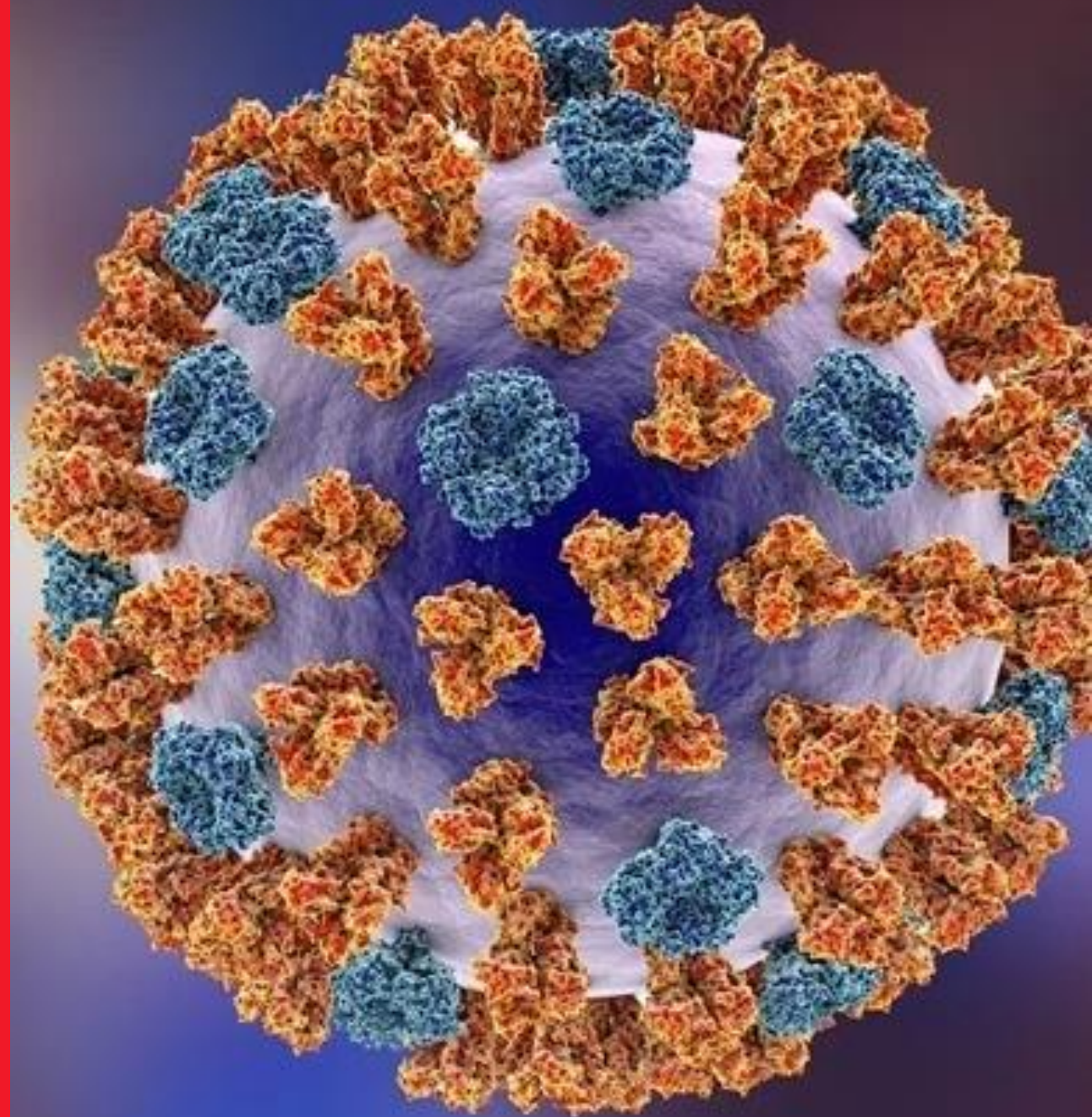


Influenza (flu)

