

# Airborne Transmission of SARS-CoV-2 Virus

## WHAT HEALTHCARE WORKERS NEED TO KNOW

Evidence supporting the possibility of airborne transmission of COVID-19 is mounting.

NYSNA's position is **all healthcare facilities must put in place airborne precautions for treating COVID-19 patients and PUIs.**

### LATEST SCIENTIFIC FINDINGS

According to a recent National Academies of Sciences, Engineering and Medicine letter to President Trump's Office of Science and Technology Policy, multiple studies have supported airborne (aerosolized) transmission of the COVID-19 virus, even from breathing alone.<sup>1</sup>

This evidence contradicts the CDC's contention that workers only need to wear an N95 or higher protection respirator during aerosol-generating procedures such as intubation.

The modes of transmission of an infectious disease determine the control measures that can prevent its spread. Understanding how the SARS-CoV-2 virus is transmitted is key to preventing COVID-19 disease in healthcare workers and in the general population.

There are 3 modes of transmission in which inhalation is a concern:

**Droplet Transmission:** Large respiratory droplets are generated when a person coughs, sneezes, or talks. Large droplets descend rapidly and travel only short distances. *Inhalation of large droplets may also be possible.*<sup>2</sup>

Droplet transmission is understood to be a primary mode of transmission of the SARS-CoV-2

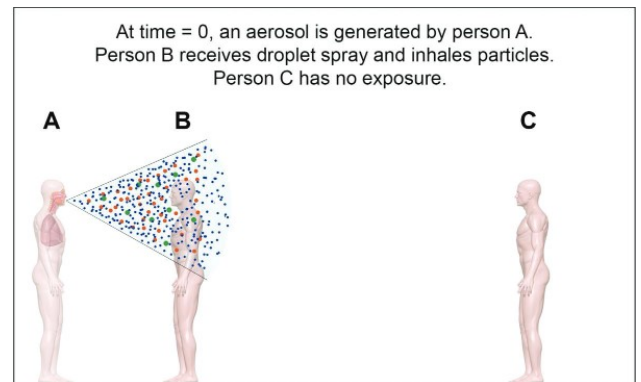


Figure 1. When an aerosol is initially emitted (time=0), the particles are clustered near the source at location A. Someone near the source (location B) may receive large-particle spray and inhale particles of all sizes.

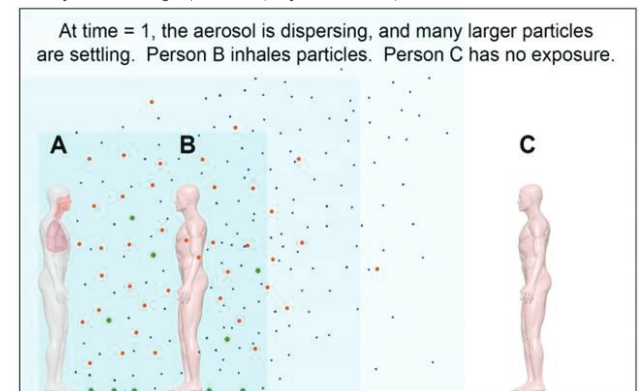


Figure 2. After some time (time=1), the particles begin to disperse and larger particles begin to settle from the air. Person B will continue to inhale particles of all sizes.

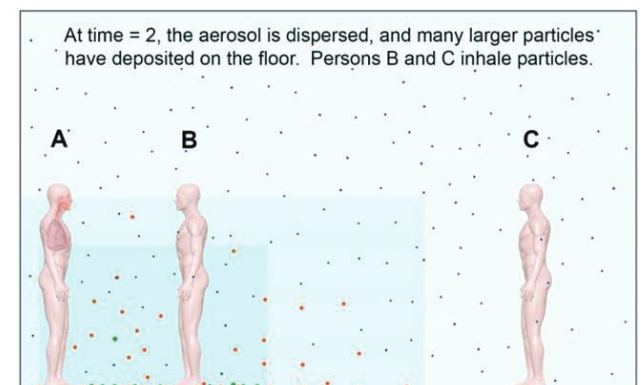


Figure 3. After more time (time = 2), the small particles are uniformly dispersed and more of the larger particles have settled from the air. Persons B and C will inhale particles that are generally smaller, have a smaller size range, and are at a lower concentration than at time = 0.

