

Vaccinations

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Applicant Guide

Area 4.0 – Clinical Sciences (Approximately 35% of Test)

4.1 Drug Information and Evidence-based Practice

- 4.1.1 Interpret and evaluate drug information and evidence based practice in the patient care decision-making process
- 4.1.2 Apply drug-information skills for the delivery of medication therapy management
- 4.1.3 Evaluate the reliability of various sources of information
- 4.1.4 Interpret guidelines as they apply in a clinical setting
- 4.1.5 Utilize basic science principles in the development and/or implementation of drug treatment protocols and clinical practice guidelines

4.2 Clinical Pharmacokinetics

- 4.2.1 Identify common drugs that require therapeutic drug monitoring and utilize appropriate monitoring pharmacokinetic parameters to avoid toxicity and maintain efficacy

4.3 Clinical pharmacogenomics

- 4.3.1 Utilize basic pharmacogenomics information to individualize drug therapy

4.4 Disease Prevention and Population Health

- 4.4.1 Recognize the proper use of nonpharmacologic therapies, including complementary and alternative medicines
- 4.4.2 Describe measures to promote wellness and disease prevention
- 4.4.3 Identify the role of immunizations in disease prevention and health promotion

We will go through...

- Types of immunity and vaccination
- Rationale for passive vaccination
- Simultaneous administration of active and passive vaccination
- Types of active vaccination
- Vaccine administration
- Contraindications and precautions
- Vaccination and pregnancy
- Vaccination and egg allergy
- Adverse effects of vaccines
- Considerations in special populations
- Vaccines storage
- Vaccination before Hajj
- Vaccination and travel
- Saudi MOH and CDC immunization schedules

Types of immunity

Active immunity

- Produced by an individual's own immune system.
- Immunity acquired in this manner has a delayed onset and is usually permanent.
- Active immunity may be acquired by having an active disease or by vaccination.
- B-lymphocytes (B cells) circulate in the blood and bone marrow for many years. Reexposure to the antigen causes the cells to replicate and to produce antibody.
- These cells are also called *memory B cells*.

Passive immunity

- Produced by an animal or human and transferred to another.
- Immunity acquired in this manner has a rapid onset and usually has a brief duration.
- All types of blood products contain varying amounts of antibody.
- Immune globulins are also used to induce passive immunity.
- One source of passive immunity is antitoxins, which contain antibodies against a known toxin.

Types of vaccination

Active vaccination

- It is the intramuscular, subcutaneous, or oral introduction of antigen(s) to stimulate a specific immune response.
- Protection through memory varies with the vaccine, but immunity is long lasting.

Passive vaccination

- It is the introduction of antibodies, either whole serum, concentrated immune globulin that is mostly IgG, or purified IgG, to provide immediate protection.
- Passive immunization is useful for patients who cannot form antibodies (immunodeficient) or for the patients who might develop disease before active immunization could stimulate antibody production.
- Passive immunization is temporary, lasting several weeks to several months for each administration.

Role of passive vaccination

- **Prophylaxis of infectious disease**

- Antibodies are given prophylactically to prevent or reduce clinical symptoms of a viral or bacterial infection (particularly in a patient without previous exposure and therefore without immunologic memory). The vaccine protects the patient during the incubation period for infection. For example:
 - Tetanus immune globulin (TIG) is used to prevent tetanus following injury in patients whose immunization is uncertain or incomplete.
 - Hepatitis B immunoglobulin (HBIG) is administered to a newborn child of a woman with hepatitis B or to nonimmune individuals as soon as possible after exposure to hepatitis B.

- **Prophylaxis/therapy**

- Prevents or attenuates the effects of infection in special populations. For example:
 - Varicella zoster immunoglobulin (VZIG) is given to patients with leukemia or immunocompromised patients who have been exposed to the varicella zoster virus
 - Snake bite antivenin to snake bite victims

- **Treatment of antibody deficiency**

- Individuals who are deficient in antibody production, either because of primary immunodeficiency or as a result of chronic lymphocytic leukemia, receive IVIG or IGIM every 2 to 4 weeks to maintain immunity. IVIG is generally preferred.

Simultaneous administration of active and passive vaccines

- Sometimes active and passive vaccines against a pathogenic organism are administered simultaneously to maximize post-exposure prophylaxis.
- The immunoglobulin offers immediate protection, and the active vaccine stimulates a lasting immune response.
- These vaccines are given at separate sites to prevent antibody (passive) and antigen (active) from reacting and inactivating one another.
- Examples:
 - HBV and HBIG
 - Infants who are born to mothers with a hepatitis B infection
 - Tetanus
 - Combined prophylaxis is sometimes used, depending on the type of wound and the patient's history of active vaccination.

