Ventilation Strategies to Reduce Spread of COVID-19 for Long-Term Care Facilities

December 7, 2021

Environmental Health & Engineering, Inc.

Agenda

- Introductions and EH&E Background
- COVID-19 Transmission Basics
- Ventilation Strategies for Infection Control
- Questions

Presenters

- **Kathleen W. Brown, Sc.D.**
  Senior Scientist
- **Will Wade, CIH**
  Principal Consultant
- **Andrew Machado, PE, CEM**
  Senior Engineer

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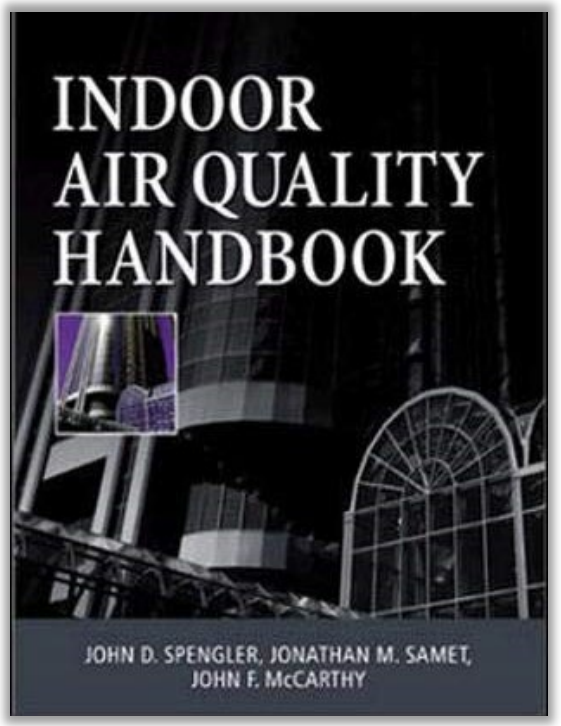
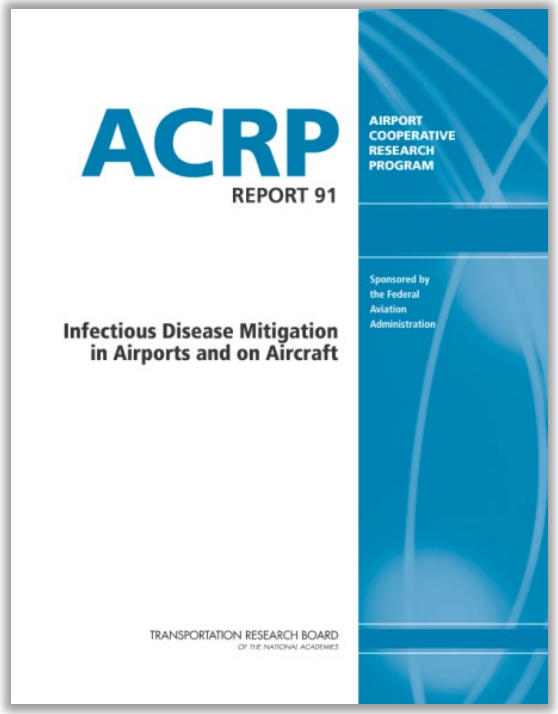
EH&E Background

- EH&E has been protecting people, businesses and the environment for over 30 years
- COVID-19
  - Many of EH&E's client relationships are confidential and include:
    - Schools, colleges, universities
    - Hospitals & healthcare facilities
    - Professional athletics
    - Travel and transportation
    - Commercial and non-profit offices
    - Movie & TV production studios





