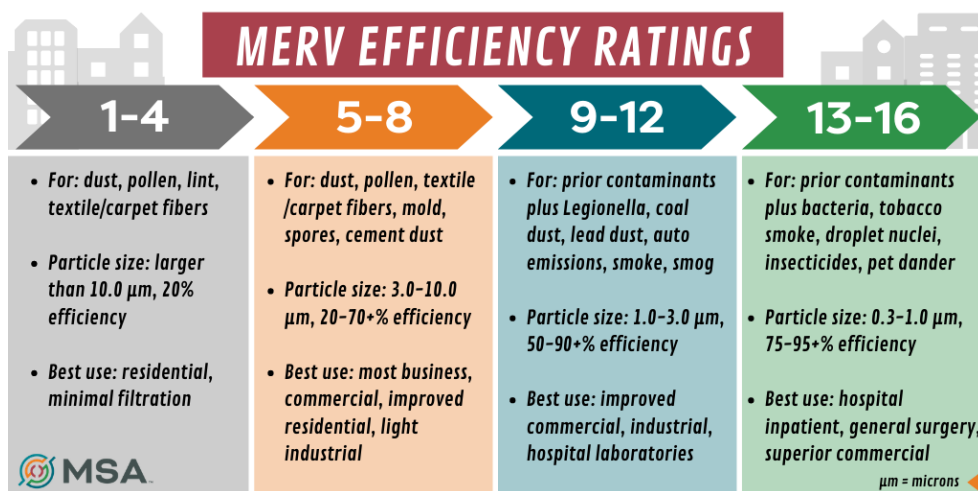
- Important but often overlooked
- Need to maintain regularly like a car
- Filter changes, ducts checked, etc.



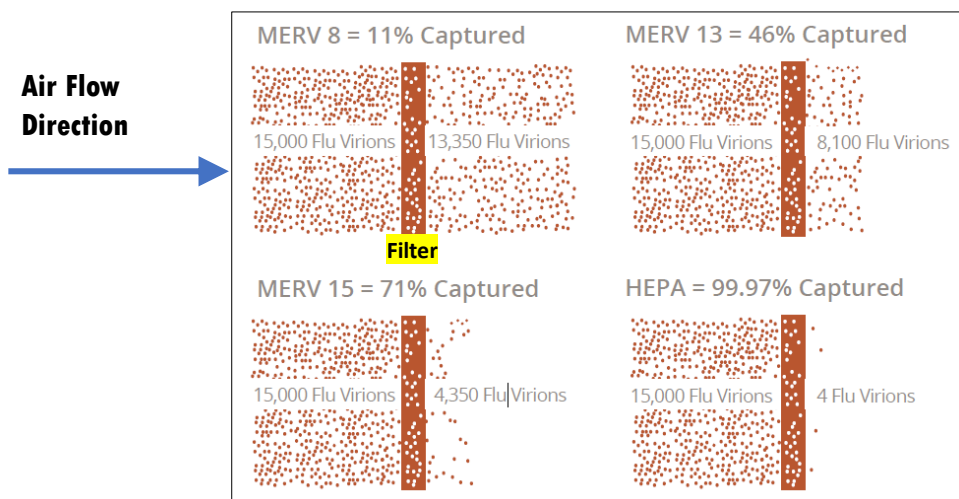
Filtration

- Upgrade filtration in ventilation system to as high as possible if facility recirculates indoor air (goal is to have MERV-14 or higher)
- Filter upgrade may not be possible in some facilities (pressure drop)
- Use portable HEPA air cleaner to filter indoor air
 - Particularly useful to supplement other strategies in red/yellow areas with poor ventilation
 - Place in visitation areas or other areas with potential crowding

Filtration



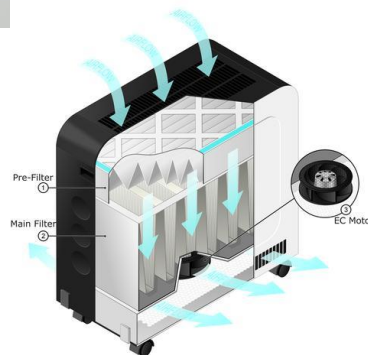
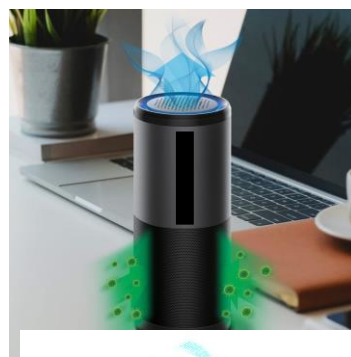
Filtration, cont.



