

Table 14.12

Terms Used to Classify Infectious Diseases

Term	Definition
● Acute disease	Disease in which symptoms develop rapidly and that runs its course quickly
● Chronic disease	Disease with usually mild symptoms that develop slowly and last a long time
● Subacute disease	Disease with time course and symptoms between acute and chronic
● Asymptomatic disease	Disease without symptoms
● Latent disease	Disease that appears a long time after infection
● Communicable disease	Disease transmitted from one host to another
● Contagious disease	Communicable disease that is easily spread.
● Noncommunicable disease	Disease arising from outside of hosts or from opportunistic pathogen
● Local infection	Infection confined to a small region of the body
● Systemic infection	Widespread infection in many systems of the body; often travels in the blood or lymph
● Focal infection	Infection that serves as a source of pathogens for infections at other sites in the body
● Primary infection	Initial infection within a given patient
● Secondary infection	Infections that follow a primary infection; often by opportunistic pathogens

Coinfection that results of first infections

Importance of Studying Communicable Diseases Epidemiology

- Changes of the pattern of infectious diseases
- Discovery of new infections
- The possibility that some chronic diseases have an infective origin.

What is *infectious disease epidemiology*?

→ The cause often known

- ❖ An infectious agent is a necessary cause

What is infectious disease epidemiology then used for?

- ❖ Identification of causes of new, emerging infections, e.g. HIV, vCJD, SARS
- ❖ Surveillance of infectious disease
- ❖ Identification of source of outbreaks *we will use this a lot in our future practice*
- ❖ Studies of routes of transmission and natural history of infections
- ❖ Identification of new interventions

Endemic - Epidemic - Pandemic

- ✓ ❖ **Endemic**
 - ❖ **Transmission occur, but the number of cases remains constant** (will form a steady state —)
- ✓ ❖ **Epidemic**
 - ❖ **The number of cases increases**
- ✓ ❖ **Pandemic**
 - ❖ **When epidemics occur at several continents – global epidemic**

✓ Hyper endemic:
disease will be present of high incidence/prevalence for **all age groups** (constantly)
endemic is not of a high rate

✓ Holo endemic:
disease will be present of high incidence/prevalence for **certain age groups** (constantly) (like malaria: children)

Hyperendemic and holoendemic

- The term “hyperendemic” expresses that the disease is constantly present at high incidence and/or prevalence rate and affects all age groups equally.
- The term “holoendemic” expresses a high level of infection beginning early in life and affecting most of the child population, leading to a state of equilibrium such that the **adult population shows evidence of the disease much less commonly than do the children** (e.g. malaria)

انما: حالات مرض تنصير بشكل
غير منتظم و ما يرتبط بنقط جيني
أو بيئي و لحالات تكون موزعة
بشكل غير منتظم في الابد.

* In Jordan we have sporadic
cases of meningitis.
* Yemen has a sporadic of malaria.

Sporadic

- The word sporadic means “scattered about”.
- Cases - irregularly, haphazardly and generally infrequently.
- Cases - few and separated widely in time and place e.g. polio, meningococcal meningitis, tetanus....
- May be starting point of an epidemic

Exotic

- **Exotic diseases** are those which are imported into a country in which they do not otherwise occur, as for e.g., rabies in the UK, Yellow fever in India

(بدا فيها كالتحريك)

(Malaria - African country)



(حالات كحسب قلة)

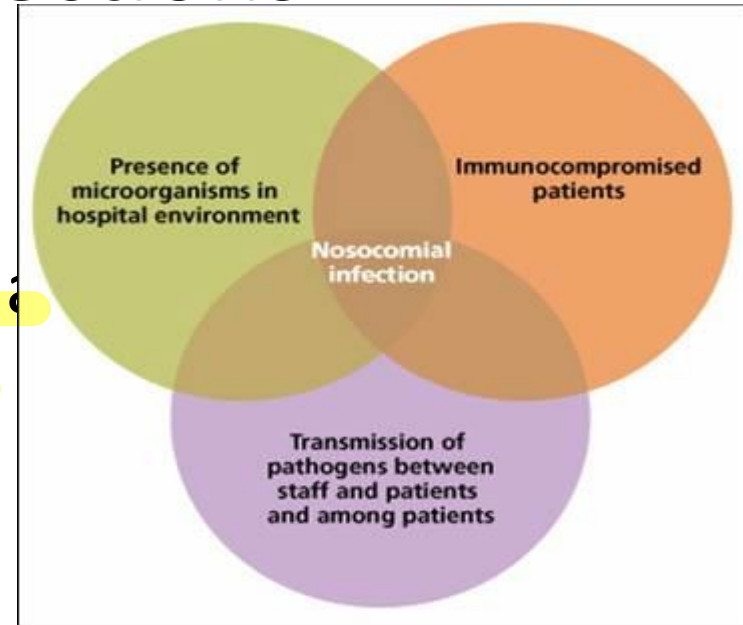
(not commonly occurring)