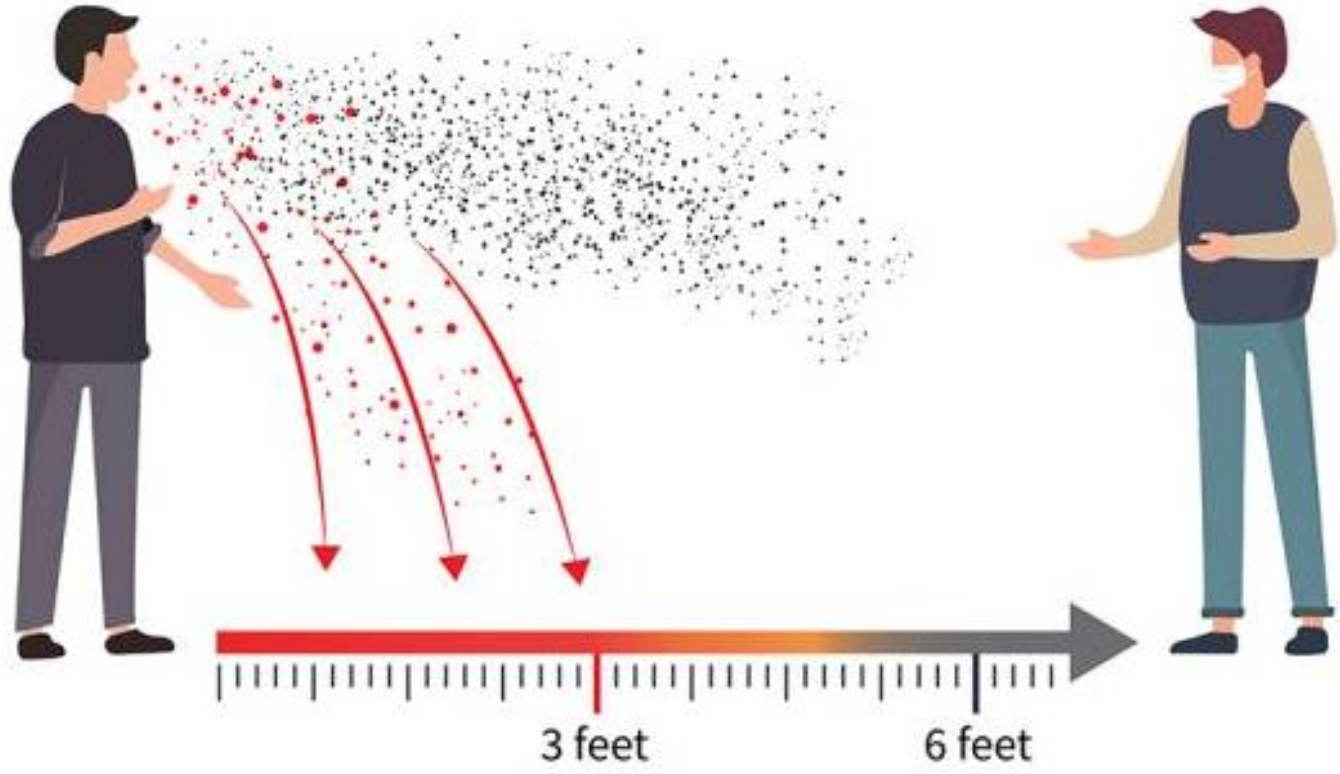
Aerobiological Pathway for Transmission of COVID-19

- Source
- Release
- Transport
- Dispersion
- Deposition
- Infection

Disease Transmission

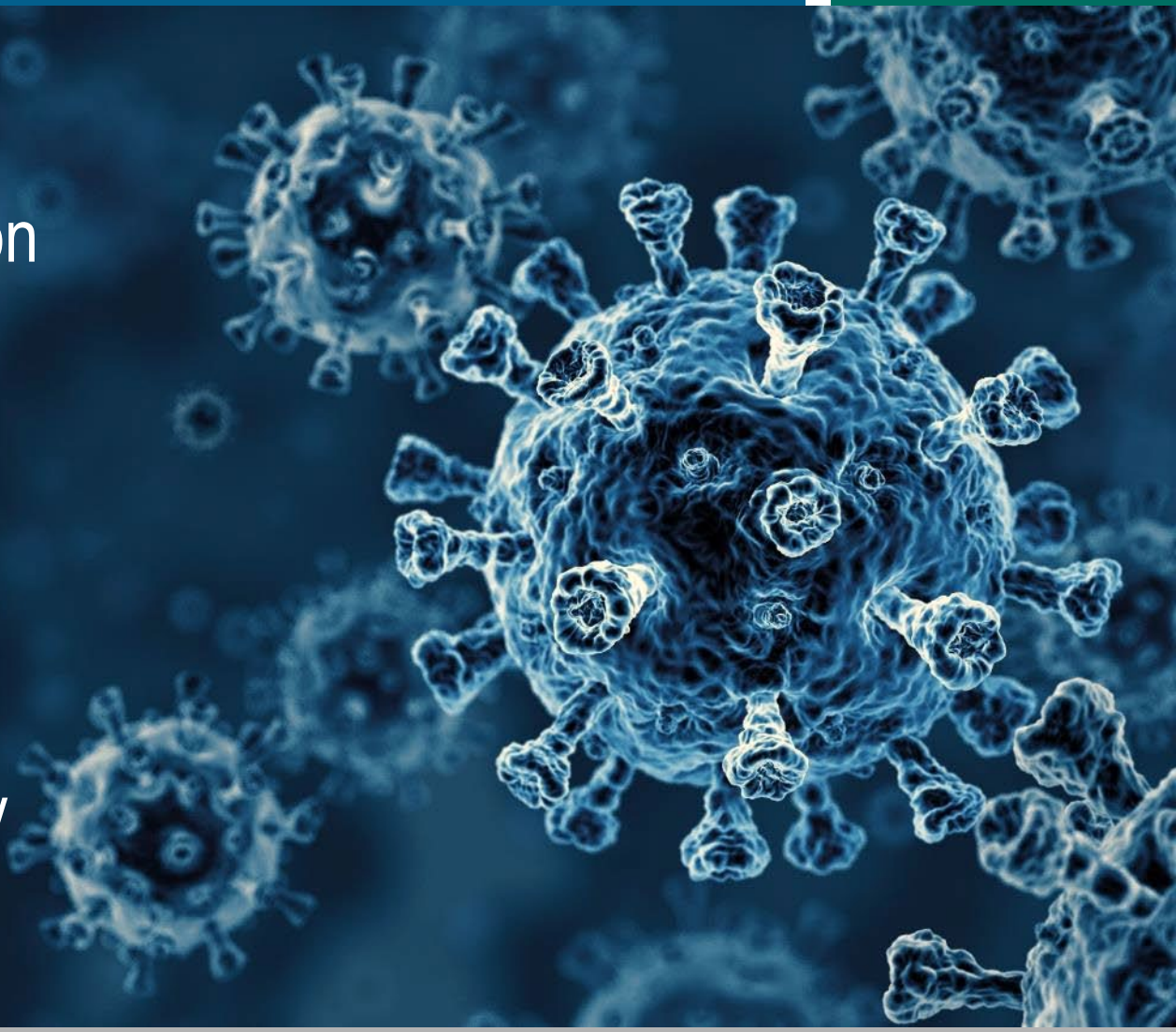
SARS CoV-2 is the coronavirus that causes COVID-19 disease

