



Relevance of Influenza and Pneumococcal Vaccination in the Workplace

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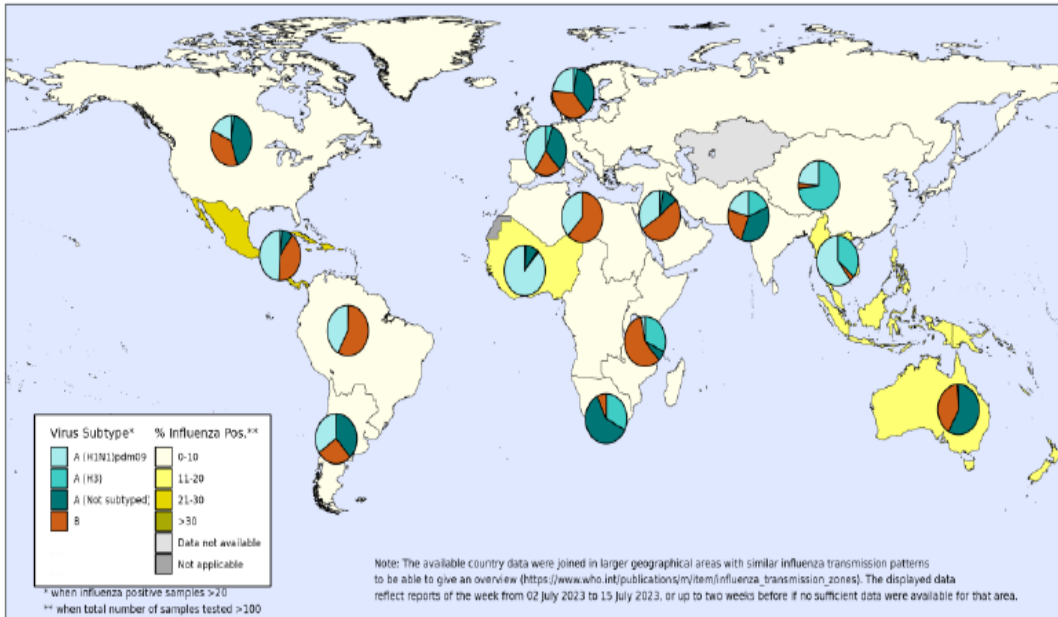
Introduction

- Seasonal influenza commonly referred to as “the flu” is an acute respiratory tract infection caused by 4 types of influenza viruses A, B, C and D
 - **A** classified into subtypes based on combinations of proteins on the surface of the virus, subtype A(H1N1), A(H3N2)
 - **B** not classified into subtypes but can be broken down into lineages B/Yamagata or B/Victoria lineage
 - **C** is less frequently detected and causes mild infection does not present public health importance
 - **D** primarily affects cattle and not known to infect or cause illness in humans
- Belongs to the family Orthomyxoviridae ,characterized by a single-stranded, segmented ribonucleic acid (RNA) genome
- Globally, billion cases reported per year, 3-5 million develop severe illness, 290 000 – 650 000 deaths
- July 2023, worldwide incidence declined, in South Africa, influenza activity of predominately influenza A decreased after peaking in June 2023