Active vaccination

- Two types of vaccines
 - Live, attenuated
 - Inactivated

Live and inactivated vaccines

Live, attenuated vaccines

- Produced by modifying a virus or bacteria to produce immunity
- They usually do not produce disease, but they may. When disease occurs, it is usually much milder than the natural disease
- They require special handling such as protection from heat and light, to keep them alive

Inactivated vaccines

- These are composed of all or a fraction of a virus or bacterium [subunits (subvirions), bacterial cell wall polysaccharides, conjugated (attached to a protein carrier) bacteria cell wall polysaccharides, or inactivated toxins (toxoids)]
- The bacteria or virus is inactivated using heat, chemicals, or both
- They are unable to induce disease

Live and inactivated vaccines (1)

DTaP: Diphtheria, tetanus, pertussis (combination vaccine)
(given to children under age of 7 years)

Tdap: Same vaccine as above but with reduced dose of diphtheria & pertussis vaccines
(given to children above the age of 7 years)

DT: Diphtheria, tetanus
(given to those with allergic to pertussis vaccine)

Td: Tetanus, diphtheria
(given to adults as a booster dose every 10 years)

Hep B: Hepatitis B vaccine

Hib: Hemophilus influenza B vaccine

Hep A: Hepatitis A vaccine

Inactivated	Live Attenuated
DTaP, DT, Td, Tdap	MMR
Hep B	Varicella
Hib	ZVL
Hep A	RV
HPV	LAIV ^a
PCV	Yellow fever ^a
PPSV	Oral typhoid ^a
IPV	
MCV	
MPSV	
MenB	
Influenza ^a	

Live and inactivated vaccines (2)

HPV: Human Papilloma virus vaccine

PCV: Pneumococcal conjugate vaccine

PPSV: Pneumococcal polysaccharide vaccine

IPV: Inactivated polio vaccine

MCV: Meningococcal conjugate vaccine

MPSV: Meningococcal polysaccharide vaccine

MenB: Meningococcal B vaccine

MMR: Measles, mumps, rubella (combination vaccine)

ZVL: Live zoster vaccine

RV: Rotavirus vaccine

LAIV: Live attenuated influenza vaccine

Inactivated	Live Attenuated
DTaP, DT, Td, Tdap	MMR
Hep B	Varicella
Hib	ZVL
Hep A	RV
HPV	LAIV ^a
PCV	Yellow fever ^a
PPSV	Oral typhoid ^a
IPV	
MCV	
MPSV	
MenB	
Influenza ^a	

How to memorize 'live attenuated' vaccines?

ROME Is My Best Place To go Yet!

- **R**ubella
- **O**ral polio vaccine
- **M**easles
- **E**pidemic typhus
- **I**nfluenza
- **M**umps
- **B**CG
- **P**lague
- **T**yphoid oral vaccine
- **Y**ellow fever

Rest of the vaccines will be inactivated vaccines.

Influenza (flu) vaccine & antiviral medications

- Inactivated influenza vaccine (IIV)
 - IAD + IIV ✓
- Live-attenuated influenza (LAIV)
 - IAD + LAIV ✗
 - IAD cessation → wait for 48 hours → administer LAIV
 - LAIV → wait for 2 weeks → administer IAD
 - If IAD administered within 2 weeks of LAIV, the vaccine dose should be repeated 48 or more hours after the last dose of antiviral medication

IAD = Influenza antiviral drugs [e.g. TAMIFLU (oseltamivir)]

Influenza (flu) vaccine – the 7 Nos for flu vaccine

- LAIV should NOT be administered to
 1. Persons who have experienced severe allergic reactions to LAIV, any of its components, or to a previous dose of any other influenza vaccine
 2. Children 2 through 17 years receiving aspirin or aspirin-containing products
 3. Persons who are allergic to eggs
 4. Pregnant women
 5. Immunosuppressed persons
 6. Children 2 through 4 years of age with asthma or who had wheezing in the past 12 months
 7. Persons who have taken influenza antiviral medications in the previous 48 hours

Vaccine administration – route

- Administered IM, SC or orally
- Majority are administered IM only except
 - MMR vaccine, varicella vaccine, ZOSTRAVAX – SC only
 - IPV, PPSV – IM or SC
 - OPV, RV – orally only

Vaccine administration – simultaneously

- Most vaccines, if/when indicated, can be administered on the same day (at the same visit) for convenience
- Live and inactivated vaccines (combo) can be administered at the same time or without regards to the spacing
- Inactivated vaccines can be administered at the same time or without regards to the spacing
- Live vaccines should be administered either on the same day or at least 28 days apart (except involving oral vaccines)
- Live vaccines must be separated from administration of antibodies, such as blood products and immune globulins – inactivated vaccines are not affected by circulating antibodies

