

# DROPLET VS. AIRBORNE: HOW IS SARS-COV-2 TRANSMITTED?

The U.S. Centers for Disease Control and Prevention (CDC) states that the primary mode of transmission for COVID-19 is droplet transmission and that “airborne transmission from person-to-person over long distances is unlikely.”

## Droplet vs. Airborne: Some History

The CDC’s categorical distinction between droplet (large) and airborne (small) transmission was established in the 1930s and has not been substantially updated since. This paradigm requires a focus on the behavior of isolated droplets and a simplified distinction between large and small droplets and their corresponding evaporation rates. Together, these give the false sense that droplets behave in only one of two ways and create a division between two types of transmission and their ranges, either close or far.

## Droplet vs. Airborne: Updating the Science

Recent research confirms that when a person breathes, talks, coughs, or sneezes, they produce a multiphase turbulent gas cloud (or plume) of warm air containing respiratory droplets ranging in size from microscopic to visible (called “aerosols”). This plume and its aerosols are transported by ambient air. Aerosols remain suspended or fall in relation to a variety of factors including their size, evaporation rates, air current, temperature, and humidity:

Larger aerosols can remain suspended in the air for several minutes before settling on the ground or on a surface, while smaller particles can be kept afloat by the dynamics of the plume, allowing them to linger in the air and travel up to 27 feet through the room and ventilation systems.

For example, think about perfume spray which can be smelled from a distance for quite some time as the particles disperse throughout the room.

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## Definitions:

### DROPLET TRANSMISSION

Large respiratory droplets are propelled onto the face and mucous membranes of those nearby the infected person (within six feet).

### AIRBORNE TRANSMISSION

Transmission of small respiratory droplets or droplet nuclei that can travel through and/or remain suspended in the air for a period of time leading to airborne transmission.

### AEROSOL TRANSMISSION

An updated understanding of the complex ways that respiratory particles are created, how they move, and where they go.

*Drops fall continuously, depending on weight and other factors.  
The most **visible** drops would fall within **6 feet**.*

***Turbulent gas cloud***

*The study suggests that droplets of various sizes are trapped in a turbulent gas cloud, allowing them to travel up to **27 feet**.*



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## Is SARS-CoV-2 aerosol transmissible?

While modes of transmission have yet to be fully established for the novel SARS-CoV-2 virus, emerging studies support aerosol transmission.

- Two recent studies have found that SARS-CoV-2 can survive and remain infectious in aerosols from three to 16 hours.
- Recent research also shows that SARS-CoV-2 can survive on surfaces for an extended period of time.
- Evidence of environmental contamination also show that SARS-CoV-2 can travel long distances from patients. For example, genetic material from SARS-CoV-2 was detected on a number of surfaces in the Diamond Princess cruise cabins of both symptomatic and asymptomatic infected passengers 17 days after they vacated.
- A recent study of SARS-CoV-2 aerosolization from the University of Nebraska also found widespread environmental contamination. They found significant contamination on air handling grate as well as positive air samples in the hallways and on window ledges which were greater than six feet away from patients.

These data support aerosol transmissibility of COVID-19 and challenges the CDC's assertion that transmission over long distances is unlikely.

## What does this mean for nurses and other health care workers?

The emerging evidence that aerosol transmission of COVID-19 is likely underlines the importance of protecting nurses and other health care workers—including both respiratory protection and contact precautions. Nurses and other health care workers should have the highest level of personal protective equipment (PPE) when caring for patients with suspected or confirmed COVID-19. The highest level of PPE for COVID-19 includes a powered air-purifying respirator (PAPR) and coveralls impermeable to viral penetration that incorporate head and shoe covering, and gloves.

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