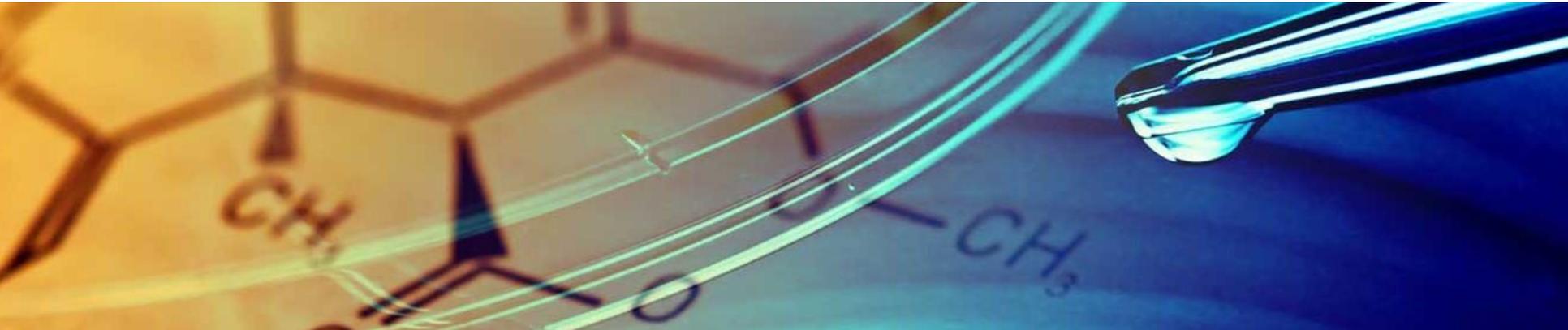


# How do we eradicate influenza?

*Oct. 7th-8th*

Aarhus University - Medical Innovation Day 2020



# Roche introduction

*Doing now what patients need next*



- Roche is the world's largest biotech company with more than 100,000 employees in more than 100 countries.
- In Denmark, Roche has 300 employees divided into three divisions: Pharma, Diagnostics, and RICC (Roche Innovation Center Copenhagen).
- RICC is the former Santaris that Roche acquired in 2014 and turned into one of 7 global innovation centers
- Roche is present in the entire Danish healthcare system's value chain - from early research, clinical trials to diagnostics and treatment. Additionally, our approach is based on partnerships, which means that we want to solve problems collaboratively with startups and the public sector.
- Our presence in cross-sector alliances gives us a unique opportunity to contribute to the development of a sustainable healthcare system.

# Background information

## *What is influenza?*

Influenza is an acute respiratory infection caused by influenza viruses which circulate in all parts of the world. Influenza is characterized by a sudden onset of fever, cough, headache, muscle and joint pain, severe malaise (feeling unwell), sore throat and a runny nose. The cough can be severe and last two or more weeks. Most people recover, however, influenza can cause severe illness or death in people at high risk.

There are three types of seasonal influenza viruses, types A, B, and C. Influenza A and B viruses circulate and cause seasonal epidemics of the disease. Worldwide, annual epidemics are estimated to result in about **3 to 5 million cases** of severe illness, and about **290,000 to 650,000 respiratory deaths**. Annually, **1000-2000 people in Denmark** die of complications from influenza.

Influenza viruses change easily and often, they are unpredictable. Although the changes may be small, they may be significant enough so that the human immune system will no longer recognize and defend against the virus. It is always a great concern when a new influenza virus emerges, because the general population does not have immunity and almost everyone is susceptible to infection and disease.

Epidemics can result in high levels of worker/school absenteeism and productivity losses. Clinics and hospitals can be overwhelmed during peak illness periods.

# Background information

## *Seasonal influenza*

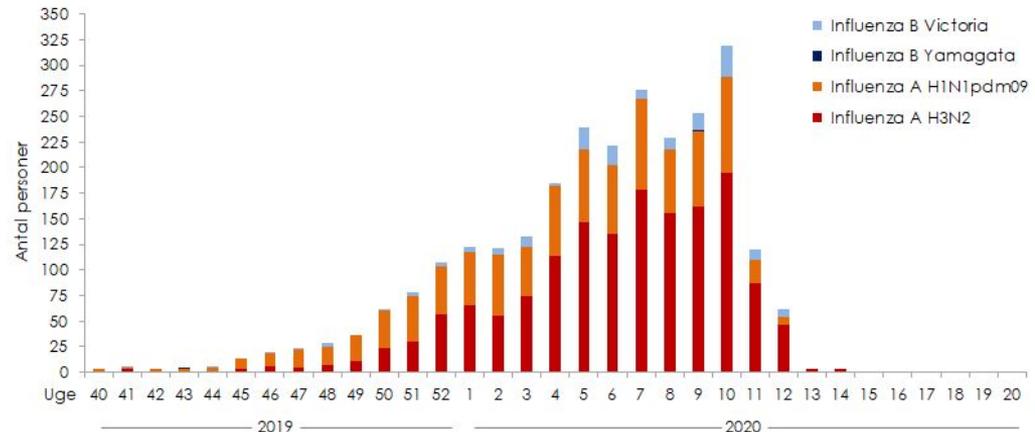
In temperate climates, such as Denmark, seasonal epidemics occur mainly during winter.