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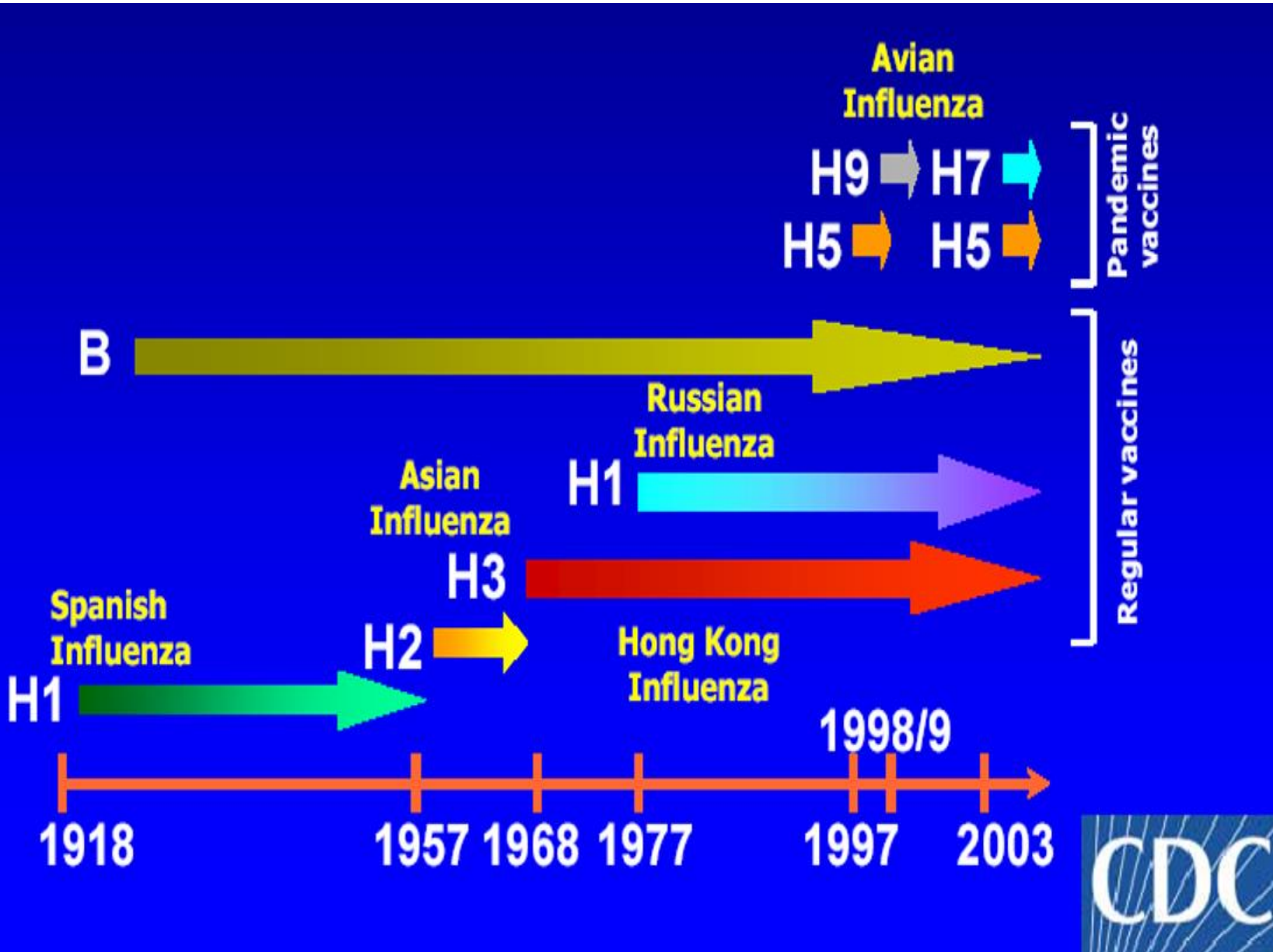
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Introduction

- Influenza is a contagious respiratory illness caused by influenza viruses (Types A, B and C) that infect the nose, throat, and lungs. Heart, brain, nerves, muscles also can be attacked.
- Sudden onset of symptoms
- Some people, such as older people, young children, and people with [certain health conditions](#), are at higher risk of serious flu complications.
- Most people **recover** from fever and other symptoms **within a week** without requiring medical attention.
- The WHO estimates that **1 billion influenza cases, 3 to 5 million severe cases, and 290,000 to 650,000 influenza-related respiratory deaths occur each year worldwide.**