- Transmission is by respiratory droplets when an infected person coughs, sneezes or talks
- Touching a contaminated surface or object then touching your mouth, nose, or eyes

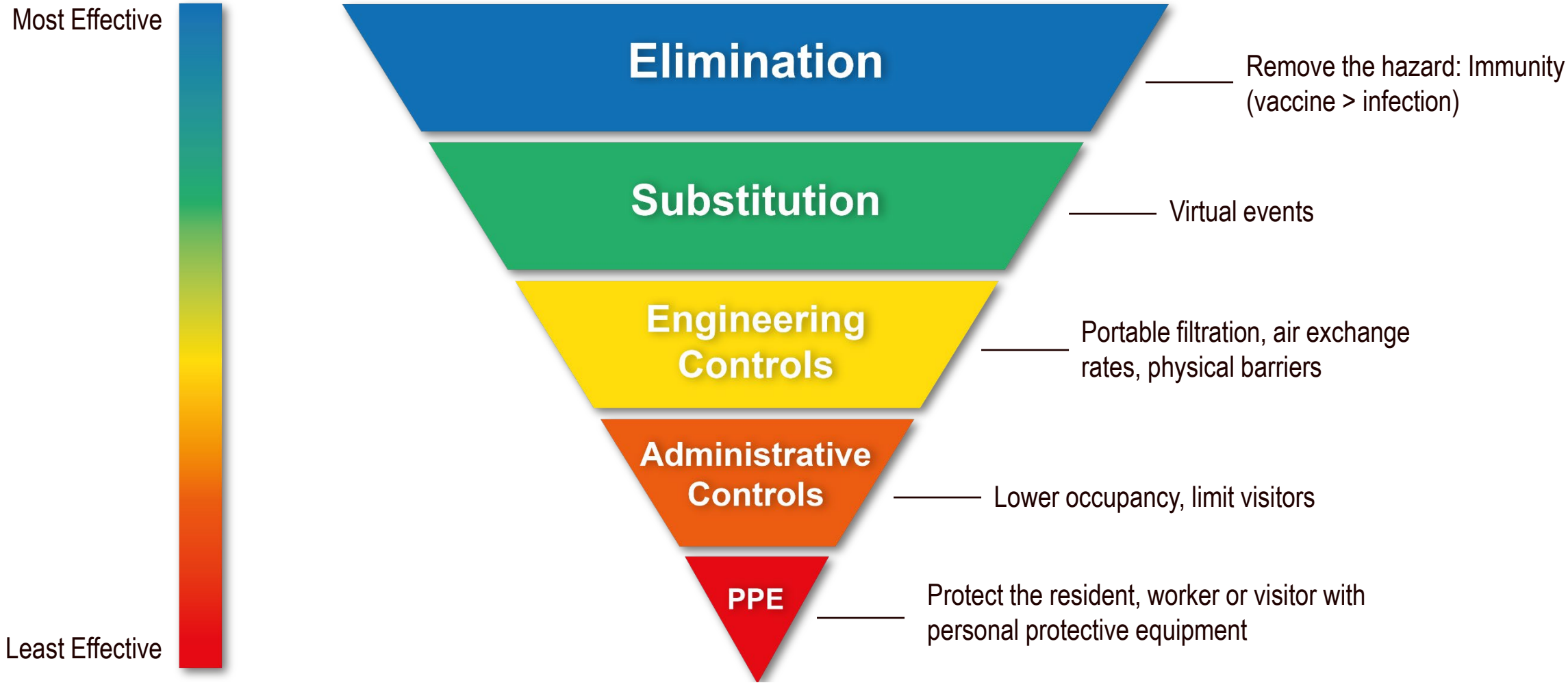


Control of COVID-19

- Immunity is **KEY**
- Goal should be the highest vaccination rate possible for residents, staff, and visitors
- Vaccines provide strong personal immunity – especially with boosters
- Community immunity is what stops transmission when personal immunity doesn't do it or do it perfectly