(Jordan)



Nosocomial infections

- **Nosocomial (hospital acquired) infection is an infection originating in a patient while in a hospital or another health care facility.** It has to be a new disorder unrelated to the patient's primary condition. E.g. infection of surgical wounds, hepatitis B and urinary tract infections.



Opportunistic infection

(Infections in immunocompromised patients)

- This is infection by organisms that take the opportunity provided by a defect in host defense (e.g. immunity) to infect the host and thus cause disease.
- E.g., opportunistic infections are very common in AIDS. Organisms include Herpes simplex, cytomegalovirus, M. tuberculosis etc.

Iatrogenic (Physician induced) Disease

- Any untoward or adverse consequence of a preventive, diagnostic or therapeutic regimen or procedure that causes impairment, handicap, disability or death resulting from a physician's professional activity or from professional activity of other health professionals.
- E.g., hepatitis B infection following blood transfusion.

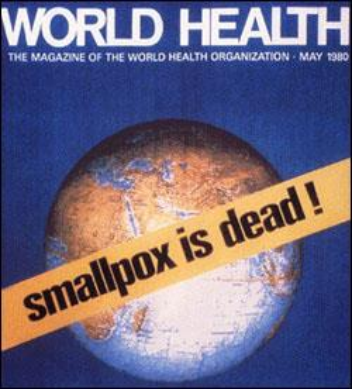
مرض طبي دواء أو طبيب أو ابن

Nasocomial: you get the infection from the hospital environment.
labrogenic: Induced by contaminated instrument/blood

can be iatrogenic if you give a medication health staff (sick)

= Iatrogenic + Nasocomial infections

طبي شل الفرقه



Eradication *(0 cases in the whole world)*

(small box)

- Termination of all transmission of infection by the extermination of the infectious agent through surveillance and containment. Eradication is an absolute process, an “all or none” phenomenon, restricted to termination of infection from the whole world.

** now we have a goal of eradication of measles worldwide
in the next 5-10 years*



*(we still have cases
not completely removed)*

Elimination *(incidence 0)*

- The term elimination is sometimes used to describe eradication of a disease from a large geographic region. Disease which are amenable to elimination in the meantime are polio, measles, leprosy and diphtheria.



*Elimination
leads to
eradication*



Cases

- A case is defined as “a person in the population or study group identified as having the particular disease, health disorder, or condition under investigation”

- **Index Case**

- Person that comes to the attention of public health authorities

(عرقنا عن طريقه في متكلة ورننا)
الهي اتجاهه

- **Primary Case**

- * Person who acquires the disease from an exposure

(كان باسبابنا اخذنا من الـ (N))

- **Secondary Case**

- * Person who acquires the disease from an exposure to the primary case
 - **Secondary attack rate**

Index case :

الحرس اللي مار في ارب وقت الكورونا

شخص مهاب ← راج حفلة ← انتشرت لمدى ← تبكم يوم ← حضور احوال متفني وعرفوا

بعد التحقيق الفلاسب كان الحرس من هنالك الشخص من انتشر ما بين الحضور.

→ شرحه عندي ا

index case is the first case detected by health authorities

وفي حالنا صوره المتصور الحضور / اول حالة دلتنا انه في متعة

Secondary attack rate

- The number of exposed persons developing the disease within the range of the incubation period, following exposure to the primary case.

- SAR =
$$\frac{\text{No. of exposed persons developing the disease within the range of incubation period}}{\text{Total no. of exposed / susceptible contacts}} \times 100$$

ex: 10 infected subjects were exposed to 100 people.

$$\frac{10}{100} \times 100\% = 10\% \quad (\text{primary case spread the infection to others})$$

$$a \frac{\text{Total no. of cases with overt infections}}{\text{Total infected}} = \text{virulence}$$

symptomatic, detectable, manifest with clear symptoms.