Background

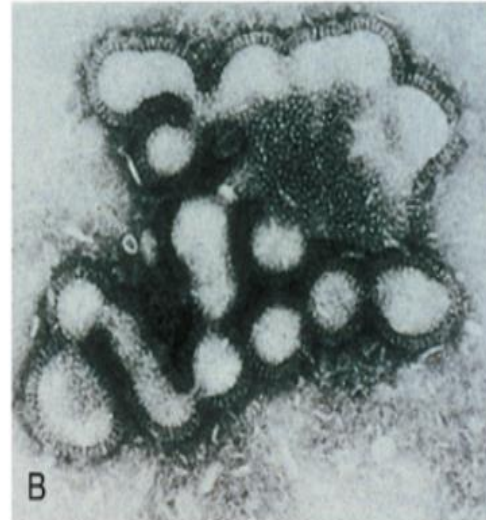
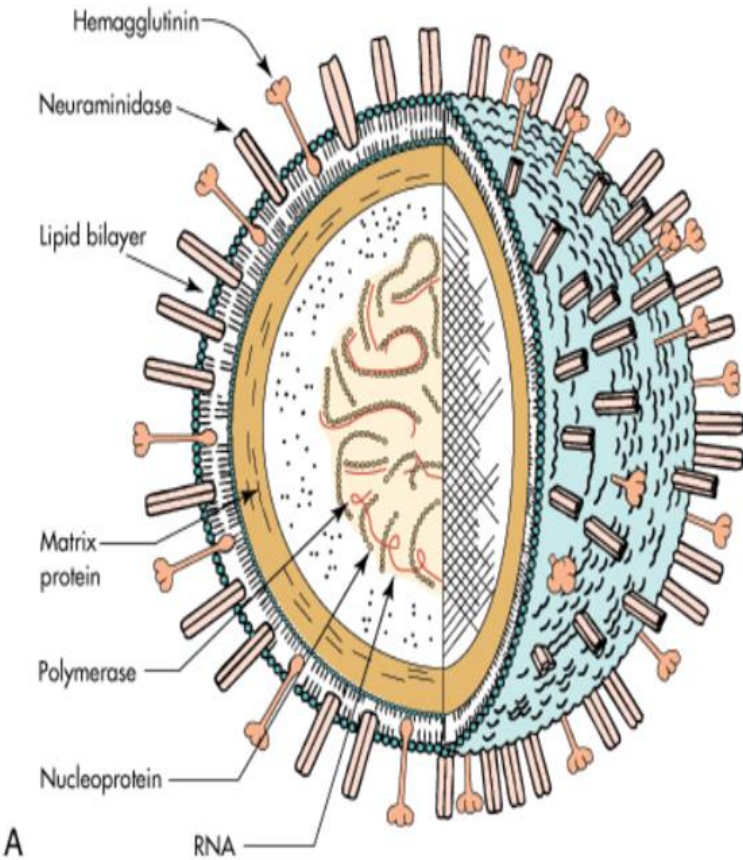


- Since the middle of the 18th century, new influenza A subtypes have caused **major global outbreaks**.
- "**Spanish flu**" in 1918 was the most severe, caused around 20-40 million deaths worldwide.
- Both influenza A and B viruses are important respiratory pathogens, although **influenza A** viruses are the main cause of large epidemics with high mortality.

Significance

- Occurs all over the world, in temperate climates outbreaks experienced mainly during the **winter season**, influenza occurs more unpredictably in tropical regions.
- Attack rate estimated at **5-10% in adults** and **20-30% in children**.
- Epidemics can result in high levels of worker/school absenteeism and productivity losses. Clinics and hospitals can be overwhelmed during peak illness periods.
- Influenza A viruses infect a range of mammalian (e.g. pigs and horses) and avian species, whereas **type B and C** infections are largely restricted to **humans**. Only types A and B cause human disease of any concern.