Hierarchy of Hazard Control

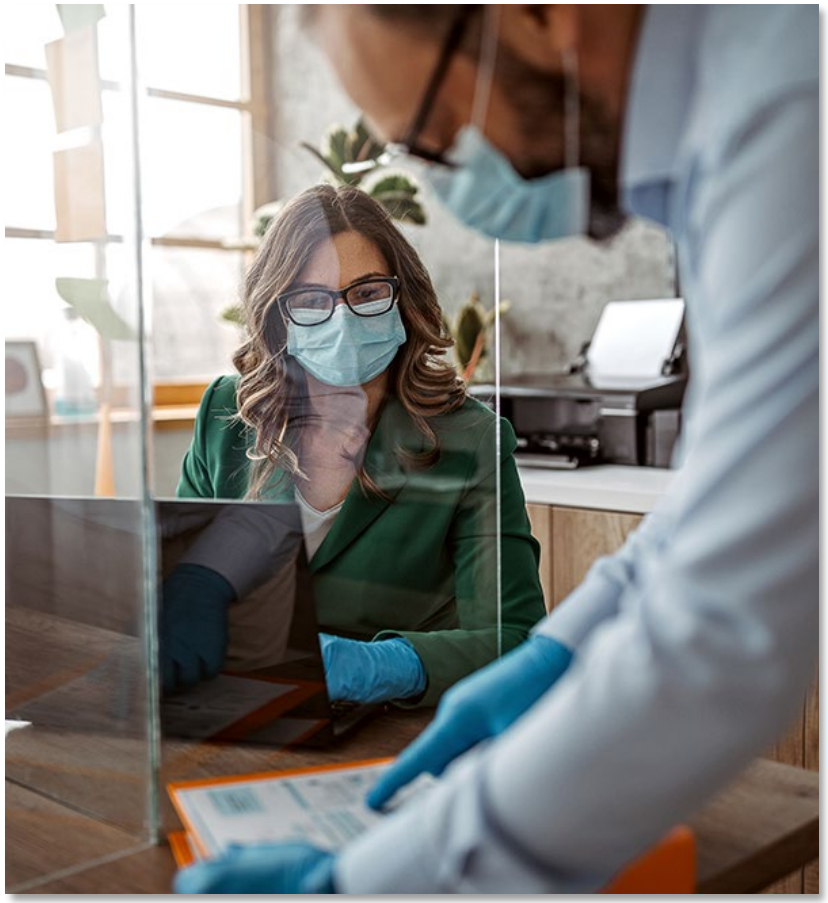


Engineering Controls

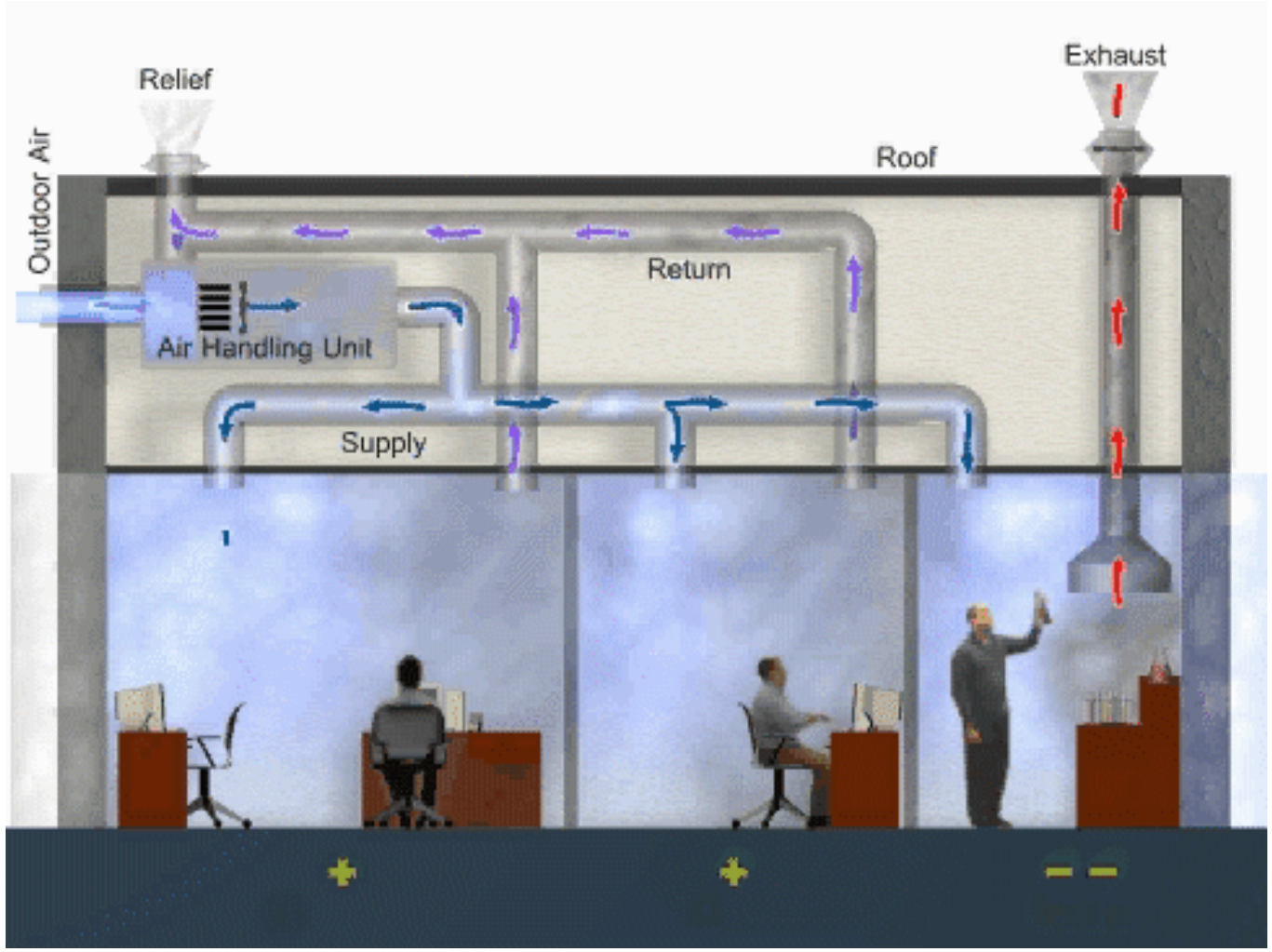
Installing portable high-efficiency air filters

