Controlling Indoor Air Quality to Reduce COVID-19 Transmission

Guidance for Building Managers and Homeowners

Maine Center for Disease Control & Prevention
Division of Environmental & Community Health

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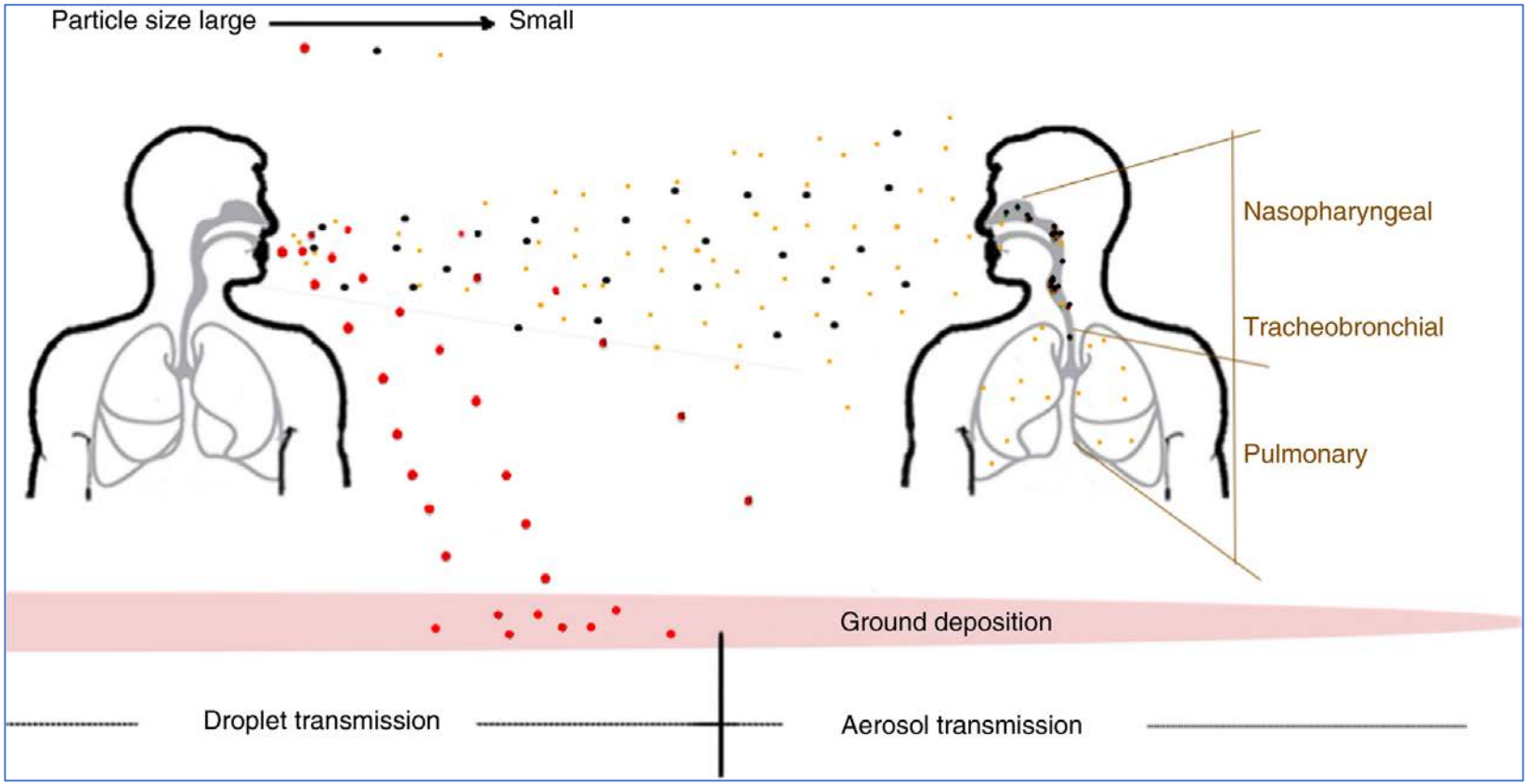
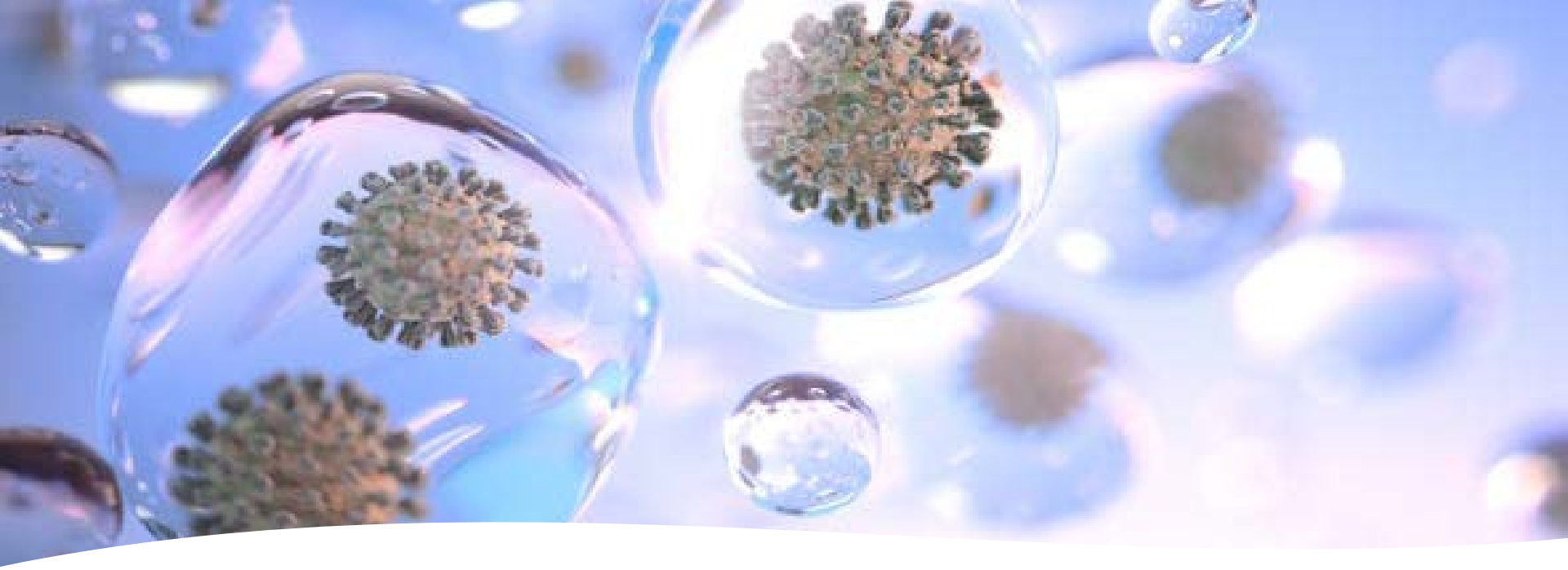
Department of Health and Human Services