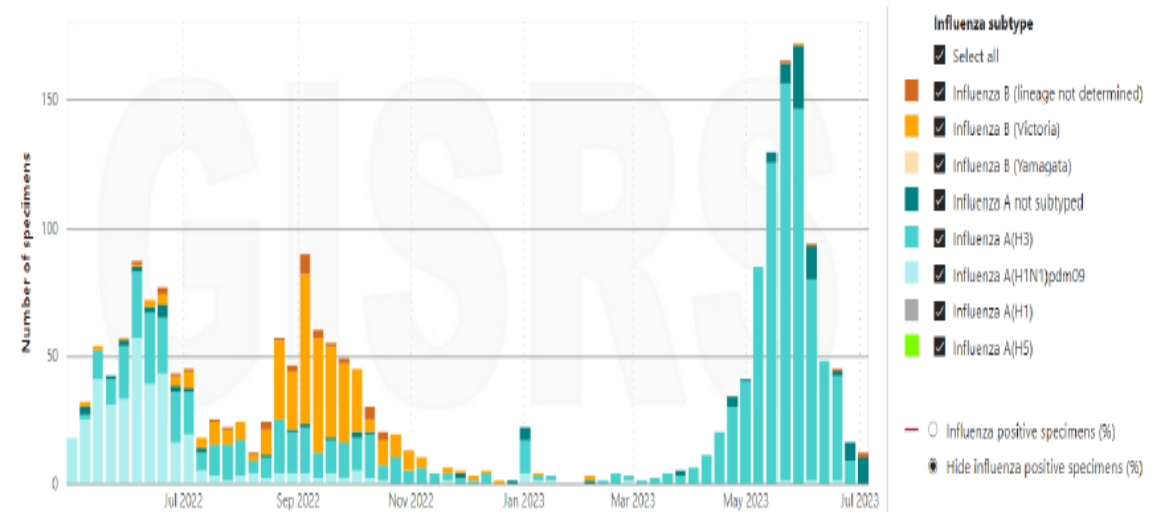
Epidemiology

Percentage of respiratory specimens testing positive for influenza, by influenza transmission zone¹. Map generated on 21 July 2023.

Percentage of respiratory specimens that tested positive for influenza
By influenza transmission zone
Map generated on 21 July 2023



Number of specimens positive for influenza by subtype in Southern Africa



Data source: FluNet (www.who.int/toolkits/flunet). Global Influenza Surveillance and Response System (GISRS)

Data generated on 21/07/2023

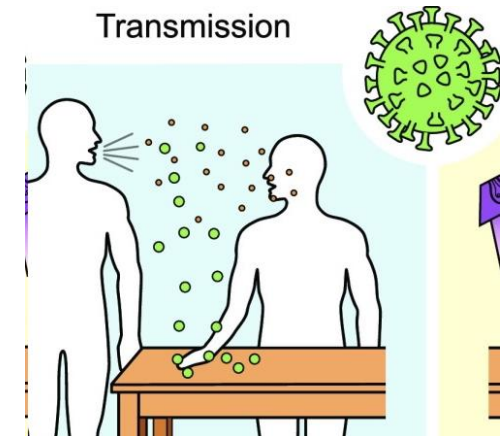
The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.



Data source: Global Influenza Surveillance and Response System (GISRS), FluNet (www.who.int/tools/flunet)
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Transmission and Disease Characteristics

- Spreads rapidly, in crowded areas including schools, public spaces, healthcare settings
- Droplet spread- infected person coughs or sneezes, infectious droplets dispersed into the air infects individuals in proximity
- Fomite transmission, hands contaminated with influenza viruses spread on surfaces
- Incubation period, 1-4 days, diagnosis clinical, if testing needed respiratory sample influenza-specific RNA by reverse transcriptase-polymerase chain reaction (RT-PCR) done
- Symptoms
 - Fever
 - Cough (usually dry)
 - Sore throat
 - Headache
 - Muscle and joint pain
 - Severe malaise
- Treatment – based on severity of disease, mild symptoms occur commonly self-limiting. Requires rest and fluids, medication for symptoms such as fever



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Vulnerable Workers High Risk of Influenza Infection

- Healthcare workers (Hospital based and Emergency care personal)
- Workers employed in essential services
 - Teachers
 - Firefighters
 - Police
 - Cleaners
- Any employee working in crowded close spaces
 - Retail Workers
 - Hospitality Industry (Hotel employees, recreation places, casinos)
 - Mines

Vulnerable Workers High Risk of **Severe** Influenza Disease

- > 50 years old
- Pregnant women and women up to 2 weeks postpartum
- Body mass index of 40 or higher
- Medical comorbidities ,chronic cardiac disease, asthma, chronic pulmonary disease, chronic renal disease, metabolic disorders, endocrine disorders (diabetes mellitus), liver disease; haematological diseases and immunosuppressive conditions (HIV/AIDS)
- Ongoing immunosuppressive treatment-oral steroid therapy