Increasing ventilation rates in occupied areas

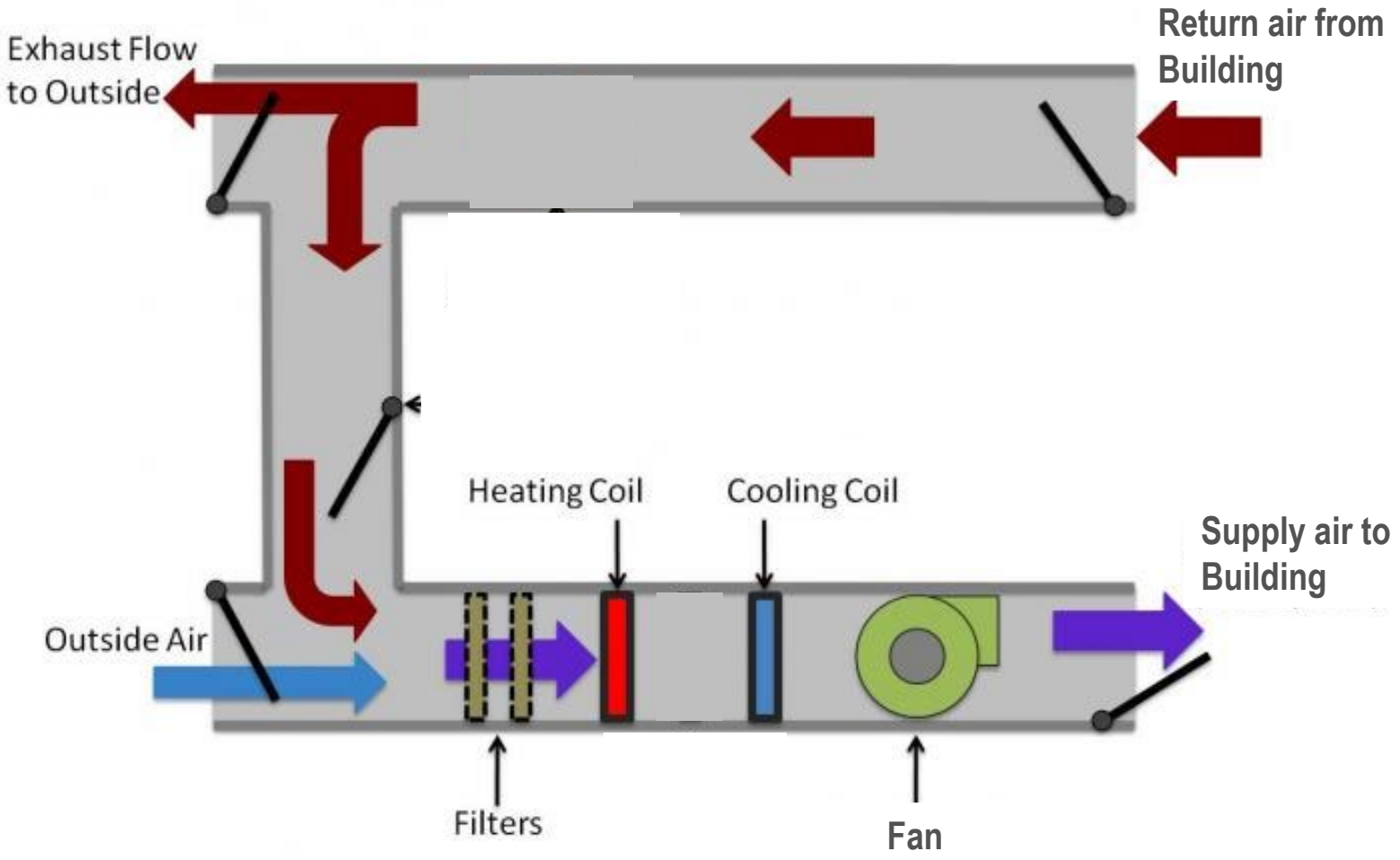
Installing physical barriers, such as clear plastic sneeze guards