How Does Indoor Air Quality Affect COVID-19 Spread?

- COVID-19 is passed from an infected person to others through airborne transmission.



Pan, M., Lednicky, J. A., & Wu, C. Y. (2019). Collection, particle sizing and detection of airborne viruses. *Journal of applied microbiology*, *127*(6), 1596–1611. https://doi.org/10.1111/jam.14278



- Aerosolized “microdroplets” contain water, salts and protein and… virus particles.
- Transmission rate is controlled by:
  - Mobility of microdroplets
  - Virus activity
- High water content reduces mobility and virus activity.

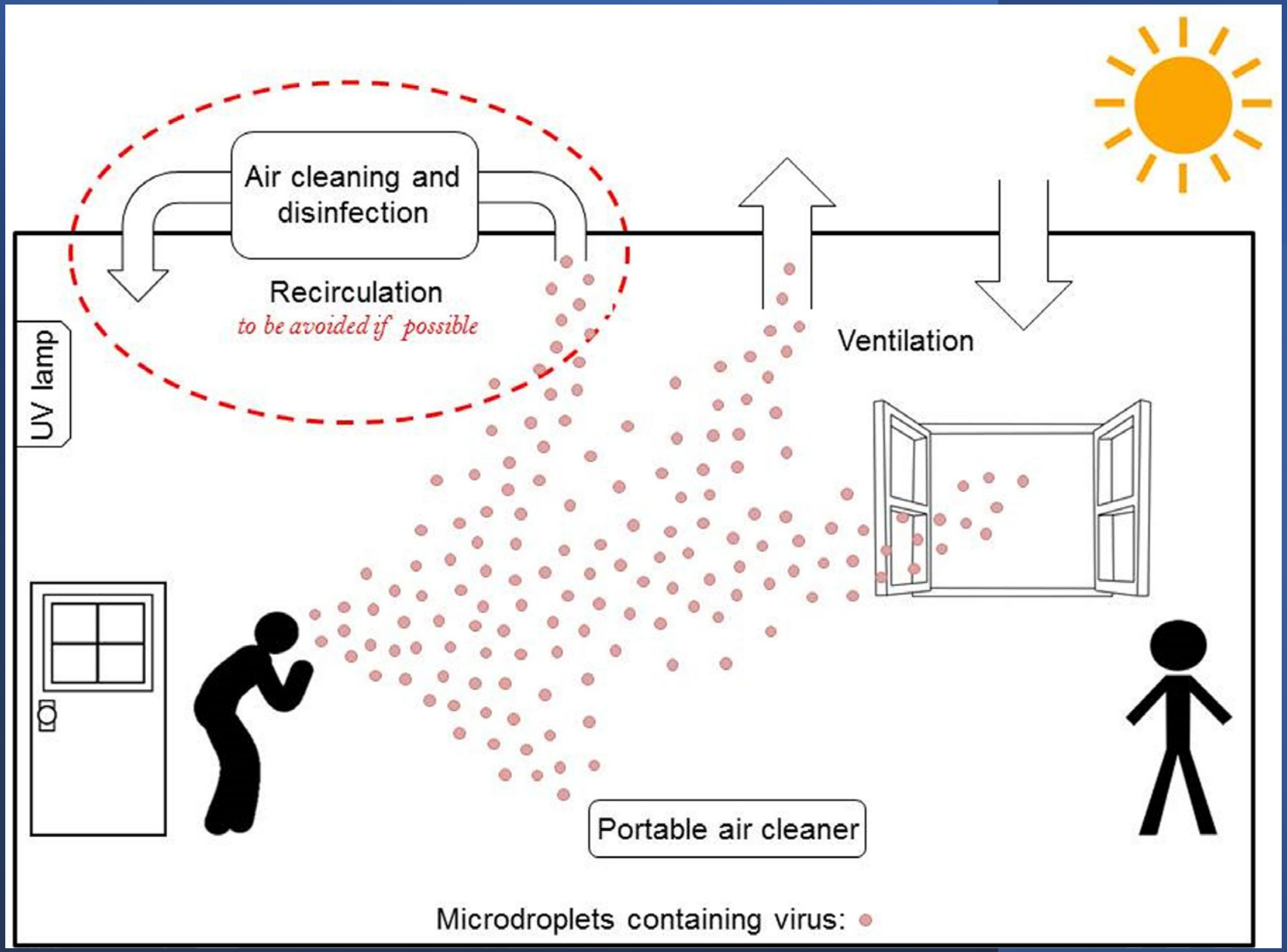
- **Summer:**
  - Air is warm and humid.
  - Heavy water laden droplets do not linger in the air.
  - At 45-55% Relative Humidity, virus particles lose their infectivity within 15 minutes.

Portland Press Herald, 2020

- **Winter:**
  - Drier air (<40% RH) decreases droplet size by 50% and weight by 90% almost immediately, making droplets more mobile and able to linger in air for several hours.
  - Reduced water content within aerosol droplets allows the virus to become highly active.
  - Dry air conditions reduce moisture within our respiratory tract – lowers resistance to infection.
  - Result: Potentially higher rates of COVID-19 transmission

What Can Building Managers Do?

- Ventilation
- Filtration
- Inactivation
- Humidification



Rhode Island Department of Health;
https://health.ri.gov/covid/indooraircirculation/

Ventilation

- Increase the percentage of **fresh air input** through air handling systems.

- The recommended air change rate to discourage virus transmission is 6-12 air changes per hour (ACH).

Filtration

- Use filters with MERV ratings of 13+ or HEPA filters in centralized heating and cooling systems.

Inactivation

- HVAC systems can be outfitted with ultraviolet germicidal irradiation (UVGI) light systems

ASHRAE, 2016

CDC/NIOSH, 2020

Humidification

In winter, in Maine:

- Aim for but **do not exceed** 30% Relative Humidity
- Higher RH in winter can cause excessive condensation in buildings without advanced HVAC systems.

Other recommendations from the Maine Indoor Air Quality Council (K. Anderson, 2020):

- Outside air dampers should be open at least 20% to allow fresh ventilation air into the building.
- Disable demand-controlled ventilation.
- Evaluate positioning of supply and exhaust air diffusers and/or dampers.
- Adjust zone supply and exhaust flow rates to establish measurable pressure differentials.

- Keep the air handler cooling coils, condensate pans, and condensate traps clean and functional.

- For buildings without air handler systems, open the windows when occupied to provide ventilation.

- Replace air filters at least quarterly or more frequently if necessary.