أكثر الناس تصابوا ومرضهم على ما يبدو.

$$\frac{\text{Total no. of deaths}}{\text{No. of cases}} = \text{case fatality}$$

Virulence and Case Fatality Rate

- **Virulence**

- Degree of pathogenicity; the disease evoking power of a micro-organism in a given host.
- Numerically expressed as the ratio of the number of cases of overt infection to the total number infected.
- When death is the only criterion of severity, this is the case fatality rate.

- **Case fatality rate**

- Proportion of infected individuals who die of the infection. This is a function of the severity of the infection.

Case Fatality Rate

$$\text{Case fatality rate (\%)} = \frac{\text{Number of deaths due to disease}}{\text{Number of cases of disease}} \times 100$$



Epidemiologic Triad-Related Concepts

Infectivity (ability to infect)

$(\text{number infected} / \text{number susceptible}) \times 100$

Pathogenicity (ability to cause disease)

$(\text{number with clinical disease} / \text{number infected}) \times 100$

Virulence (ability to cause death)

$(\text{number of deaths} / \text{number with disease}) \times 100$

All are dependent on host factors

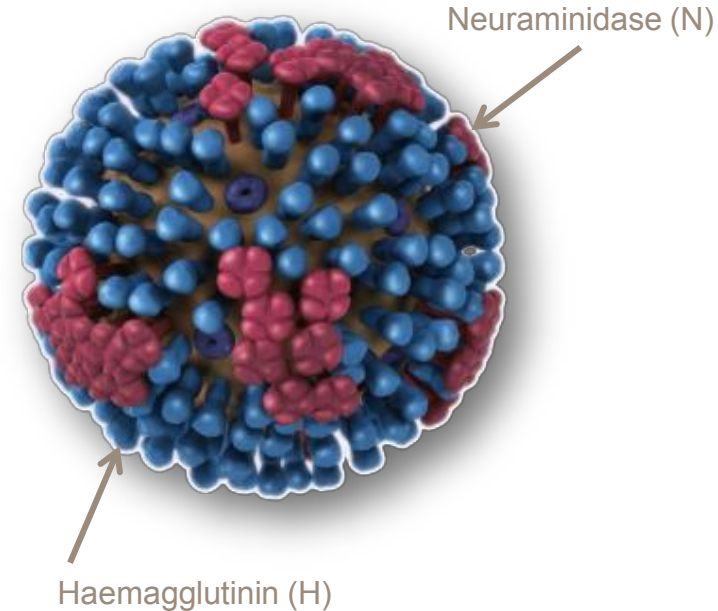
Influenza as a cause of disease

You should advise (elders, pregnant ladies, people with chronic diseases) and council them to go take flu shot.

- **Type A** influenza virus
 - Affects both humans and animals
 - Divided into subtypes, based on two surface proteins: haemagglutinin and neuraminidase
 - Main circulating strains are H1N1 and H3N2
- **Type B** influenza virus
 - Affects predominantly humans
 - Not divided into subtypes, but split into two lineages: Victoria and Yamagata
- **Type C** influenza virus
 - Rarely reported in humans, and most cases subclinical

انفلونزا
A+B
نادراً
م

Influenza A virion showing the two major surface glycoproteins



** Jordan's subtype of the flu shot (40-50)!
 ↳ 2% of the ones receive it
 * UK give high risk groups only
 * US all people over 6 months & not 50% are not satisfied = 150 million*

ذكر الدكتور نقطة عن بريطانيا! ان كانت بعض الامارات اذا ما اكلت الطعام ما بيحطوه شهادة التوثيق

CDC, Centers for Disease Control and Prevention
 US CDC. [The pink book: influenza](#). 2012 (accessed April 2014); Nelson MI, Holmes EC. [Nat Rev Genet](#) 2007;8:196-205.

Constant and rapid genetic evolution of influenza¹

London, 2008+2009+2010
expected a pandemic
of influenza.

لم يسبب الوباء الذي كان متوقعا

وباء حروث pandemic
USA promoted the vaccine,
gave children before schools.