Typical Air Distribution



Typical Air Handling Unit



HVAC Operations

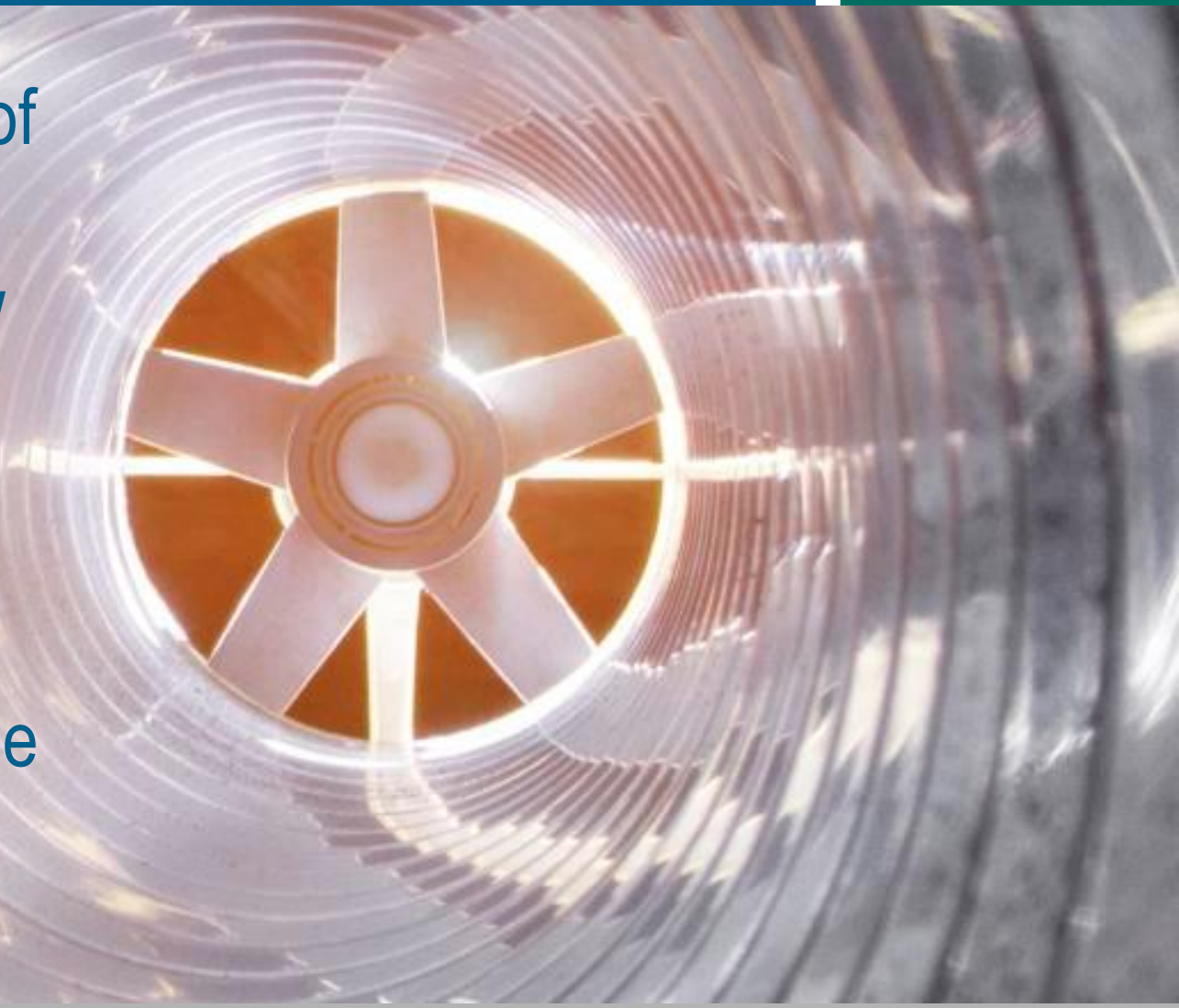
- Facilities Team
  - Tenants and Managers
  - Testing and Balancing Contractor
  - Building Controls Contractor
  - Mechanical Contractor
  - Building Owner and/or Operator

System Condition and Operation

- Conduct a walkthrough
- Inspect HVAC system components to verify proper function
- Review building automation system (BAS) or thermostat programming
- Modify thermostat or BAS occupancy schedules

