

Hey Clinical Problem Solvers! My name's T.J. La, a 6<sup>th</sup> year MD/JD/LLM student at Baylor College of Medicine and the University of Houston Law Center, and I am so excited to talk to you about influenza.

Influenza is a respiratory illness caused by the influenza viruses classified as type A, B, or C by their nucleoproteins and matrix proteins. The influenza viruses, part of the Orthomyxoviridae family, are transmitted by droplets, aerosol, person-to-person contact, and contact with contaminated items. The R<sub>0</sub>, which indicates how contagious an infectious disease is, for influenza is 1.3. In other words, R<sub>0</sub> is the expected number of cases directly generated by one case in a population where all individuals are susceptible to infection.

Looking at the epidemiology of influenza, **antigenic drift** refers to minor mutations in preexisting combinations of H and NA antigens, resulting in new viral strains that can cause seasonal epidemics.

An **antigenic shift** refers to a rare shift in H and/or NA antigens causing new strains of the influenza virus. This in turn can cause devastating pandemics because antibodies against other viral strains provide little or no protection against these new viral strains.

Worldwide, there are 3-5 million severe cases every year leading to 290,000-650,000 deaths.

**High risk groups** for influenza include children and adults > 65 years old, those with chronic health problems (eg, diabetes, heart disease, renal or hepatic insufficiency, immunodeficiency), and women in the 2<sup>nd</sup> or 3<sup>rd</sup> trimester of pregnancy.

**Looking at the pathophysiology**, the incubation period ranges from 1 to 4 days with most experiencing mild symptoms including fever, myalgias, headache, malaise, non-productive cough, rhinorrhea, sore throat, and GI symptoms in children (eg, nausea, vomiting, or abdominal pain).

- **Several respiratory complications** can also arise from influenza including primary influenza pneumonia with symptoms of a worsening cough, dyspnea, bloody sputum and rales. Secondary bacterial pneumonia, commonly caused by *S. pneumo*, *S. aureus*, and *H. influenza*, is a possibility when there is a recurrence or persistence of fever and cough after the primary illness appears to have been resolving. Post-influenza aspergillosis, triggered by influenza B virus, can be seen when there is respiratory decline in a patient.
- **Cardiac complications** include myocarditis, pericarditis, and acute cardiovascular events (eg, heart failure and myocardial infarctions).
- Other complications include acute viral myositis (rare), rhabdomyolysis (due to multifactorial causes), encephalitis, and transverse myelitis.

**To diagnose influenza**, reverse transcriptase-polymerase chain reaction (RT-PCR) tests are preferred to test for influenza because they are highly sensitive and specific (with sensitivity close to 100%). The sensitivity for antigen testing ranges from 60-90%.

**In regards to treatment**, most patients can be treated symptomatically while some patients may present with severe respiratory symptoms and might require complex management. However,

prompt antiviral treatment is key to reduce the incidence of lower respiratory disease and hospitalization in high-risk patients.

- We first look to the neuraminidase inhibitors (oseltamivir, zanamivir, and peramivir) that interferes with the release of influenza virus from infected cells.
- There is also a new medication called baloxavir which is an endonuclease inhibitor that blocks viral RNA transcription and is active against influenza A and B.

It is also important to go to your PCP or local pharmacy for a flu shot, whether it's an inactivated or a live attenuated vaccination, as annual vaccination can prevent most cases of influenza infections.

Overall, influenza is a viral infection of the lungs and airways with one of the influenza viruses. Often diagnosed based on symptoms of fever, rhinorrhea, sore throat, cough, headache, myalgias and malaise, the virus is spread by being in direct contact with an infected person or inhaling airborne droplets from an infected person. Most can be treated symptomatically, but sometimes antivirals are needed for high-risk patients.

We hoped you enjoyed this schema!