In Denmark, influenza season is between **December and Marts**. The time from infection to illness (the incubation period) is about 2 days, but ranges from one to four days. It takes normally **1-2 weeks to recover** from influenza.

Seasonal influenza spreads easily, with rapid transmission in crowded areas including schools and nursing homes. When an infected person coughs or sneezes, droplets containing viruses are dispersed into the air and can spread up to 1 meter, and infect persons, who breathe these droplets in. The virus can also be spread by hands contaminated with influenza viruses.

### *Registration of people infected with influenza in Denmark*

Figur 9. Subtypefordeling af influenza A og B blandt prøver modtaget på SSI, sæson 2019/20



# Background information

## *High risk groups*



*All age groups can be affected but there are groups that are more at risk than others*

*Pregnant women*

*Children u/59 months*

*The elderly*

*Individuals with chronic medical conditions*

Such as chronic cardiac, metabolic, liver or hematologic diseases

*Individuals with immunosuppressive conditions*

Such as HIV/AIDS, receiving chemotherapy or steroids

## **Case challenge**

### *Eradication of influenza*



## Challenge statement

*How do we organize the healthcare system so we are able to eradicate influenza?*

# Challenge information I

## *Behavior and testing*



### Behavior

#### Pre-COVID

The general perception of influenza in the public is that it is uncomfortable to be infected, however it is not dangerous. The general public think that there is no treatment option available, only pain relief is possible and cheap. Usually, more than 24 hours has gone by before the patient realises that he/she has caught the flu. As a patient it is hard to know whether you have influenza or just a regular cold.

#### Post-COVID

A completely new awareness of infection has been brought to the general public due to the covid-pandemic. Every single person knows about the importance of proper hand-hygiene, physical distance and staying home if symptomatic. Everybody knows that they can get tested fast and that they will receive a fast answer. In addition, the awareness about a coming vaccine and treatment has increased the knowledge in the general public that viral infections can be treated.

### Testing

#### Pre-COVID

The general practitioner (GP) is able to diagnose based on the typical symptoms of influenza including fever combined with muscle and joint pains. In addition, the GP is able to conduct a lab test enabling them to diagnose, however this is very rarely done. Sometimes, a sample from the throat is taken to help identify the subtype. The sample is sent to the microbiology laboratory where it is subject to RNA extraction and real-time PCR testing to detect the virus.

#### Post-COVID

Testing of COVID-19 is done efficiently in tents around Denmark where they are currently structured in two tracks: the societal track and the health track. Testing of asymptomatic individuals is carried out at the societal track and testing of individuals with suspicion of infection, and health care professionals is carried out at the health track.

The number of influenza cases during the covid-19 pandemic has dropped dramatically.

# Challenge information II

## *Treatment and barriers of influenza*

### Treatment

If you feel unwell, you can use medication that reduces the fever and relieves the pain. The drugs work on the symptoms, but do not shorten the course of the disease. Antibiotics only help with bacteria and therefore have no effect against influenza or other diseases caused by virus. Vaccines are available for a specific group of people, however are not relevant in this case

#### **Anti-influenza medicine**

In recent years, new anti-influenza drugs have entered the market. They are called neuraminidase inhibitors. These drugs can to a limited extent reduce the symptoms (fever, muscle aches, cough and runny nose), complications and the duration of the disease. The earlier the treatment starts (preferably within 12 hours after the start of symptoms and at the latest within 2 days after the start of symptoms), the better the effect. The downside of early treatment is that it will always be a little uncertain whether the symptoms are actually the flu or something completely different. It is usually recommended to wait with this medication until the symptoms are more characteristic.

### Barriers

- **Testing.** We need a convenient and rapid testing scheme for influenza.
- **Time-to-treat.** If an anti-viral medication should be efficient, the patient needs to be treated within the first 48 hours of infection.
- **Behavior.** A new mindset around viral infection is needed to make an early diagnosis of influenza.
- **Patient journey.** The patient should be able to reduce physical contact points with the healthcare system, ideally the patient should be able to stay at home during the whole course of the disease.
- **Data.** In Denmark we have some of the world's most comprehensive and quality assured health data. However, we need to ensure better use of and access to health data.

# Challenge statement

## *Eradication of Influenza*



### Overall challenge statement

- How do we organize the healthcare system so we are able to eradicate influenza?

### The team may focus on one or several of these challenges:

- COVID-19 learnings: Which of the structural changes made during COVID-19 can be adapted to fight influenza?
- Technology: How could we enable early diagnosis and change the patient journey?
- Behavior: How do we change the behavior of the general public in order to properly fight influenza?
- Data: How do we best utilize data to eradicate influenza?

Now is the time to act, as we have the potential to eradicate influenza within a few years

# Additional Reading

- [Testing tracks](#)
- [Sundhed.dk - Influenza and Anti-viral treatment](#)
- [Roche - Infectious diseases](#)
- [WHO - Influenza](#)
- [Sundhedsstyrelsen - Influenza](#)
- [Influenza cases 2020](#)

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