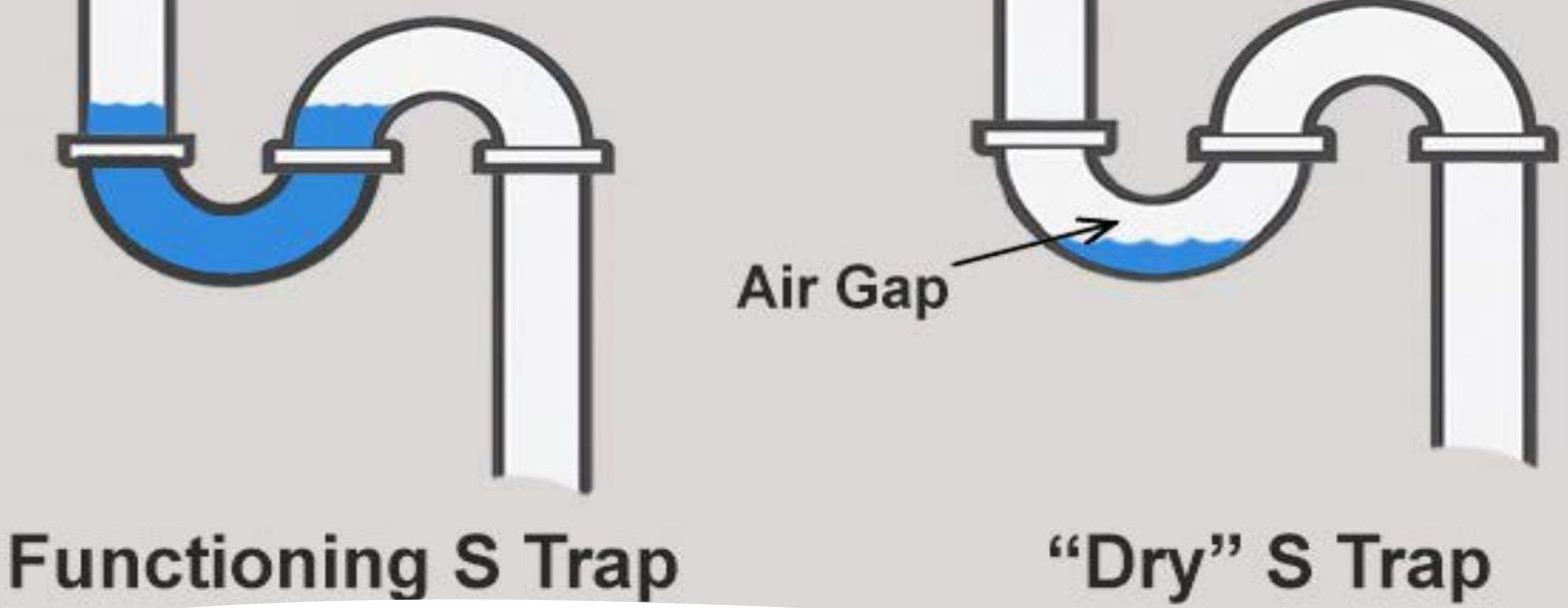
- Inspect the filters in place and seal any air gaps that allow air to bypass the filter. **Use personal protective equipment (PPE) when changing filters.**

- Check the exhaust air discharges, relief air discharges, and sewer vent pipes.

- Make sure the exhaust air is not being re-entrained into the building through outdoor air intakes and building envelope openings.

- Avoid transfer of air between floors. Avoid use of desk or ceiling fans.

- NOTE: Every building is unique. Use an incremental approach to determine how to achieve best results without creating other health issues or unmanageable costs.



- Make sure all drain traps are sealed with water or a non-evaporative product like Brodi Vapor Block, mineral oil or RV antifreeze. Trap priming systems for each trap may offer a more permanent solution.

NOTE: The strategies presented so far are not a replacement for using face coverings and social distancing to prevent the spread of COVID-19.

- Wear cloth face coverings
- Practice social distancing
- Wash hands and sanitize common surfaces