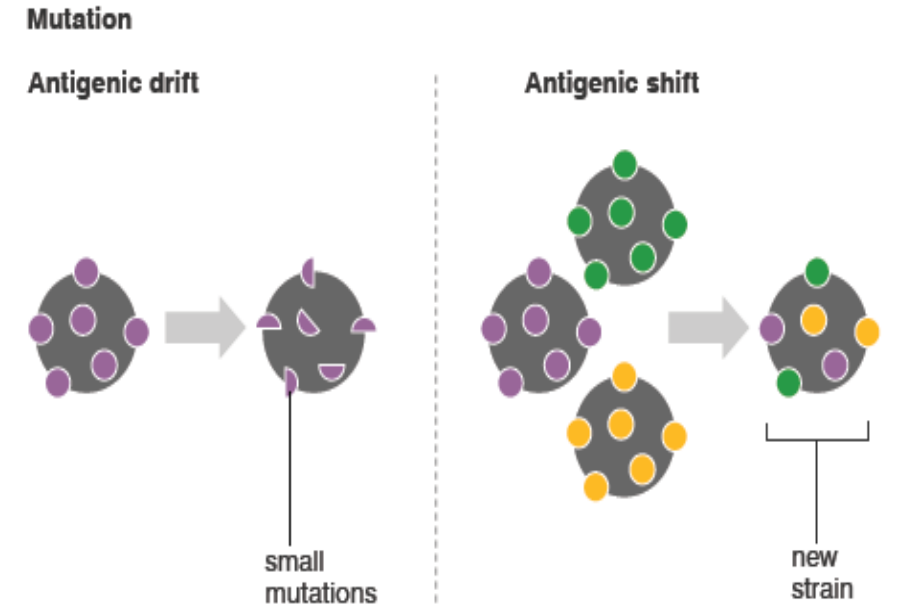
Pathogens



- Influenza viruses belong to the family **Orthomyxoviridae**, which is characterized by a single-stranded and segmented **RNA** genome.
- The influenza viruses are classified into types **A, B, C** and **D** on the basis of their core proteins, whereas the subtypes of influenza A viruses are determined by envelope glycoproteins possessing either haemagglutinin (HA) or neuraminidase (NA) activity.
- **High mutation rates** and **frequent genetic reassortments** of these viruses contribute to great variability of the HA and NA antigens.

Pathogens and their genetic changes

- Minor point mutations causing small changes ("**antigenic drift**") occur relatively often.
- Major changes in the HA antigen ("**antigenic shift**") are caused by reassortment of genetic material from different A subtypes. Type B virus does not exhibit antigenic shifts and is not divided into subtypes.
- Humans are generally infected by viruses of the subtypes H1, H2 or H3, and N1 or N2.



Flu symptoms

- Influenza (flu) can cause mild to severe illness, and at times can lead to death.
- **The common symptoms** are:
 1. fever* or feeling feverish/chills (not everyone with flu will have a fever)
 2. Cough (can be severe and can last 2 or more weeks)
 3. sore throat
 4. runny or stuffy nose
 5. muscle or body aches
 6. Headaches
 7. fatigue (tiredness)
 8. some people may have vomiting and diarrhea, though this is more common in children than adults.

Flu versus COVID-19 and cold

- Caused by **different viruses**
- COVID-19 virus **spreads more easily**
- If a person has COVID-19, it could take them **longer to experience symptoms**
- If a person has COVID-19, they could be **contagious for a longer time.**
- COVID-19 seems to cause **more serious illnesses** in some people.
- Influenza antiviral drugs are approved to use.