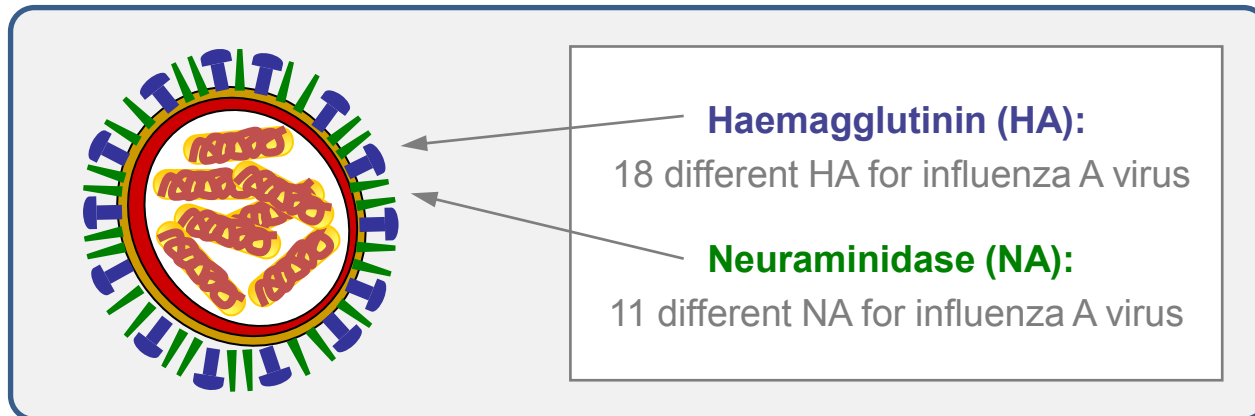
Surface antigens of influenza viruses change:

- **Antigenic drift:** (كل سنة انفلونزا تتغير)
 - **Minor** changes associated with annual outbreaks or epidemics
 - **Impact : updating vaccine yearly to match predicted strains that will be circulating**
- **Antigenic shift:**
 - **Major** changes resulting in new subtype with a new HA protein (and sometimes NA)
 - Can lead to pandemics

Covid 19 was in
Saudi Arabia

الوباء خارجيا :
antigenic shift

و نتج من
تغير شاف



WHO recommendations for influenza vaccination



WHO Recommends¹

- People at high risk of complications:



- Pregnant women (highest priority)



- Children aged 6 months to 5 years:

- Children aged 6–23 months of age
- Children aged 2–5 years of age



- Elderly people (≥65 years of age)



- People with underlying health conditions (diabetes, asthma, chronic heart or lung diseases, HIV/AIDS)

- International travelers with any of the above



People at high risk of exposure and/or capable of transmitting influenza to those at high risk of influenza related complications:

- Healthcare workers + medical students

للأسف نحن لنشاء يفكروا
هناك ابطعوم حسب لاشاكل
بالكل.