National CDC, 2020

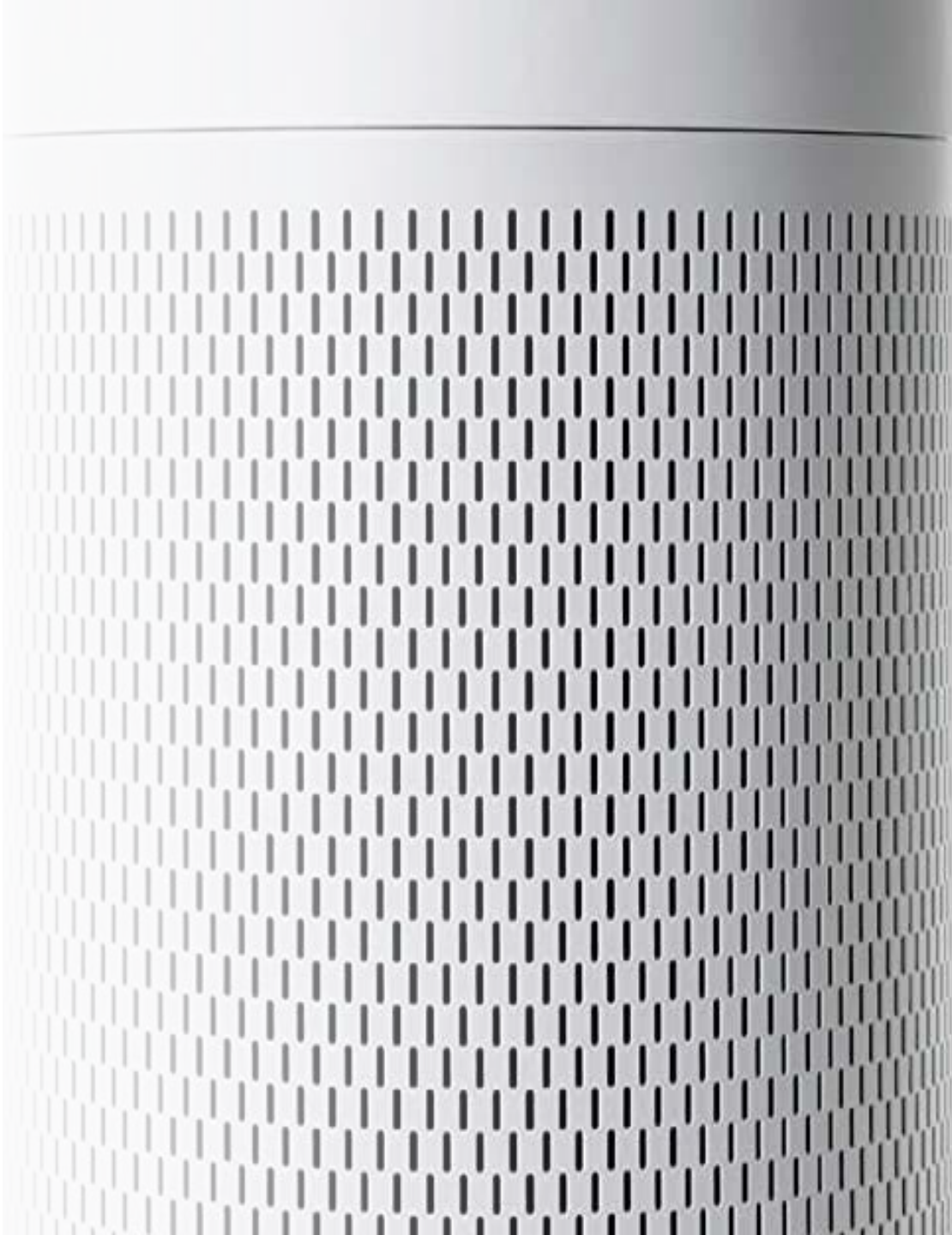
Other Low Cost measures:

- Symptom checks and Temperature screening
- Reduce building occupancy
- Schedule breaks for occupied spaces
- Portable air filters (HEPA)
- Portable air cleaners (UVGI)
- Provide personal hydration
- Provide risk education

Guidelines for Homeowners and Small Businesses

- Maintain normal thermal comfort conditions.
- Increase ventilation rate: Opening multiple windows is an acceptable alternative, provided the open windows do not cause excessive draft.
- Plug-in steam humidifiers may be used. Look for UL 2998 Certification. Clean equipment frequently.
- Avoid over-humidification.

- Operate Stand-Alone Air Filters and Air Cleaners in high occupancy areas.
- Select devices that have a high Clean Air Delivery Rate (CADR).
- HEPA Filtration is “tried and true” technology.
- Before using UV lamps in a home, review product’s health and safety risks and follow manufacturer’s instructions for use.



For Homes/Small Buildings with Forced Hot Air Systems:

- Use high-efficiency filters (such as MERV13) when the system allows it.

- Forced air systems that provide outside ventilation should be run as much as possible, such as by using a “FAN ON” setting on the thermostat or control system.

Additional Information

- ASHRAE has developed several resources for management of building indoor air quality to manage COVID-19 transmission: https://www.ashrae.org/technical-resources/resources

- Heating, Ventilation, and Air Conditioning (HVAC) measuring devices such as the EXTECH Mini Thermo-Anemometer with Humidity can be purchased for approximately $180. http://www.extech.com/products/45158

- Visit the Maine Indoor Air Quality Council website at https://maineindoorair.org/ for information on managing building IAQ in our Maine climate.

If you have questions about this presentation, please contact:

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