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

While the U.S. Centers for Disease Control and Prevention (CDC) has finally recognized that Covid-19 can be spread by breathing in aerosol particles that contain the SARS-CoV-2 virus, it has yet to address the inhalation of aerosols at long range. Stating that "distances of more than 6 feet might also be of concern," ignores how far aerosol particles can travel as well as the build-up of virus concentration in poorly ventilated spaces.

Droplet vs. Airborne: Some History

The 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.

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.

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Is SARS-CoV-2 aerosol transmissible?

Scientific evidence regarding aerosol transmission as the significant and predominant mode for SARS-CoV-2 is overwhelming.

- Studies have found that SARS-CoV-2 can remain infectious for up to 16 hours suspended in aerosols and survive on surfaces for several days.
- Researchers have recovered viable (infectious) SARS-CoV-2 virus in the air from hospital rooms with Covid-19 patients, collected 6.5 to 15.7 feet away.
- Studies have found widespread environmental contamination indicating long-range aerosol transmission. Researchers detected SARS-CoV-2 in ventilation exhaust filters located at least 50 meters (164 feet) from patient room vent openings within wards.
- A SARS-CoV-2 outbreak investigation of a large meat processing complex in Germany found that a single index case led to 1,500 worker infections. SARS-CoV-2 virus was transmitted between workers more than 26 feet away from each other who had no other points of contact.

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?

Scientific evidence overwhelmingly proves that SARS-CoV-2 is aerosol transmitted, underlining 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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