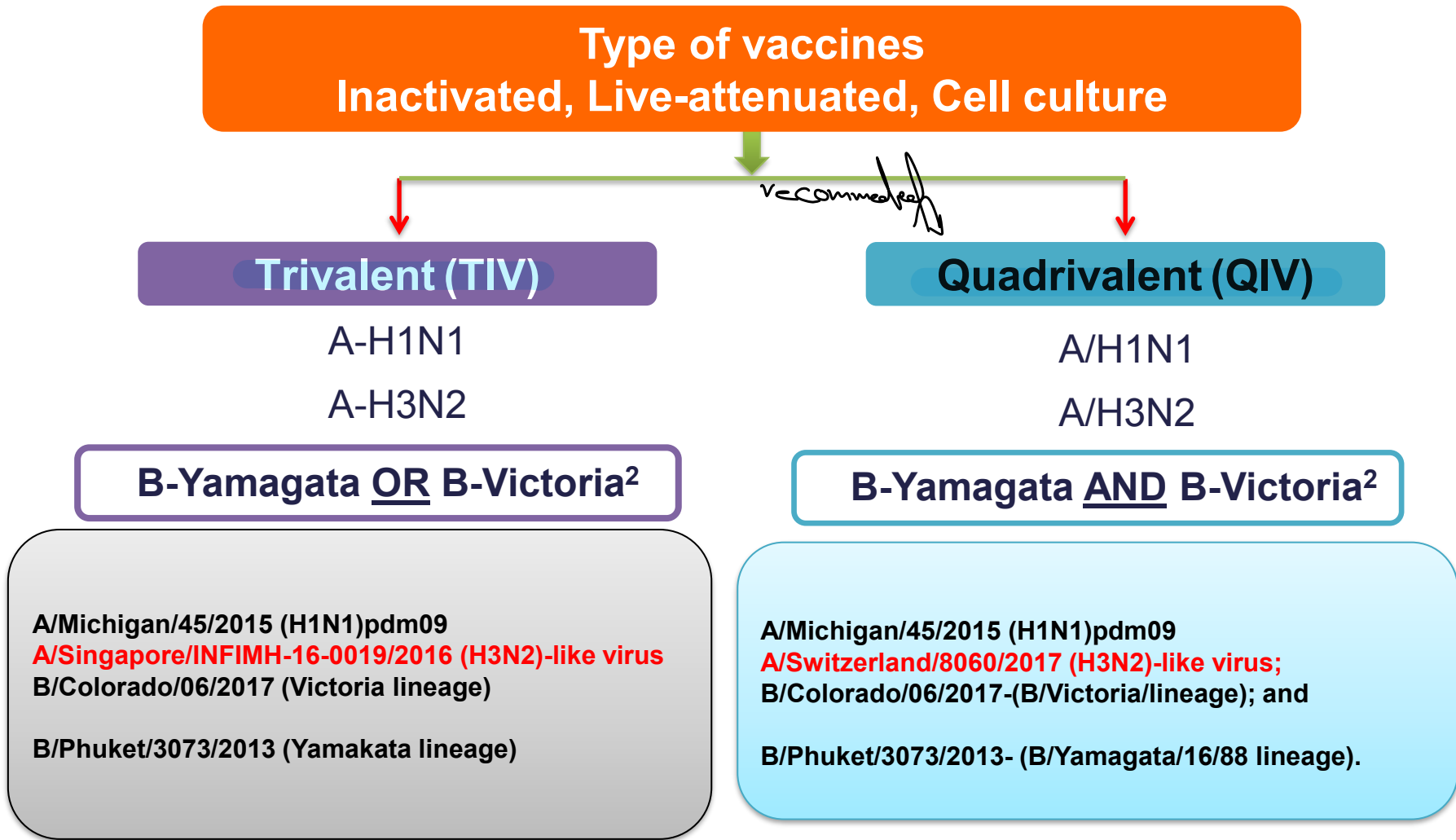
Flu vaccination

If you vaccinate 7 people you will prevent 1 case;

influenza is most efficient + cost effective preventive → compared with other infections
Shot mission

Reference: 1. WHO. Weekly Epidemiological record No. 47, 2012, 87(47):461 (<http://www.who.int/wer/2012/wer8747.pdf>)