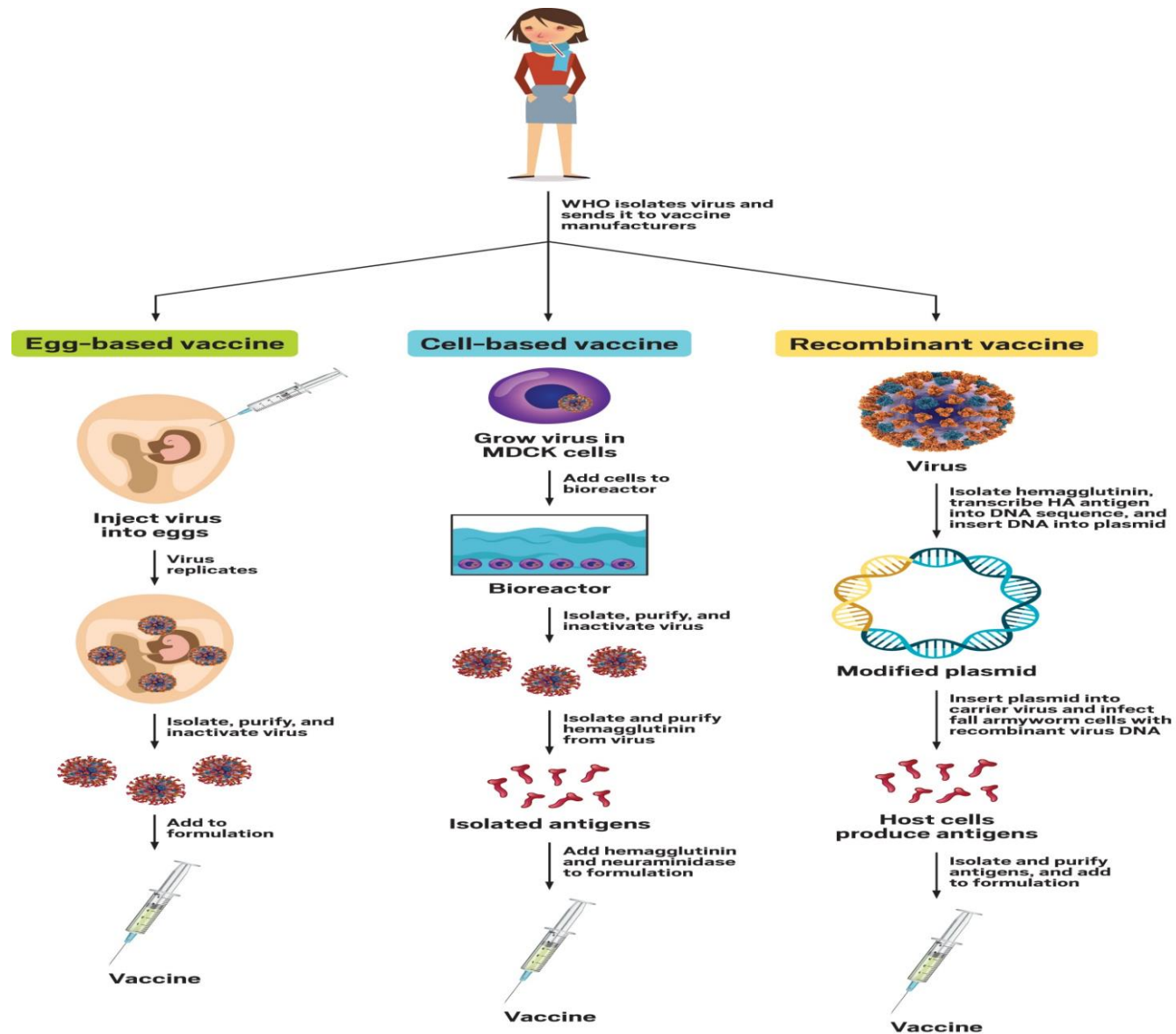
Vulnerable Workers High Risk of Severe Disease South Africa Standard Treatment Guidelines

STG Recommendations **Influenza Vaccination**

- > 65 years old
- Pregnant women
- HIV Infection
- Chronic cardiac and respiratory disease

Vaccination

- Single dose is sufficient, immunity for 12 months
- Inactivated and live attenuated seasonal influenza vaccines available
 - Trivalent: 2 influenza A subtypes (H1 and H3) and 1 influenza B virus (Yamagata or Victoria lineage)
 - Quadrivalent formulations: 2 influenza A viruses and 2 influenza B viruses (1 from each lineage)
- Registered influenza virus vaccines are produced using
 - Egg (**Inactivated egg-based vaccines most common**) *should be avoided in those with egg allergy*
 - Cell based approach
 - Recombinant approach uses purified influenza antigens such as haemagglutinin produced using recombinant deoxyribonucleic acid (DNA) technology
 - Adjuvanted and high-dose formulations are available for certain populations
 - Live Vaccine, form of nasal spray available in the United States



Influenza (avian and other zoonotic)

