

OUTBREAK PREVALENCE IS ON THE RISE

We are not through this yet.

While the global COVID-19 pandemic is novel in many respects, several precedents can be used for modeling its behavior. Since the early 1700s, there have been eight well documented global influenza pandemics. With those examples, the Center for Infectious Disease Research and Policy (CIDRAP) recently published a COVID-19 Viewpoint with Michael T. Osterholm et. al. on four potential future COVID-19 models, all showing a significant duration of this pandemic due to lack of herd immunity, which is the point at which enough of the population have become immune to the disease so that it will naturally die out.¹

One measure of the infectiousness of the disease is R_0 , (R-naught), a measure of how many other people a person who has the virus will typically infect. For reference the seasonal flu has an R_0 of 1.3, and COVID-19 has an R_0 of 2.6. While at first this seems small, as a recent *New York Times* article examined² (Figure 1), walking through a few rounds of spreading leaves 45 people sick from the flu but 368 people sick from COVID-19 in just five cycles. R_0 is driven by several factors, including how long a person has the virus and how well the virus lives outside of the body.

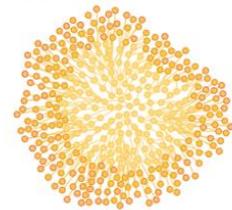
Figure 1 Seasonal flu vs. COVID-19 spreading.

If 5 people with seasonal flu each infected 1.3 others...



... there could be **45 people sick** after 5 cycles.

If 5 people with COVID-19 each infected 2.6 others...



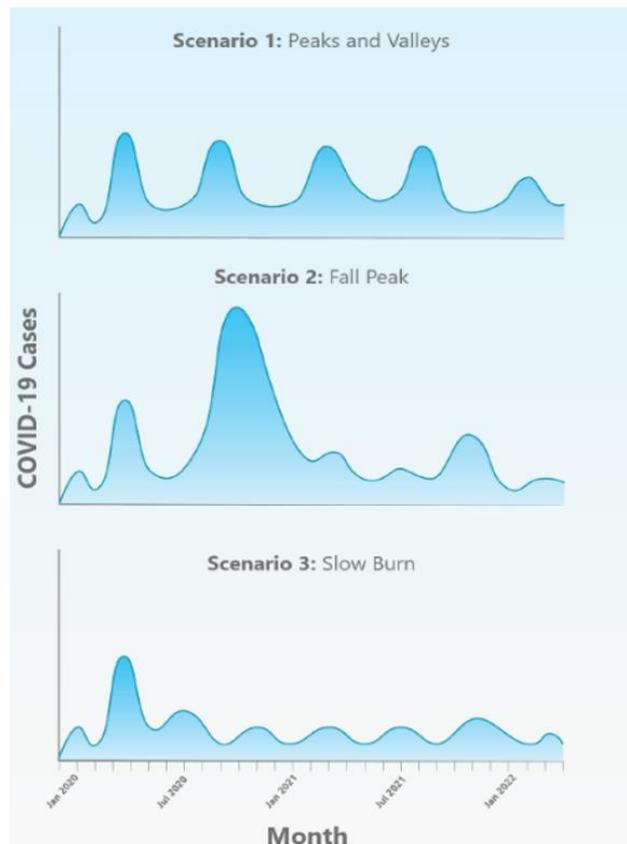
... there could be **368 people sick** after 5 cycles.

When comparing the pandemics, the report highlighted several striking differences between COVID-19 and the other influenza outbreaks. First was the incubation time. Once someone is exposed to the influenza virus, the incubation period (time before symptoms show) is typically only 2 days (range 1-4 days). For the SARS-CoV-2 virus that causes COVID-19, the typical incubation period has been 5 days (range 2-14 days). COVID-19 can have an infection window three times wider than a typical flu, and that can lead to more significant outbreaks.

The second consideration with COVID-19 is that the amount of virus in the body (viral load) may be highest at the earliest stage of symptoms, when people are just starting to feel ill. This can lead to pre-symptomatic viral shedding: people transmitting the virus to others without knowing they are infected. One nursing home in the study found that of the “27 residents who were asymptomatic at the time of testing, 24 developed symptoms a median of four days later.”

Depending on several factors such as social distancing, personal hygiene, and seasonal virus swings, the study presented three scenarios on how the virus will continue (Figure 2). The first had peaks and valleys, gradually diminishing until 2021. The second had a small wave in the spring of 2020, followed by a much larger wave in the fall or winter of 2020, and then smaller waves through the end of 2021. The third scenario had a larger wave in the spring of 2020 followed by smaller waves, or a "slow burn" of ongoing transmission, through 2021. Each scenario is realistic depending on the mitigating factors and early spread, but "we must be prepared for at least another 18 to 22 months of significant COVID-19 activity," according to the researchers.

Figure 2 Three possible COVID-19 pandemic wave scenarios, each lasting through late 2021.



The overall conclusion in the report was that the SARS-CoV-2 virus would have seasonal outbreaks that are less predictable, but that the extent of the virus was predictable and would continue through late 2021 until 60-70% of the population was either exposed to or vaccinated against the disease.

Significant COVID-19 activity will likely last 18 to 24 months and will likely continue until 60-70% of the population is immune. *Michael Osterholm, Director, CIDRAP*

1. Kristine A. Moore, Marc Lipsitch, John M. Barry, Michael T. Osterholm. Part 1: The Future of the COVID-19 Pandemic: Lessons Learned from Pandemic Influenza. [Internet]. 2020 [cited 2020 Jul 11]. Available from: https://www.cidrap.umn.edu/sites/default/files/public/downloads/cidrap-covid19-viewpoint-part1_0.pdf
2. Sheikh K, Watkins D, Wu J, Gröndahl M. How Bad Will the Coronavirus Outbreak Get? Here Are 6 Key Factors. The New York Times [Internet]. [cited 2020 Jul 13]; Available from: <https://www.nytimes.com/interactive/2020/world/asia/china-coronavirus-contain.html>