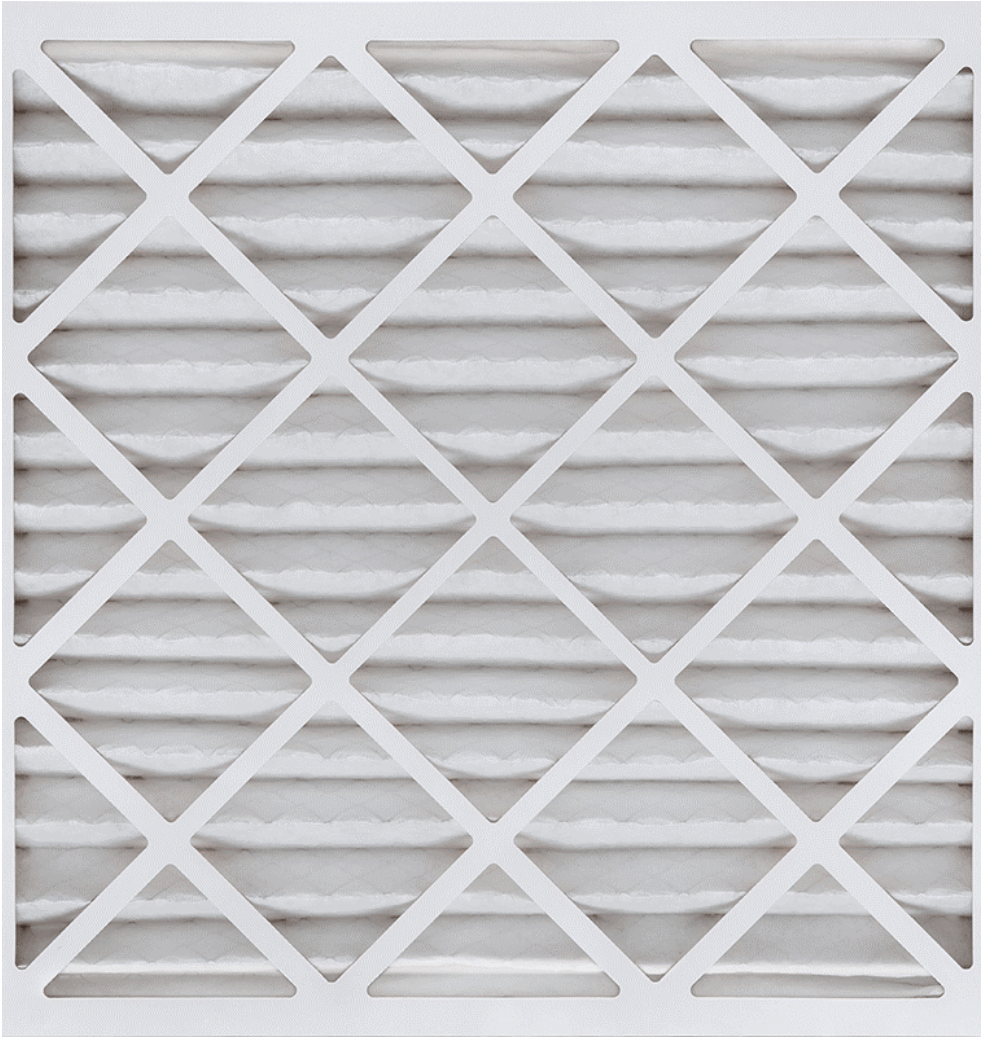
Ventilation

- Opening windows during periods of building occupancy (when the weather is good or even just a few inches even in cold weather)
- Operating HVAC systems at increased outdoor air rates
- Exhaust air systems should also be operated



Filtration

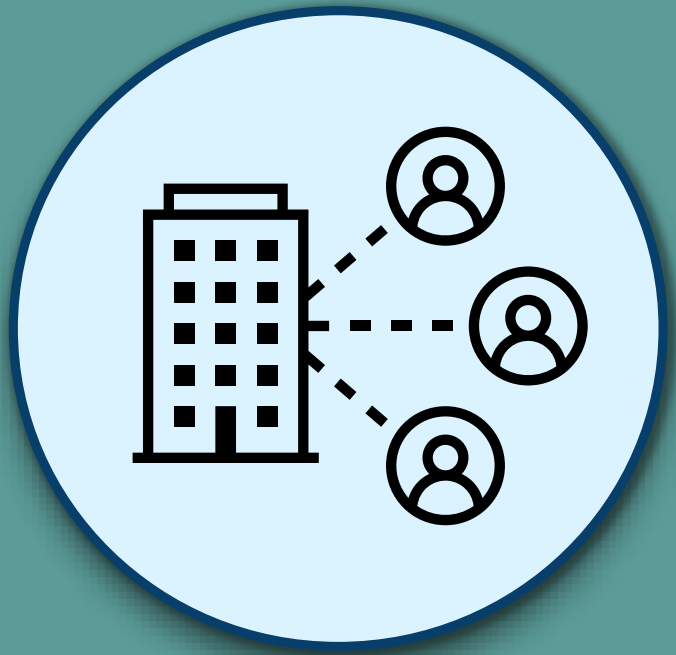
- Increasing the level of filtration in the air handling systems to a MERV-13 or highest efficiency filter compatible with the system
- Portable high efficiency particle air (HEPA)-filtered units can be used in occupied spaces to provide continuous local filtration
- Minimum of 4 ACH for resident activity and dining spaces; see ASHRAE Standard 170-2017, Table 7.1 for other spaces within healthcare facilities
- ASHRAE requirements for healthcare facilities range from 2 to 10+ ACH depending on the space/activity
- Key metrics – CO_2, airborne particles, filtration, air exchange rates



Air Exchange Rates

Ventilation

Filtration

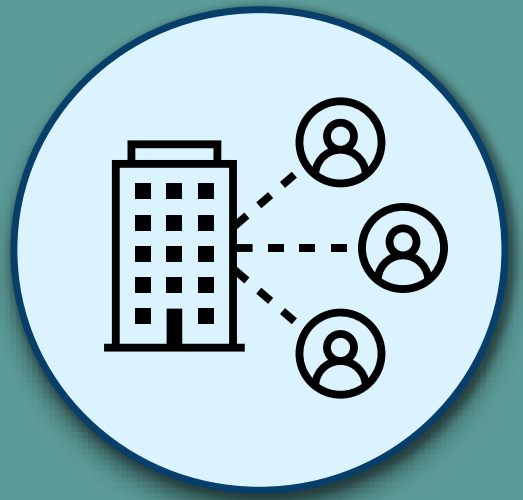


Effective Air Exchange Rate

Effective Air Exchange Rates

$$\text{AER} = \frac{\text{Outdoor Airflow} + \text{Filtration Airflow}}{\text{Room Volume}}$$

$$\#/\text{hr} = \frac{\frac{\text{ft}^3}{\text{min}} * 60\ \text{min/hr}}{\text{ft}^3}$$