- Influenza A and B viruses circulate and cause seasonal epidemics of disease in humans, Influenza A has been established in many animal species
- Animal influenza viruses named according to the host – e.g., avian, swine, equine, canine influenza
- Distinct from human viruses and ***do not transmit to humans easily***
- Public should minimize contact with animals in areas known to be affected by animal influenza viruses, perform hand hygiene and good food safety practices

Pneumococcal Pneumonia

- *Streptococcus pneumoniae* gram positive encapsulated diplococcal **bacteria** that colonizes the human nasopharynx , is transmitted through respiratory droplets
- >90 serotypes, leading cause of Pneumonia worldwide
- *Pneumococcal pneumonia secondary to influenza is high as evidenced by previous H1N1 pandemics*
- Disease occurs in the respiratory tract, can also infect secondary sites
 - Meninges leading to meningitis and bacteraemia
 - Contagious spread from the nasopharynx may cause otitis media

Pneumococcal Vaccination

- 2 different types of pneumococcal vaccines
 - a 23-valent polysaccharide vaccine (PPV23) available since the early 1980s
 - Conjugate vaccines available since 2009, one 10-valent (PCV10) the other 13-valent (PCV13). (EPI schedule for South Africa, Immunity wanes after 5 years of age)
- SA Guidelines for management of pneumonia
 - Adults ≥ 65 years vaccine naïve should receive PCV13 followed by pneumococcal polysaccharide vaccine (PPV23) one year later
 - Younger adults with chronic immunocompromising conditions (including HIV) should receive PCV13 followed 2 months later by PPV23

Vulnerable Workers High Risk of Pneumococcal Infection

- 65 years or older
- Healthcare workers
- Workers exposed to metal fumes such as welders, boiler manufacturers, workers in foundries
- Workers exposed to mineral dust (Silica)
- Comorbidities, Sickle cell disease, congenital and acquired splenic dysfunction, HIV infection, malignancy, nephrotic syndrome
- Smokers
- Alcoholism

Risk of Invasive Pneumococcal Pneumonia

Table 5 Logistic regression models for invasive pneumococcal disease (IPD) risk and IPD with pneumonia in relation to occupation and to occupational exposure defined by job–exposure matrix restricted to cases and controls 50–65 years of age

Occupational exposures	IPD			IPD with pneumonia		
	All IPD (n=2679)	OR	95%	(n=1855)	OR	95%
Welder*	27	3.79	2.27 to 6.32	24	3.87	2.23 to 6.72
Foundry worker	2	NA	NA	1	NA	NA
Steel mill worker*	12	0.92	0.83 to 1.02	9	1.47	0.66 to 3.24
Blacksmith*	11	1.93	1.44 to 2.57	8	2.94	1.25 to 6.99
All metalworkers*	52	2.34	1.64 to 3.32	42	2.77	1.87 to 4.10
Fumes†						
All	491	1.04	0.89 to 1.21	352	1.08	0.91 to 1.30
Low	459	0.98	0.84 to 1.14	323	1.00	0.84 to 1.21
High	32	3.13	1.95 to 5.04	29	3.29	1.98 to 5.47
Inorganic dust†						
All	621	1.14	0.97 to 1.33	443	1.16	0.96 to 1.40
Low	601	1.12	0.96 to 1.31	428	1.14	0.95 to 1.38
High	20	1.77	0.99 to 3.15	15	1.83	0.95 to 3.52
Silica dust†						
All	123	1.41	1.11 to 1.78	84	1.46	1.10 to 1.94
Low	112	1.37	1.07 to 1.73	75	1.43	1.05 to 1.93
High	11	1.81	0.86 to 3.81	9	1.79	0.78 to 4.11
Vapours and gases‡						
All	579	0.96	0.82 to 1.12	419	1.02	0.85 to 1.22
Low	535	0.91	0.78 to 1.06	383	0.95	0.79 to 1.15
High	44	2.38	1.58 to 3.57	36	2.65	1.67 to 4.18
Organic dust†						
All	224	0.93	0.79 to 1.10	156	0.93	0.76 to 1.14
Low	215	0.93	0.78 to 1.10	150	0.92	0.74 to 1.13
High	9	1.21	0.50 to 2.94	6	1.57	0.55 to 4.48
Any exposure‡	1061	1.13	1.02 to 1.24	752	1.12	1.00 to 1.27


*Matched for gender, age and place of residency and adjusted for educational level, chronic obstructive pulmonary disease (COPD), asthma, diabetes and ethanol abuse.