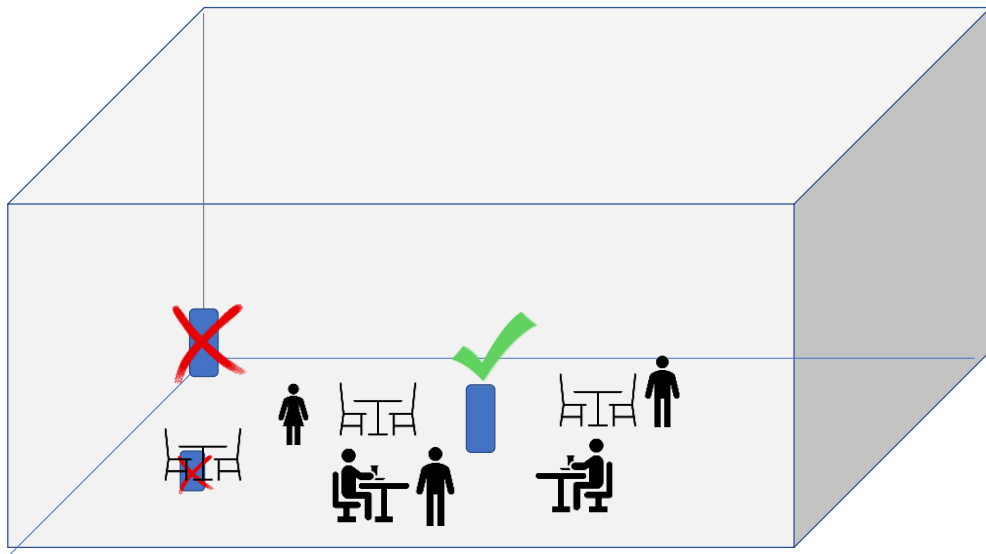
Portable Air Cleaners

- Equipped with HEPA filters
- Designed to take in “dirty air” and filter contaminants and release fresh air back into the room
- HEPA filtration is proven, ozone and “ionizers” not recommended

See [CDPH guidance on ventilation](#) for selecting and sizing portable air cleaners.



Placement of Portable Air Cleaners



Exercise: What Would You Recommend?

Scenario: Terry and Adrienne conduct a site visit at Mercy Home in Fresno County. Mercy Home has had an outbreak.

Terry and Adrienne gathered the following information from their interviews:

- Five positive patients in the red zone
- The positive patients want windows closed because they are cold/sick
- Mercy Home has a mechanical ventilation system which only lets in outside air to maintain the pre-set thermostat temperature and recirculates air
- Mercy Home bought portable air cleaners because they read they were beneficial but aren't sure where to put them

How Do I Evaluate the Situation?

Fundamental Principles (smoke analogy):

- Isolation
- Exhaust Indoor Air to the Outside
- Dilution
- Filtration

Recommendations

- Ask Mercy Home to run ventilation system continuously if possible and not just for temperature control
- Ask Mercy Home to upgrade to highest filter possible since they are recirculating air (goal is MERV-14 or above)
- Place portable air cleaners in rooms with positive patients to filter and reduce "build-up" of what they are exhaling in their rooms
- Ensure isolation areas are not breached without fit-tested N95 and other required PPE (more detail in next webinar)

Conclusions and Next Steps

- Virus behavior and “smoke” analogy
- Fundamental principles:
 - Isolation, Exhaust, Dilution, Filtration
- Encourage administrators to consult professionals!
- Next webinar will focus on implementing isolation practices, which are central in reducing transmission, particularly in outbreaks

Resources

- [WHO - Roadmap to improve and ensure good indoor ventilation in the context of COVID-19](#)
- [ASHRAE- HVAC Strategies for LTC Infection Management & Prevention](#)
- [CDPH - Interim guidance for Ventilation, Filtration, and Air Quality in Indoor Environments](#)
- [Cal/OSHA - Aerosol Transmissible Diseases Standard](#)
- [ASHRAE Addendum to Increase to MERV 14 Filters in SNFs](#)

Thanks for your participation!

QUESTIONS?