Common Symptoms	Cold	Flu	COVID-19
Fever and/or chills		✓	✓
Headache		✓	✓
Muscle pain or body aches		✓	✓
Feeling tired or weak		✓	✓
Sore throat	✓	✓	✓
Runny or stuffy nose	✓	✓	✓
Sneezing	✓		
Cough	✓	✓	✓
Shortness of breath or difficulty breathing		✓	✓
Vomiting and diarrhea		✓	✓
Change in or loss of taste or smell			✓

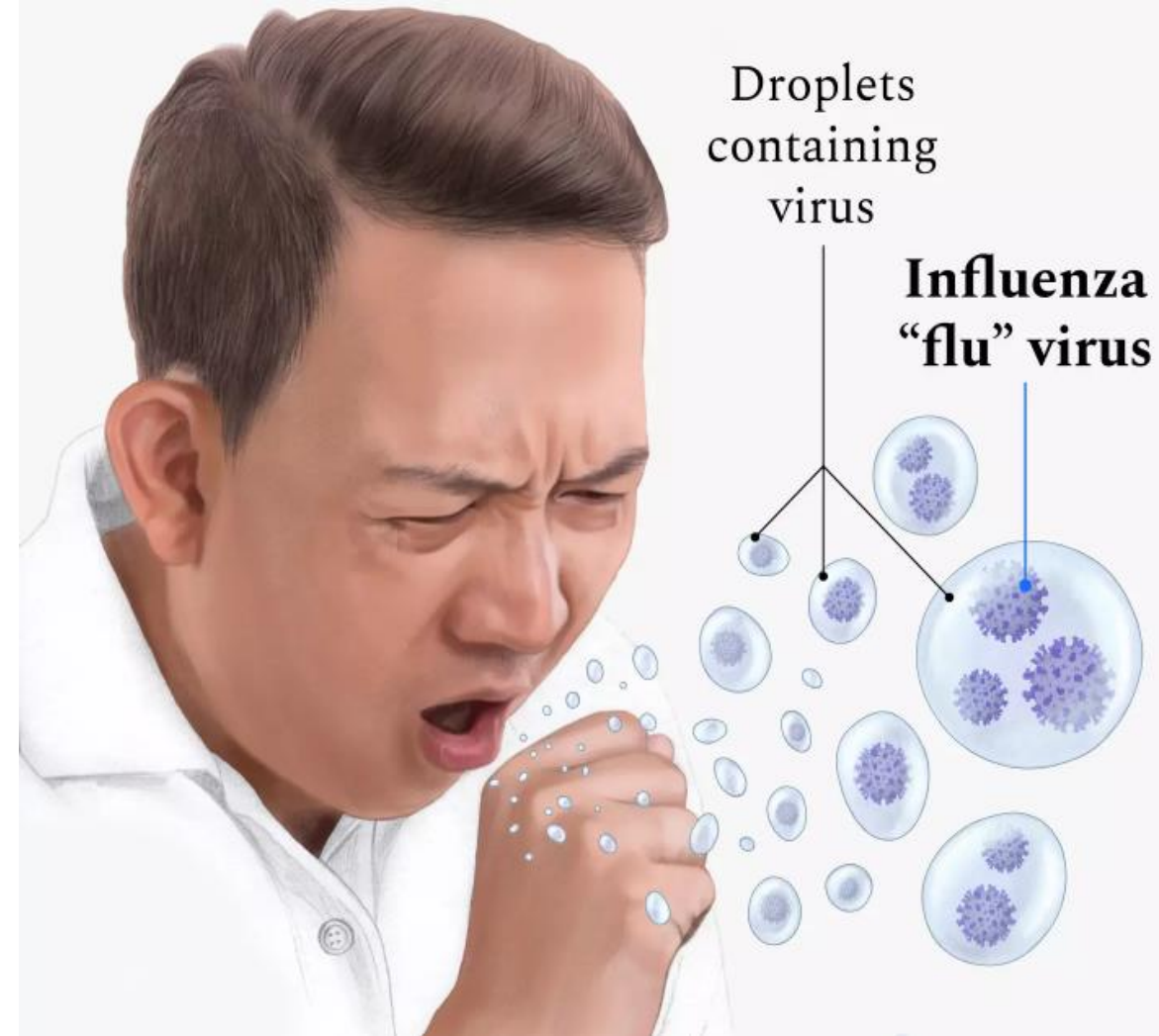
Epidemiology

- All age groups can be affected but there are **groups that are more at risk** than others.
- Aerogenic transmission. The virus can also be spread **by hands** contaminated with influenza viruses.
- **Incubation period is about 2 days**, but ranges from one to four days.
- The influenza virus is contagious from **about 24 hours before symptoms appear for up to 10 days after**.



