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Do not PROCRASTINATE, get the Flu jab

Why the Flu vaccine remains an important personal health investment

Opinion piece by Prof Jeffrey Mphahlele, NSTF Chairperson

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Prof Mphahlele was Vice President for Research at the South African Medical Research Council (SAMRC) from 2014, prior to joining the NWU.

He previously served, inter alia, as a full-time academic at MEDUNSA in various capacities: Professor and Academic Chair of the Department of Virology and National Health Laboratory Service (2005 to Sep 2014) and Co-Director of the SAMRC/Diarrhoeal Pathogens Research Unit, which is also a WHO Rotavirus Regional Reference Laboratory for Africa (2010 to March 2018) and designated a WHO Collaborating Centre for Diarrhoeal Diseases Research and Surveillance. Jeffrey's research publications cover epidemiology, vaccination control of infectious diseases and strengthening immunisation services and policies. He serves on a number of governance and advisory structures and scientific committees or task groups.

Contrary to those who are sceptical about the benefits of vaccines, Covid-19 has left an indelible lesson that can be extrapolated to most infectious diseases, especially respiratory infectious diseases. It became very clear with the evolution of the effectiveness of Covid-19 vaccines that the vaccinated enjoy many more health benefits than the unvaccinated. Simply put, Covid-19 vaccines reduce the risks of becoming infected; and if one becomes infected, the vaccines significantly lower the risk of serious morbidity, hospitalisation, and mortality. There is a lot in common between SARS-CoV-2, the virus responsible for Covid-19, and the Influenza virus, commonly referred to as Flu.

Why vaccinate against influenza each year?

Every year is Influenza year. The Influenza virus is highly contagious – the virus enters the respiratory tract through the nose, mouth and eye. The incubation period, that is, the time from exposure to symptoms, varies between one and four days, but can be as short as one day. The outcome of infection can range from mild to severe disease, or even death. For those who become ill, symptoms include high fever, sore

throat, headache, cough and nasal congestion. Complications include pneumonia (often caused by secondary bacterial infections) and death. The cases rise predominantly in the winter period for temperate regions such as southern Africa. The seasonality is linked to people being in closer proximity within confined spaces often with poor ventilation due to colder weather. This facilitates the transmission of virus laden respiratory secretions generated during sneezing or coughing to susceptible persons.

Benefits of vaccination

The Flu vaccine represents the first-line intervention and is used as a primary weapon against annual Flu epidemics. The vaccines are reasonably effective, with over 60 years of safety track record (WHO, 2023). Generally, vaccines are regarded as the most important medical intervention for preventing infectious diseases. In the case of Influenza, vaccines are not 100% efficacious – vaccination does not always translate to protection from infection or disease. However, vaccination reduces the health consequences of infection. There are a number of studies with proven vaccine efficacy against morbidity, mortality and associated respiratory diseases.

- The vaccine prevents against severe illness and deaths, especially among high-risk individuals. Seasonal Influenza infections lead to annual epidemics worldwide estimated to cause between 3 - 5 million cases of severe illness and approximately 290 000 to 650 000 deaths (WHO, 2023).
- According to the US Centers for Disease Control and Prevention, studies have demonstrated that vaccination reduces the risk of influenza disease by between 40% and 60% among the overall population if the circulating strains are well-matched to vaccine strains (CDC, 2023).
- Vaccination averts high levels of absenteeism at school or work that can result in loss of productivity.
- Unvaccinated individuals are at risk of acquiring infection during Influenza season, and thereby at risk of transmitting the virus further to family members and susceptible individuals in the community.

Is there a perfect timing to be vaccinated?

In southern hemisphere, especially temperate regions such as South Africa, it is highly recommended that one gets a vaccine between March and April, in order to reap the benefits of vaccination. Unfortunately, South Africa has a tradition of low uptake of Flu vaccine despite high levels of infection and associated morbidity.

Do not procrastinate, get the Flu jab.

It is critically important to continue with a momentum of building vaccine trust, especially after the negative public perception left by Covid-19 vaccination.

Vaccines saved millions of lives - this is exactly what they are designed for.

Recommended groups for Influenza vaccines

Anyone from six months of age is eligible to receive a Flu vaccine. The Flu vaccines can be given both at public and private health facilities. However, public facilities prioritise high risk target groups on a first-come, first-served basis.