Measuring Air Exchange Rate

Facilities with No Mechanical Ventilation

- Ensure all windows are operable
- Keep windows open as much as possible to promote increased ventilation
- Operate all building exhaust fans continuously
- Consider using portable HEPA-filtered air cleaners to increase air cleaning
- Choose a portable HEPA unit based on room size or CADR; follow air exchange calculations

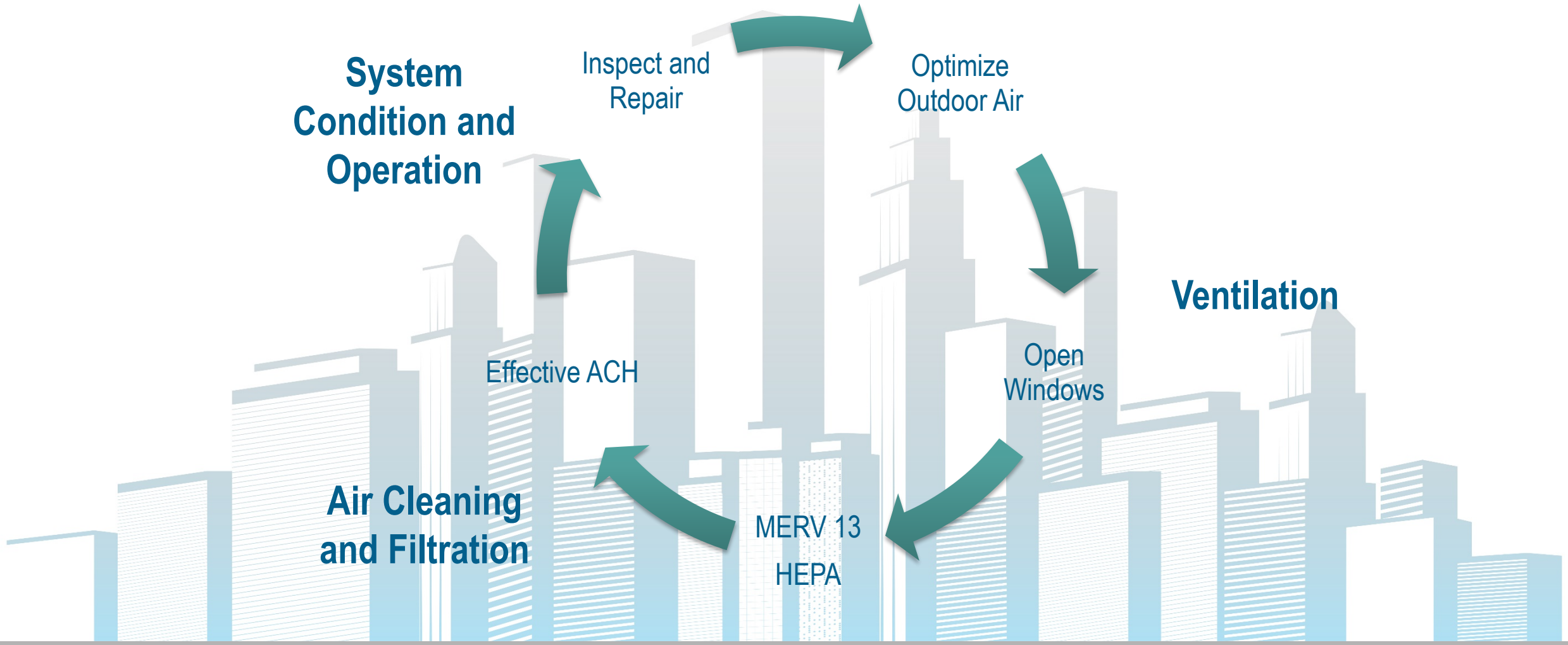
Additional Considerations for LTC Facilities

- Nighttime HVAC setbacks
- Certain areas/systems not operated 24/7
- Some facilities have older HVAC equipment
- Decreasing outdoor air contribution during winter months
- Gatherings and events

Common Mistakes

- Leaving thermostats on the “auto” setting
- Obstructions to air intakes
- Choosing portable HEPA units that are not correctly sized to the room

Summary


System Condition and Operation
Inspect and Repair
Optimize Outdoor Air
Ventilation
Open Windows
MERV 13
HEPA
Air Cleaning and Filtration
Effective ACH

Questions?

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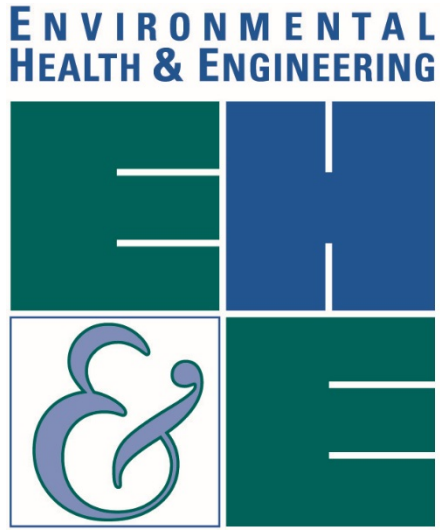

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