Risk factors for epidemic spreading

- The reasons of the **immediate spread of the disease**:
 - I. High level of contagiousness – low dose of virus
 - II. Short incubation period
 - III. Fast replication of the virus
 - IV. General susceptibility of the population



Diagnosis

- The majority of cases are **clinically diagnosed**
- Laboratory confirmation of influenza virus from throat, nasal and nasopharyngeal secretions or tracheal aspirate or washings is commonly performed using direct antigen detection, virus isolation, or detection of influenza-specific RNA by **reverse transcriptase-polymerase chain reaction (RT-PCR)**.
- **Viral culture**
- **Immunofluorescence assays**
- **Rapid influenza diagnostic tests (RIDTs)** are used in clinical settings.



Treatment

- **Symptomatic** with isolation at home
- Patients who are at risk for developing severe or complicated illness should be treated with **antivirals** in addition to symptomatic treatment.
- **Neuraminidase inhibitors** (i.e. oseltamivir) should be prescribed as soon as possible (ideally, within 48 hours following symptom onset) to maximize therapeutic benefits.
- Treatment is recommended for a **minimum of 5 days**, but can be extended.
- All currently circulating influenza viruses are **resistant** to adamantane antiviral drugs (such as amantadine and rimantadine), and these are therefore not recommended for monotherapy.

Prevention

- Personal protective measures
- A package of anti-epidemic measures
- **Vaccination** – the most effective way.



Personal protective measures:

- **Regular hand washing** with proper drying of the hands
- **Good respiratory hygiene** – covering mouth and nose when coughing or sneezing, using tissues and disposing of them correctly
- **Early self-isolation** of those feeling unwell, feverish and having other symptoms of influenza
- Avoiding close contact with sick people
- Avoiding touching one's eyes, nose or mouth



Anti-epidemic measures:

- face masks,
- restriction in the number of people allowed at events,
- restrictions to opening hours in public catering facilities,
- washing hands and disinfection,
- respiratory hygiene and social distancing.
- Measures also include recommendations for providers of healthcare and social services.

Groups for vaccination:

WHO recommends **annual** vaccination for:

- pregnant women at any stage of pregnancy
- children aged between 6 months to 5 years
- elderly individuals (aged more than 65 years)
- individuals with chronic medical conditions
- health-care workers.

Among healthy adults, influenza vaccine provides protection, even when circulating viruses do not exactly match the vaccine viruses.

Vaccination is especially important for **people at high risk of influenza complications**, and for **people who live with or care for the people at high risk**.



Vaccination

Everyone 6 months and older should get an annual flu vaccine, ideally by the end of October.

Quadrivalent vaccines include a 2nd influenza B virus in addition to the viruses in trivalent vaccines, and are expected to provide wider protection against influenza B virus infections.

A number of **inactivated** influenza vaccines and **recombinant** influenza vaccines are available **in injectable form**. **Live attenuated** influenza vaccine is available as a **nasal spray**.