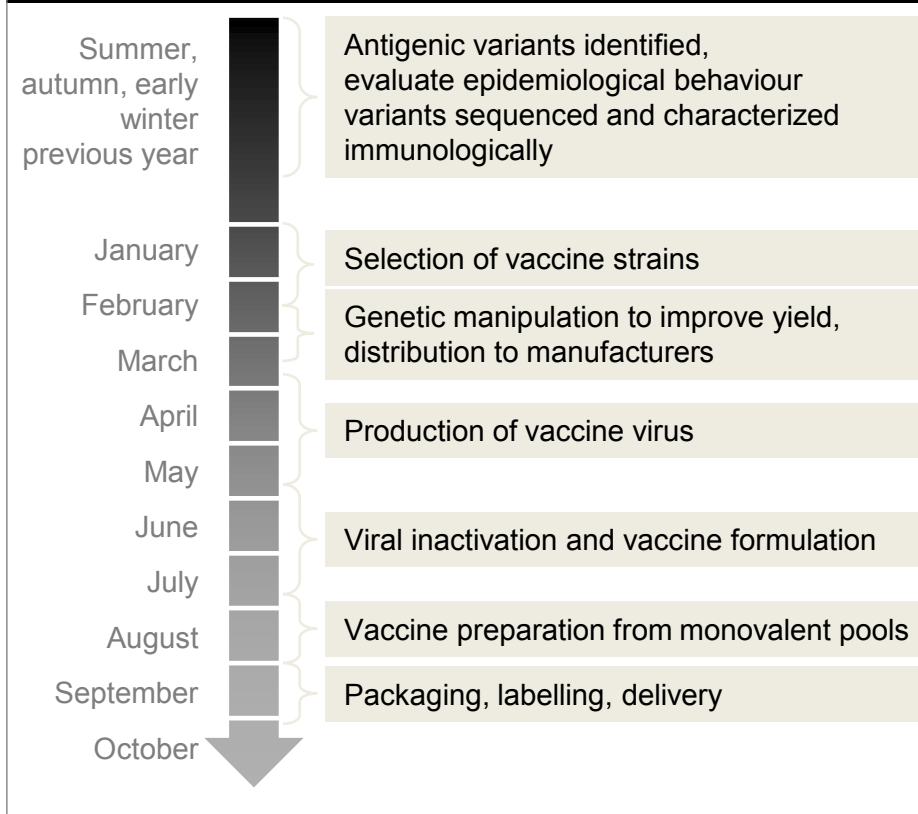
Types of seasonal influenza vaccine



1. ACIP. *Morb Mortal Wkly Rep* 2014; **63**: 691–7; 2. Ambrose GS, Levin ML. *Hum Vaccine Immunother* 2012; **8**: 81–8; 3. WHO recommendation. Access from <http://www.who.int/influenza/vaccines/virus/recommendations/> Last accessed 30 October 2017

Annual process of development, manufacturing and distribution of influenza vaccines in the northern hemisphere

Annual process of development, manufacturing and distribution of influenza vaccines in the northern hemisphere.¹



- Since 1999, two vaccine compositions recommended annually:²
 - Mid-February – recommendation for the following northern hemisphere
 - September – recommendation for the following southern hemisphere
- WHO provides guidance on which B strain, based on epidemiological data¹
- The choice does not always reflect the circulating strain in the following season, leading to mismatch¹

Northern hemisphere starts 10 (October) - finish April
 Northern hemisphere starts 10 (October) - finish April
 Northern hemisphere starts 10 (October) - finish April
 Northern hemisphere starts 10 (October) - finish April

وہو، بلکہ وہی ہے جو کہ زیادہ سے زیادہ
موجود ہے۔

↳ surveillance center

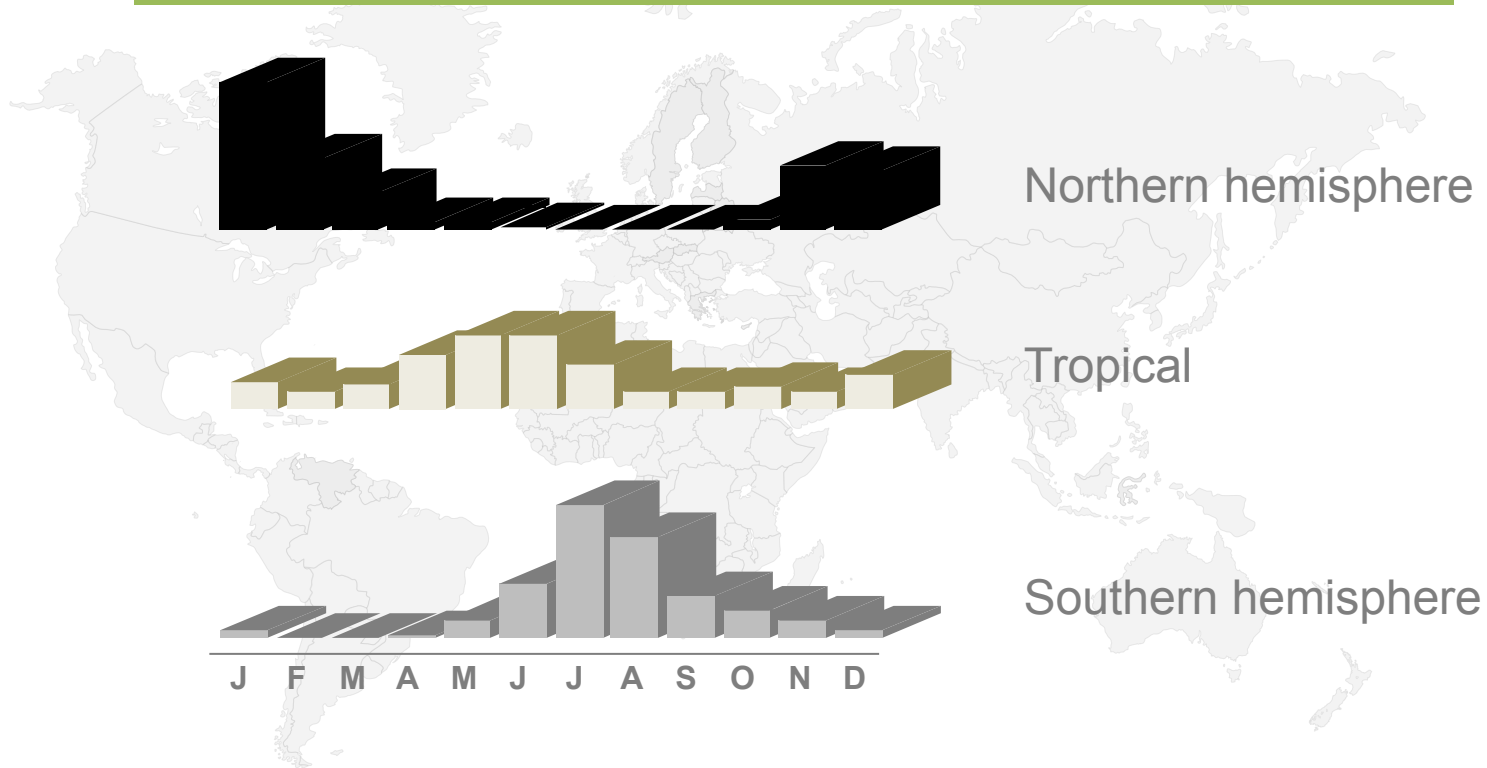
↳ where we look at the available strains to know what strains do we have.

