

Intro: Hey Clinical Problem Solvers! This is Indy Prabhu, a fourth year medical student at Touro University Nevada, and I am incredibly excited to talk to you about the differences between COVID-19 and Influenza. Given our current pandemic, it is a good idea to learn more about COVID's manifestations, prevention, diagnosis, and treatments. Comparing it to influenza can help us better understand why this pandemic is such a "big deal".

First of all, what are these viruses anyway? A virus is an infective agent that consists of DNA or RNA in a protein coat and requires a living host in order to replicate. The influenza virus is part of the Orthomyxoviridae family...but I think "the flu" is less of a tongue twister. It comes in 3 types, or flavors: A, B, and C. COVID-19 on the other hand, is part of the Betacoronavirus family (where the publicly advertised name "coronavirus" comes from), and has only one strain: SARS-CoV-2.

The disease time course differs as well. Influenza tends to run its course in less than a week and symptoms peak at around 2 days. COVID-19, on the other hand, runs its course in 2 weeks and peaks around day 5. We will discuss the symptomatology of these diseases later in this video!

Of the cases of influenza that do occur, 98% of them will be mild; you can think of these cases as the "fevers and body aches" that cause many kids to stay home, and people generally feel better in 4-5 days. 1.8% of the cases are severe, and 0.2% lead to ICU admission. Influenza generally kills 1 in every 1000 infected people, a number that has drastically come down since the advent of the annual flu vaccine. As you can see, COVID-19 boasts an 80% "mild" cases rate, so what's all the fuss with this pandemic then? Unfortunately, this virus has severe case, critical case, and case fatality rates that are several orders of magnitude higher than your everyday influenza. With more and more of the population becoming infected with COVID, the threat and devastation to life for many people only increases.

The reason that these two viruses are often compared is because they are both spread in a similar manner: contact and droplet. How pervasively they transmit, however, is quite different. So what does R-zero mean? Well, that is actually pronounced R-naught, and it is a measure of how contagious the virus is. For example, for every 10 influenza cases, 13 more people will be infected. However, for every 10 COVID cases, 20-30 more people will be infected, which is why physical distancing is crucial to preventing viral transmission (but more on that later).

The best way to diagnose influenza is by PCR assays using nasopharyngeal swabs, which is both sensitive and specific, whereas the antigen test sacrifices sensitivity for specificity; PCR assays using nasopharyngeal swabs is the most widely used method to diagnose COVID, although it may be susceptible to false negatives early and late in the disease course.

These viruses present quite similarly, with a few distinct takeaways. The presence of upper respiratory symptoms such as nasal congestion and sore throat are highly variable for COVID-19, so their presence or absence cannot be used to rule in or out COVID. When you examine the labs, patients with COVID-19 tend to have lymphopenia, which means low B and T cell counts, making them susceptible to superimposed infections. These patients will also have their liver enzymes (the ALT/AST), along with markers of inflammation, LDH and CRP, elevated.

Imaging of influenza and COVID-19 patients using a CT scan shows ground glass opacities. Ground glass opacities, or GGOs, are essentially hazy areas of the lung that have increased attenuation with preserved

vascular/bronchial markings. Diffuse, patchy consolidations are more consistent with COVID-19, whereas subpleural consolidations characterize influenza.

So what can we do to stop these viruses? Do we just let them do their dirty work and hope they stop? Well...yes and no. For influenza specifically, the annual vaccine you can get at your local pharmacy does an amazing job at protecting you from that year's strain, and is a huge reason that the R-naught is so close to 1, with herd immunity, or the immunity that unvaccinated individuals receive from the sheer number of vaccinated individuals, playing a huge role. Medications are given to influenza patients within 48 hours of symptom onset, if they are younger than age 2 or older than 65, hospitalized, or pregnant. These can be in the form of oral oseltamivir (Tamiflu), oral Baloxavir, intravenous peramivir, or inhaled Zanamivir. If the patient does not meet these criteria, then supportive management and watchful waiting are the next best steps. COVID-19, on the other hand, is a bit trickier. Current recommendations include dexamethasone and remdesivir therapy in hospitalized patients with severe disease. Another mainstay therapy is supportive treatment, including placing mechanically ventilated patients with COVID ARDS in a prone position. Society's best bet is a vaccine, which is currently starting the clinical trial process, but is still 6-12 months away. As of now, the best way to deal with the virus is preventing its transmission. Given the contact and droplet transmission modes, physical distancing is truly as effective as it is made to seem.

Remember that influenza and COVID-19 can present very similarly, so it's important to test for both when PCR assays using nasopharyngeal swabs is available. It is important to note that a COVID-infected person can be completely asymptomatic, and still be incredibly infectious, so if you've had close contact with a person with COVID-19, the best thing to do is a 2-week quarantine and socially distance yourself from others. As for influenza, getting the vaccine at the beginning of flu season will help the majority of people stay healthy, with medications used in specific instances. We hope you've enjoyed this schema!