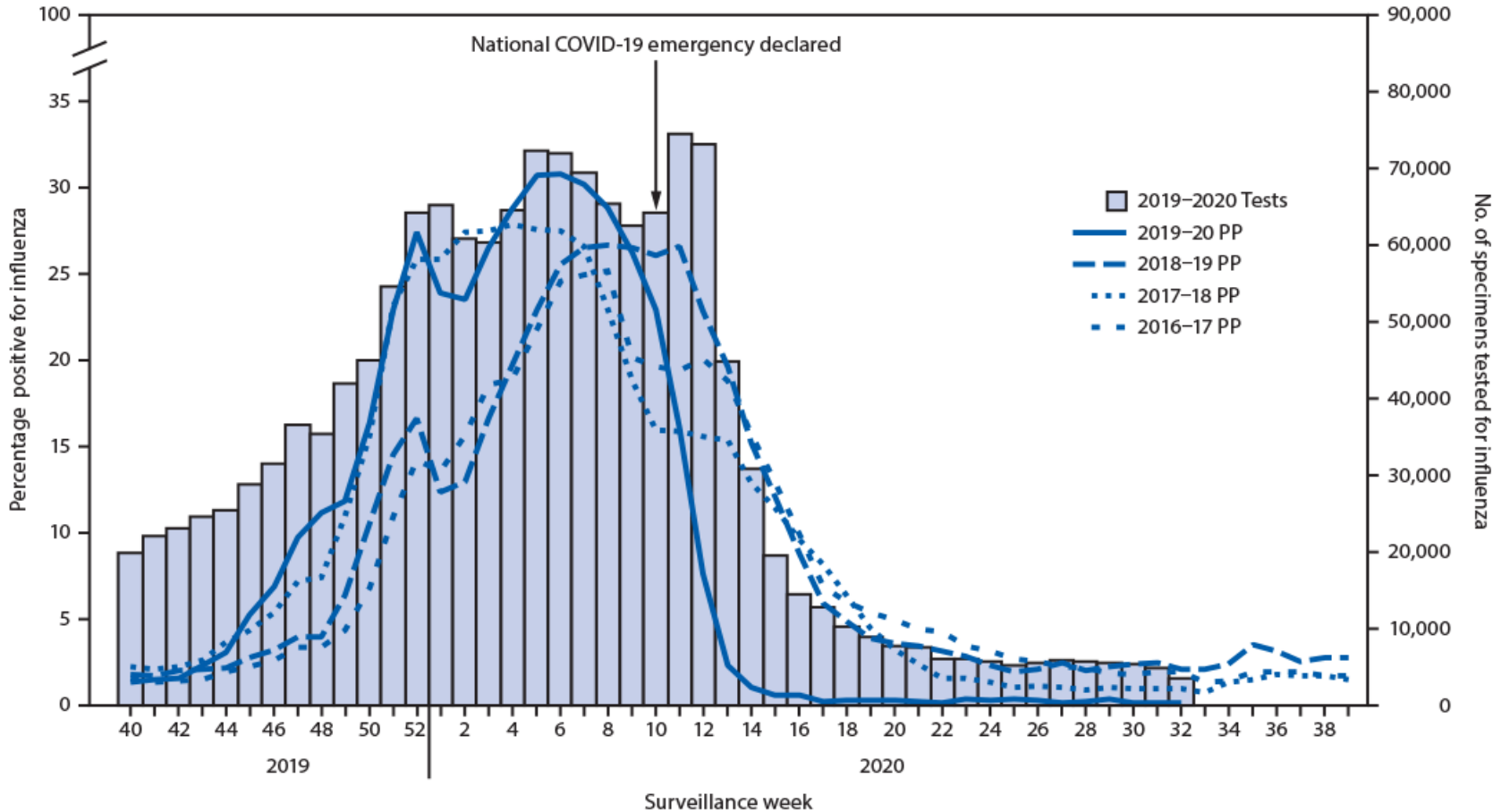
Most influenza vaccines (inactivated and live attenuated) are based on production of influenza viruses/antigens in fertilised hens' eggs. Therefore, should **not be recommended for people with egg allergies**. However, cell-based influenza vaccines were manufactured and can be recommended for people with such allergies.

Selecting viruses for the next seasonal influenza vaccine

- Seasonal influenza (flu) vaccines are designed to protect against the four main groups of flu Type A and B viruses that research indicates are most likely to spread and cause illness among people during the upcoming flu season.
- Each of these four vaccine **virus components are selected based on the following:**
 - **which flu viruses are making people sick** prior to the upcoming flu season,
 - **the extent to which** those viruses are **spreading** prior to the upcoming flu season,
 - **how well the previous season's vaccines may protect** against those flu viruses, and
 - **the ability of vaccine viruses to provide cross-protection** against a range of related flu viruses of the same type or subtype/lineage.

Decreased Influenza Activity During the COVID-19 Pandemic

FIGURE 1. Number of respiratory specimens tested and percentage testing positive for influenza, by year — United States, 2016–17 through 2019–20 seasons



Source: https://www.cdc.gov/mmwr/volumes/69/wr/mm6937a6.htm#F1_down



Thank you for your attention!