جنوبی نصف گولہ گویا جنوبی نصف گولہ گویا

- southern hemisphere strains in northern hemisphere

Influenza seasonality

Influenza activity and occurrence in different climates¹



Temperate climates: yearly winter epidemics

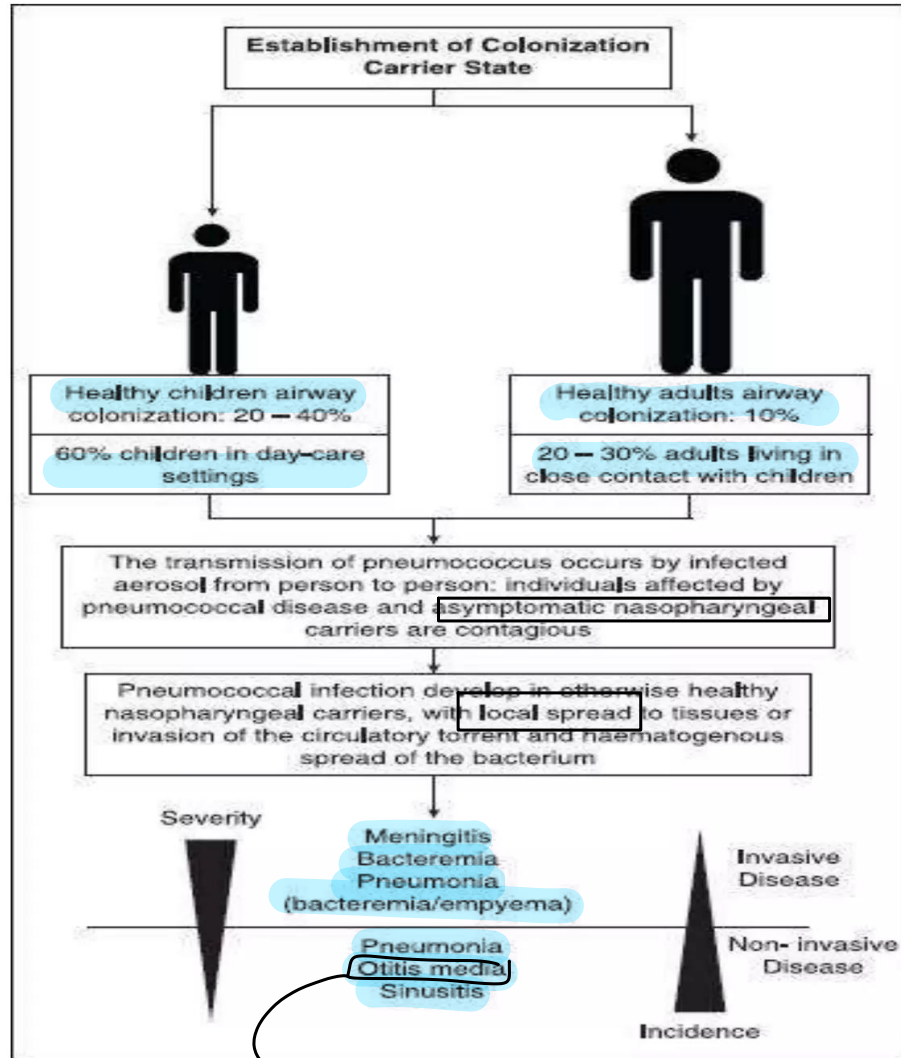
Tropical climates: year-round transmission with several peaks