While Influenza viruses are democratic, affecting anyone regardless of age or socio-economic status, there are groups that are more at risk than others. At high-risk individuals include health care workers who are at high risk of contracting influenza virus infection due to increased exposure to the patients, young children, the elderly (>65 year), residents of nursing and old age homes, frail care centres, individuals with cardiovascular diseases (including chronic heart disease, hypertension, stroke and diabetes), compromised respiratory function (including asthma and chronic obstructive pulmonary disease), individuals living with HIV and AIDS, pregnant women, chronic renal disease, and poultry farmers (WHO, 2023).

In South Africa, priority target groups for vaccination include health care workers, individuals aged >65 years, individuals with cardiovascular and chronic lung diseases, individuals living with HIV and AIDS and pregnant women (National Department of Health, 2022).

About the pathogen

Influenza virus is an RNA virus belonging to the family *Orthomyxoviridae*. There are four types of influenza viruses – designated influenza virus type A, B, C and D. Influenza A and B viruses circulate and cause seasonal epidemics in humans. Influenza A is found in both humans and animals, while Influenza B and C are only encountered in humans. However, Influenza C is not as frequently detected as types A and B, and it is usually associated with mild infections. Influenza D viruses have not been reported to infect humans, they seem to be associated with bovine animals. This makes Influenza A viruses the most diverse and potentially more important from a public health point of view.

The RNA genetic material is segmented into eight pieces, a phenomenon that allows the virus to undergo genetic changes or mutations. There are two proteins (or antigens) on the surface of the virus – one is called haemagglutinin (H) and the other is neuraminidase (N). Influenza A viruses are classified into subtypes on the basis of these two antigens; i.e. the haemagglutinin (which has subtypes, e.g. H1, H2, H3) and neuraminidase (which has subtypes, e.g. N1 and N2). There are more than 15 different H and nine different N subtypes circulating in nature in various species. Theoretically, any H can combine with N antigens, resulting in e.g. H1N1, H5N1, H3N2, etc.

Mutations, involving the H and N antigens, allow the virus to escape pre-existing immunity year on year, resulting in re-infections

Typically, RNA viruses mutate faster than DNA viruses. RNA viruses replicate using RNA polymerase which lacks proof-reading mechanisms; hence mutations accumulate faster. In contrast, DNA polymerases can correct the wrong bases during replication. Mutation is frequent with Influenza A, less so for Influenza B, and almost never for Influenza C. Mutations, involving the external antigens (H and N), allow the virus to escape immunity. There are two types of mutations depending on whether the RNA segment variation is small or great:

Antigenic drift (or minor variation) – the mutations occur every year or every few years. These mutations affect Influenza A and B viruses without resulting in new subtypes. They involve minor changes of RNA amino acids of the H or N antigen. The epidemics from seasonal Flu is a result of antigenic drift.

Antigenic shift (or major variation) – the mutations occur every few decades at unpredictable intervals (could be every 10 - 40 years) and affect only Influenza A virus. The mutations involve genetic reassortment or swapping of RNA segments responsible for either H or N antigens, or both, resulting in a novel Influenza virus or subtype. This occurs when more than one virus replicates within the same host which acts as a mixing vessel. In most cases, pigs become important mixing vessels to generate novel Influenza viruses. Alternatively, introduction of a novel virus in humans can be due to a direct transmission of a novel virus from one species (e.g. avian). Either way, this results in sudden appearance of a novel virus to which the population has no immunity. The new virus is highly pathogenic and has a potential to cause a pandemic within four weeks. Influenza pandemics are recurring events − the world may be on the brink of another pandemic. Taken together, the two types of mutations render Influenza virus a moving target as the virus is continuously evolving and escaping the pre-existing immune system. It is therefore understandable if the vaccines are unable to induce long lasting immunity.

Composition of Influenza vaccines

The current composition of influenza vaccines is either trivalent or quadrivalent as recommended by the World Health Organization. The trivalent preparations have been used for many decades and comprise two influenza A virus strains and one type B strain. The quadrivalent vaccines, which started

in 2013/2014, contain two each of influenza A virus and Influenza B virus, and are generally expected to provide wider protection against influenza B virus infections.

Influenza antivirals

Antivirals are available and can be used for the management of symptomatic influenza cases. While chemotherapy is particularly effective for influenza prophylaxis for certain key personnel (such as health care workers, police, army, fire fighters, etc), it is not a substitute for vaccination, but a very important complement to vaccines.

References

a. World Health Organization, 2023. https://www.who.int/news-room/fact-sheets/detail/influenza-(seasonal).
b. US Centers for Disease Control and Prevention, 2023. https://www.cdc.gov/flu
c. National Department of Health, Influenza Vaccination Guide 2022

The opinions expressed above are those of Prof Jeffrey Mphahlele, and do not necessarily reflect the views of the Executive Committee or members of the NSTF.