

Fearing The Coronavirus



By *Chuck Dinerstein, MD, MBA* — January 29, 2020

Plenty of attention is focused on the growing number of cases in China of the Wuhan coronavirus -- also known as 2019-nCoV -- and those around the world. According to the New York Times, as of this writing, there are at least 132 reported deaths and nearly 6,000 confirmed cases of the disease. While the number of fatalities continues to grow, let's take a moment to understand what these numbers might mean.



Image courtesy of the State Library of Queensland [1]

R₀ – How infectious is the virus?

Short answer, we do not know. R_0 or R naught is the number that tells us how easily an infection is transmitted to other individuals. That number varies within a range based not only on the innate characteristics of the infectious agent, in this case, the coronavirus, but also on the weather, and how densely populated an area might be. You can find a good discussion of the spread of an "epidemic" [here](#) [2] and a look at the "herald wave" of the 1918 Spanish flu [here](#) [3]. It is impossible, at this time, to determine 2019-nCoV's infectivity, and there are any number of R_0 's available on the Internet to consider. The best we might guess is that it is more infectious than seasonal flu, whose R_0 is 1.3, perhaps in the range of the norovirus, with an R_0 of 1.6 to 3.7. To give the R_0 of 2019-nCoV context, our best guesses make it less infectious than polio, whooping cough, and that perennial favorite of the anti-vax crowd, the measles, which has an R_0 of 12-18.

If the R_0 of Wuhan coronavirus is near the 3.7 end of the range, that puts it in the ballpark of SARS. And because SARS infections took a lot of lives, that is, helping to fuel concern and anxiety. So, the next question we need to consider is how deadly this new virus might be.

Case Fatality Rates (CFR)

The CFR measures of how many people die from an infectious disease divided by how many are infected. We do not know the CFR for the current coronavirus; we can only make an educated guess. But it turns out that the CDC does this type of guess-timation every year in reporting flu statistics.

Let's begin with the denominator; how many cases of the flu occurred? There are many reasons for the flu to go undetected. The CDC employs a network of hospitals that report confirmed cases of the flu and uses that information in their estimates. In to be counted in the Flu surveillance network, you must be admitted to a hospital and have a confirmed case of the flu. So already two variables have been introduced. First, you have to be hospitalized, and not everyone is, many individuals stay home or have mild cases that don't rise to the need for even chicken broth. There are also several ways to test for the presence of the flu virus, each with its own ability to detect the virus, the test's sensitivity. You might well have the flu, and your analysis can be falsely negative. (They are currently running out of kits to test for the Wuhan coronavirus). And the sensitivity of flu tests varies with the age of the patient; lower sensitivity is seen in older adults, the very group that has more episodes of the flu. Long story short, the CDC based on several years of testing against seasonal flu has developed multipliers that given them a ballpark guess as to how many people in the US had the flu in any given year. That multiplier takes into account the ages of our population, their location, how many are hospitalized, and have positive diagnostic testing – a chain of assumptions. That multiplier ranges from about 2 to 5.

How about the numerator, you would think, counting the dead would be an easier task; you would be (dead) wrong. The CDC's flu surveillance system does capture all those patients admitted to the hospital that die during hospitalization from the flu. But that fails to account for those who die afterward, or who never were in the hospital at all. And there is a larger group who die because the flu has exacerbated underlying chronic medical problems, like a cardiovascular and pulmonary disease. [1] And often, in this latter group, death certificates don't list the flu as a cause. Once again, the CDC has developed multipliers converting what they know for sure, the flu deaths in the hospital, what we would like to know, the flu deaths across the nation.

It is hard to parse the information coming out of China. Using the information we have, the CFR for Wuhan coronavirus is about 2.2% putting it in the ballpark with seasonal flu. Of course, that number will change, and given the problems of getting real counts in the US, let alone in China, we will have to content ourselves with that estimate for the moment.

For the flu, adults 65 or older account for 54-70% of hospitalizations and 73-85% of deaths. The CDC estimates that less than 50% of our population got the flu shot last year. Consider how much ink, pixels, and airtime have been given to Wuhan's coronavirus compared to seasonal flu. Seasonal flu's death toll, a real problem here and now for us, is evidently not as significant as the fear of what may turn out to be a similar problem in China.

[1] Other lifestyle issues may also impact the effect of a viral infection. Specifically, roughly half of older Chinese men smoke, for American men, age 65+, those at highest risk, the rate of smoking is 12%.

Source: Estimating Influenza Disease Burden From Population-Based Surveillance Data in the United States PLOS DOI: 10.1371/journal.pone.0118369

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Links

[1]

[https://commons.wikimedia.org/wiki/File:Women_wearing_surgical_masks_during_the_influenza_epidemic,_1919_\(29](https://commons.wikimedia.org/wiki/File:Women_wearing_surgical_masks_during_the_influenza_epidemic,_1919_(29)

[2] <https://www.acsh.org/news/2019/01/22/pandemic-theres-app-13743>

[3] <https://www.acsh.org/news/2018/03/07/pandemic-flu-beware-herald-wave-12667>