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virus. However, “using arbitrary droplet size cutoffs may not accurately reflect what actually occurs with respiratory emissions.”<sup>3</sup>

**Long-Range Airborne Transmission:** Droplet nuclei are forcefully expelled small particles of pathogen-containing respiratory secretions which are reduced by evaporation to small, dry particles in the respirable size range. They are capable of remaining airborne for long periods of time and of traveling considerable distances.<sup>4</sup>

**Close-Range Aerosol Transmission:** A bio-aerosol is an airborne suspension of particles containing whole or parts of biological entities, such as viruses, carried by other materials, such as respiratory secretions. Infectious bioaerosols can be generated from human respiration or by medical procedures such as intubation.

Although the CDC is silent on close-range aerosol transmission, **research supports the possibility that SARS-CoV-2 can be spread via bioaerosols generated directly by patients’ exhalation.** Such bioaerosols are comprised of a range of component materials, from large respiratory droplets to small droplet nuclei that can remain airborne and available for inhalation for up to 3 hours.<sup>5,6,7,8,9,10</sup> *“The results of available studies are consistent with aerosolization of virus from normal breathing.”*<sup>11</sup>

## IMPACT ON HEALTHCARE WORKERS

Evidence of aerosolized transmission has significant ramifications for inhalational exposure and respiratory protection for nurses and other healthcare workers.

Particles smaller than 5  $\mu\text{m}$  can enter the deep lung and are considered the “respirable” fraction.<sup>13</sup> The physical size of the SARS-CoV-2 virus is approximately 0.125  $\mu\text{m}$ .<sup>14</sup>

A surgical mask is an infection control device designed to help prevent the spread of infection from the wearer’s exhaled breath to potentially susceptible persons.<sup>15</sup> *Most surgical masks are not designed to seal tightly to the face and*

## AIRBORNE HAZARDS MEAN WE NEED BETTER PROTECTION!

Evidence supporting the possibility of airborne transmission of COVID-19 is mounting. We need all healthcare employers to implement the following measures immediately:

- Deploy **negative pressure filtration units** to areas designated for care of COVID-19 patients. Use them to remove hazards at the source and before they reach other parts of the facility.
- Mandate and install **PPE donning and doffing zones.** Ad-hoc decontamination spaces will reduce spread of the virus and exposure.
- Deploy **higher level respiratory protection**, like elastomeric half-face masks and powered air purifying respirators (PAPRs). This equipment can be decontaminated safely and reused, easing the pressure on the single-use N95 equipment. Move toward having this equipment available permanently down the road.
- **Organize patient care to minimize staff exposure** and limit back and forth from hot zones to clean zones.
- **Reduce transmission from facility to community**, by providing laundry services or replacement scrubs and hotel options for staff.

To facilities who have implemented some or all of these measures, keep it up. To those who have not: **time to get moving!**



Hospitals must deploy higher level respiratory protection, including powered air purifying respirators (PAPRs).

do not protect against inhalation of droplet nuclei or particles.<sup>16,17</sup> In contrast a respirator, such as an N95 or PAPR, is designed to protect the wearer against inhalation of specific hazardous agents, such as bioaerosols.

## WHAT WE NEED

NYSNA's position is that every healthcare worker must be provided, at a minimum, with an N95 disposable respirator, or higher-level protection, when caring for suspected or confirmed COVID-19 patients, when engaged in aerosol-generating procedures, at triage stations, and in any location where direct contact with COVID-19 confirmed or suspected patients is possible.

Per OSHA, when N95 disposable respirators are required but not available, employers should consider use of respirators that provide equal or greater protection, such as NIOSH-approved reusable elastomeric respirators or powered, air-purifying respirators (PAPRs). Other disposable respirators, such as N99, N100, R95, R99, R100, P95, P99, and P100, are also permissible when N95s are not available.<sup>18</sup> OSHA also requires that respirators be fit tested and that healthcare workers must be medically cleared to wear respiratory protection.

Per the CDC, "In times of shortages, alternatives to N95s should be considered, including other, more protective disposable respirators, elastomeric half-mask and full facepiece air purifying respirators, and powered air purifying respirators (PAPRs) where feasible."<sup>19</sup>

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