†Matched for gender, age and place of residency, and adjusted for educational level, ethanol abuse, and diagnoses of COPD, asthma and diabetes and other occupational exposures.

‡Matched for gender, age and place of residency, and adjusted for educational level, ethanol abuse, and diagnosis of COPD, asthma and diabetes.

NA, not applicable.

Workplace Applications

- **Occupational Health Services**
 - Occupational Hygiene
 - Risk assessment biological agent exposure
 - Workplace
 - Individual
 - Control Measures
 - Medical Surveillance
 - Wellness Clinics  Health Promotion
 - Primary health care treatment for acute illness

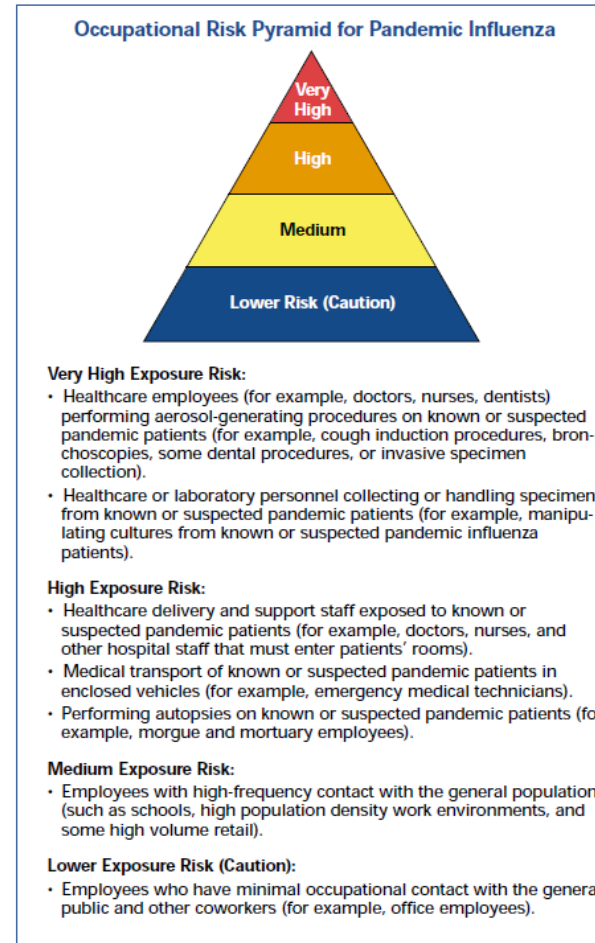
Occupational Health Services



Occupational Hygiene

Risk assessment

- Workplace
- Individual



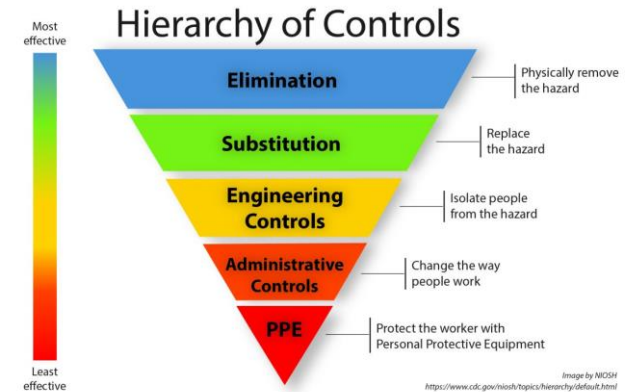
Occupational Health Services

- **Control Measures**

- Engineering controls-
 - Hand washing stations
- Administrative Controls
 - Appropriate policies and guidelines for ill employees
 - IPC procedures
- PPE
 - Respiratory protective equipment

- **Medical Surveillance**

- Review chronic health conditions and clinical management thereof
- Pre-placement and baseline medical examination Identify vulnerable employees





Conclusion

- Respiratory pathogens cause significant morbidity and mortality, among those vulnerable to severe or complicated disease
- Early identification of vulnerable workers is crucial to promote and maintain employee health and wellness
- Influenza increases the risk of pneumococcal disease and therefore both vaccines should be encouraged in vulnerable workers
- High risk occupations- healthcare workers and workers exposed to metal fumes must have appropriate education and training
- Medical surveillance programs can screen and identify at risk vulnerable individuals