Garth Hunter
Transmission mechanisms
COVID-19

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Coronavirus COVID-19
Transmission and infection

Infected with coronavirus SARS-CoV-2

Droplets containing virus in the air

Droplets land in nose, mouth, possibly lungs

Droplets fall on surfaces/objects

On fingers from touching

The droplets eventually get into nose and mouth
Size 0.05-0.15µm
• Practically 0.1 µm

Dies at 56 °C

Lives for up to 72 hrs on plastic & steel
Normal speaking produces thousands of oral fluid droplets (1 µm to 500 µm), and can cause transmission in confined environments.

Medium-sized (10 µm to 100 µm) droplets, a fraction of which remain airborne for at least 30 s

Larger droplets, which are also abundant but associated with close-proximity direct virus transfer or fomite transmission

FFP2 masks filter 94% of all particles that are 0.3 µm in diameter or larger

Lifetime of droplet from a fraction of a second to minutes.
Multiphase Turbulent Gas Cloud From a Human Sneeze

https://jamanetwork.com/journals/jama/fullarticle/2763852
The average number of viral particles needed to establish an infection is known as the infectious dose.

COVID-19 is clearly very contagious. May be:

- Infected people release a lot of virus in their environment. (*J. F.-W. Chan et al*).
- Few particles are needed for infection (the infectious dose is low).
- Exact COVID-19 Infectious Dose not known yet, but expected to relatively low – in the region of a few hundred or thousand particles.

Infectious Dose is not 1 virus.
CLOSE CONTACT

- Means that you had face-to-face contact within 1 metre or were in a closed space for more than 15 minutes with a person with COVID-19
- This contact happened while the person with COVID-19 was still “infectious”, i.e. from 2 days before to 14 days after their symptoms began.
- For example, you may be someone who:
  - Lives in the same household as a person with COVID-19
  - Works closely in the same environment as a person with COVID-19
  - Sat in the same classroom as a person with COVID-19
  - Attended the same gathering as a person with COVID-19
  - Provided direct care for a person with COVID-19 in a healthcare setting without using the proper personal protective equipment
  - Sat within two seats (1 metre) in any direction of a person with COVID-19 case in any kind of vehicle including buses, minibus taxis, etc.
  - Sat close to a person with COVID-19 in an aircraft
Various transmission routes of respiratory infection between an infected and a susceptible individual. Both close range (i.e. conversational) and longer range (over several meters) air transmission are possible.
Restaurant X is an air-conditioned, 5-floor building without windows.

The third floor dining area occupies 145 m²; each floor has its own air conditioner.

The distance between each table is about 1 m.

Families A and B were each seated for an overlapping period of 53 minutes and families A and C for an overlapping period of 73 minutes.

The air outlet and the return air inlet for the central air conditioner were located above table C.
Mid wall split unit air conditioner
Central ducted air con with filter
Practical implications

- Droplet primary transmission / fomites secondary transmission
- To be at significant risk must be a close contact
- Close contact is not a person you walk past who has COVID-19
- Droplets are different to aerosols
- Air-conditioning systems transmit aerosols not droplets. Therefore not transmitted via ducted air-conditioning systems
Thank you