Social Distancing 101: COVID-19 Basics

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Topics Covered

• Background on emerging disease threats
• Brief history of coronaviruses
• Information on SARS-CoV-2 (COVID-19)
• Take home points
Zoonosis

- A disease that can be transmitted to humans from animals.
- Estimated that pathogens shared with wild or domesticated animals cause > 60% of human infectious diseases.

*Lancet* 2012;380:1936-45
A Brief History of Coronaviruses (CoV)

- 1912 – German veterinarians examine febrile cat with swollen abdomen (1st case?)

- 1960s – UK and USA, two viruses isolated with crown-like structures from humans with common colds.
  - Similar viruses isolated from sick animals
  - Viruses resemble the sun’s corona under electron microscope
  - 1968 termed coronaviruses

- Intestinal and respiratory coronaviruses identified in multiple animal species including companion animals and domestic livestock.

Nature 4 May 20
Severe Acute Respiratory Syndrome (SARS) SARS-CoV (2003)

SARS-CoV = recombination of bat SARS-related coronaviruses → Civet and Human infection and adaptation → SARS outbreak

~8,000 cases

*Nature Reviews Microbiology* 2019;17:181-192
Middle East Respiratory Syndrome
MERS-CoV (2012)

Figure: The epidemiology of Middle East respiratory syndrome coronavirus
Black arrows represent unconfirmed routes of transmission. Red arrows represent plausible routes of transmission. Red human figures represent people infected with Middle East respiratory syndrome.


~2500 cases
SARS-CoV-2 (2019)

Coronavirus Disease 2019 – COVID-19

Coronavirus Transmission Cycle

Reservoir Host → Intermediate Host → Human → Many humans

> 6 million cases and counting

SARS-CoV-2 (COVID-19)

- Unlike bacteria which can reproduce outside of a host, viruses require host cells to replicate and thus perpetuate the disease.

- Primary transmission occurs person-to-person through respiratory droplets and possibly aerosols.

- Sustained close contact (< 6’ for ≥ 15 minutes).

- The virus can contaminate surfaces, which may serve as a fomite for transmission.
Social Distancing

Scientists measure the intensity of an infectious disease by its reproduction number ($R_0$).

$R_0$: the average number of people a sick person will infect

For COVID-19, this has been estimated at 2.5

Example: 12 Oct 20 = 0.81 for Boone County
Infection Control Measures

**HOW TO PROTECT YOURSELF AND OTHERS**

- If you are sick or not feeling well, you should stay home
- Wash hands often, use soap and scrub for 20 seconds
- Avoid touching your face - eyes, nose and mouth
- Cover mouth with sleeve or tissue to sneeze or cough
- For medical attention, contact & follow advice of medical provider

**COMMUNITY HEALTH ENGAGEMENT AND OUTREACH**

**CDC.gov**
Light scatter image of droplets

https://twitter.com/EricTopol/status/1250533296447995904
Timing of Testing

Daily symptom check detects, tests, and isolates

Contact tracing detects those you exposed before symptoms

Asymptomatic testing yields some infectious individuals (~1-2%) but also fails to detect early infections and places some convalescent individuals in prolonged isolation. Symptomatic testing focuses resources on those that are most infectious.
A Testing Algorithm

Daily monitoring (Symptoms/Fever) Smart Phone App

Negative
Participate in campus activities

Positive
Quarantine & Test (PCR +/- Antibody)

Test Positive
Result reported to Health Department
Case Investigation Initiated (Isolated)
Contact Tracing Initiated (Quarantined)
Follow Health Dept. guidance

Test Negative
Follow Healthcare guidance on return to campus

Take Home: Symptomatic, Test Positive, and Close Contacts NOT IN CLASS!
In general, no single factor influences decision-making. The number of cases is not the primary driver, but the capacity to deal with cases.
Take Home Points

• SARS-CoV-2 is a communicable respiratory virus that has a higher mortality rate than other viruses such as influenza.

• There are two scenarios to stop the pandemic:
  – Prevent person-to-person spread so the virus has nowhere to go.
  – Members of society develop immunity to the virus. In the absence of an efficacious vaccine, immunity can only be achieved by natural infection and even then immunity may be incomplete or short-lived.

• Hence, our only real tool to quell the pandemic at this time is adopting changes in behavior to prevent person-to-person transmission.
Questions?

• Additional Resources
  – Online COVID course: P_HLTH 4001/7001

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