In our region we have the vaccine in October
in Australia they have it in June

بیس لکھ

Pneumococcal infections

- Continuous burden



الدكتور شرح الفرق بين efficacy // effectiveness

واكثر من مودورين

بالطيارات

الطوبى الامتاز

* efficacy: clinical trial

* effectiveness: قد اشرى لنا الى اعطيت اياه

→ a huge burden around 40-50% of cases in Jordan

strong pneumonia

Jordan is one of the 2-3 countries (of the region) that don't have
strep. vaccine.

Pneumococcal colonisation

- Pneumococcal disease may take place when two situations coincide:
 1. The host is colonized with a pneumococcal strain against which immunity has not yet been established .
 2. An alteration of the natural barriers or host immune system has occurred.

Pneumonia + septicemia : invasive disease
invasive: → go to sterile site
(ear + throat not sterile)

Table 1 - Diseases caused by pneumococcus

Non-invasive diseases

Invasive diseases*

Acute otitis media

Bacteremia

Sinusitis

Bacteremic pneumonia / empyema

Conjunctivitis

Meningitis

Bronchitis

Sepsis

Pneumonia

Peritonitis

Arthritis / osteomyelitis

* Invasive diseases: isolation of pneumococcus from usually sterile sites (blood, cephalorachidian, pleural or sinovial liquid).

Conditions That Increase Risk for Invasive Pneumococcal Disease

Table 2. High-risk conditions for severe or recurrent pneumococcal disease in childhood and adolescence

Risk group	Disease or condition
Immunocompetent children	✓ Chronic pulmonary disease: severe asthma, bronchopulmonary dysplasia, cystic fibrosis, α 1-antitrypsin deficiency, bronchiectasis
	✓ Chronic heart disease, especially congenital cyanotic heart disease or conditions that can lead to heart failure or hemodynamic alterations
	Down syndrome ¹
	Diabetes mellitus
	Chronic liver disease
	Subarachnoid space fistulas
	Children with cochlear implants
Children with asplenia ² (anatomic or functional)	Sickle-cell anaemia and other hemoglobinopathies
	Congenital or acquired asplenia, or splenic dysfunction
Immunocompromised children ²	✓ HIV infection
	Primary immunodeficiencies (excluding isolated IgA deficiency)
	✓ Chronic kidney failure and nephritic syndrome
	Diseases that require treatment with immunosuppressive drugs or radiotherapy (including leukaemia, lymphoma, bone marrow or solid organ transplant)

we should insure all people get the strep vaccine.

ACIP risk groups for pneumococcal infection

- (ACIP) recommends vaccination of:
 - All adults aged 65 years and over
 - Adults aged 19-64 years with the following underlying medical conditions:

1- Immunocompetent persons

- Chronic heart disease
- **Chronic lung disease**
- Diabetes mellitus
- Cerebrospinal fluid leaks
- Cochlear implant
- Chronic liver disease

Cigarette smoking

2- Functional or anatomic asplenia

- Sickle cell disease
- Splenectomy
- congenital or acquired asplenia

3-Immunocompromised persons

- Congenital or acquired (HIV) immunodeficient
- C R F & Nephrotic
- Leukaemias & Lymphomas
- Generalised malignancy
- *Diseases treated with immunosuppression(steroids >1 m or Biologics*
- Solid organ transplantation

Incidence of IPD in Adults Aged 18-64 Years with Selected Underlying Conditions, United States, 2009