Contraindications and precautions

- Vaccines are contraindicated if the patient has experienced anaphylactic reaction to previous dose or any component of that vaccine
- Generally, the vaccination should be withheld until the precaution has resolved unless benefit outweighs the risk
- Administration of any vaccine should be cautioned in patients with moderate to severe acute illness with or without fever

Vaccine	Contraindication
DTaP, Tdap	Encephalopathy within 7 d of a previous dose
	Progressive neurologic disorder—infantile spasms, uncontrolled epilepsy, encephalopathy
Hib	Age <6 wk
HPV	Pregnancy
IPV	Allergy to neomycin, streptomycin, or polymyxin B
MMR	Allergy to gelatin or neomycin
	Pregnancy
	Severe immunodeficiency
RV	Severe latex allergy (Rotarix only)
	History of intussusception
	Severe combined immunodeficiency
Varicella	Pregnancy
	Immunodeficiency
	Untreated active tuberculosis
	Allergy to gelatin or neomycin
ZVL	Pregnancy
	Immunodeficiency
	Allergy to gelatin or neomycin

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	Immunodeficiency
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BCG and LAIV are also contraindicated in pregnancy.

Generally, live vaccines and selected inactivated vaccines are contraindicated or not recommended in pregnancy.

More info about vaccination in pregnancy:
<https://www.cdc.gov/vaccines/pregnancy/hcp/guidelines.html>

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	Immunodeficiency
	Allergy to gelatin or neomycin

Some vaccines may contain small amount of certain antibiotics (neomycin, polymyxin B, streptomycin, gentamicin) to prevent bacterial contamination during manufacture process.

Note that which vaccines may be contraindicated in case of allergy to any of these antibiotics.

More information:

<https://www.chop.edu/centers-programs/vaccine-education-center/vaccine-ingredients/antibiotics>

Vaccination and egg allergy

- Following vaccines may contain traces of egg protein:
 - MMR vaccine
 - Influenza vaccine
 - Yellow fever vaccine
- People with egg allergies no longer need to be observed for an allergic reaction for 30 minutes after receiving vaccine
- All patients with egg allergy can be given influenza vaccine:
 - Persons who have experienced only hives after exposure to egg should receive flu vaccine as usual.
 - Persons who report having had reactions to egg involving symptoms other than hives, such as angioedema, respiratory distress, light headedness, or recurrent emesis; or who required epinephrine or another emergency medical intervention can receive influenza vaccine in an inpatient or outpatient medical setting but under the supervision of a health care provider who is able to recognize and manage severe allergic conditions.
- Yellow fever vaccine potentially contains higher amounts of egg protein and allergy specialist evaluation is recommended before vaccination
- For more info:

<https://www.cdc.gov/flu/protect/vaccine/egg-allergies.htm>

Adverse effects of vaccines

- Healthcare provider administering the vaccines should be prepared to handle emergency situations that may arise from vaccine administration
- Epinephrine, diphenhydramine and cardiopulmonary resuscitation (CPR) may need to be administered if a patient has an anaphylactic reaction
- It is important to monitor patients for at least 15 minutes following administration

Vaccine	Adverse Events
DTaP	Injection site reactions (pain, swelling, erythema), fever, fatigue, vomiting, anorexia, febrile seizures (rare)
Td, Tdap	Injection site reactions, headache, myalgias, fatigue, neuropathy (rare), and paralysis (rare)
Hep A	Injection site reactions, headache, malaise, fever, Guillain-Barré syndrome(GBS)
Hep B	Injection site reactions, fever, GBS
Hib	Injection site reactions, fever
HPV	Injection site reactions, syncope, fever, nausea, headache, GBS, thromboembolism
IPV	Injection site reactions, fever
MCV	Injection site reactions, fever, diarrhea, anorexia, drowsiness, GBS ^a
MMR ^b	Injection site reactions, thrombocytopenia, febrile seizures, GBS
PCV	Injection site reactions, fever, febrile seizures
PPSV	Injection site reactions, fever, myalgias
RV	Mild diarrhea and vomiting, irritability
Varicella	Injection site reactions, varicella-like rash
ZVL	Injection site reactions, fever, arthralgias, varicella-like reactions

^a MCV has a higher incidence of GBS than MPSV.

^b MMR is not associated with an increased risk of autism.

When to avoid...

- Live vaccines in pregnancy
- Live vaccines in immunocompromised patients
 - Combined primary immunodeficiency (SCID)
 1. Receiving cancer chemotherapy
 2. Recent hematopoietic cell transplant (HCT)
 3. Receiving biologic agents (e.g., TNF inhibitors, rituximab)
 4. HIV – depends on the vaccine
 - MMR and varicella vaccines if CD4 count less than 15% (less than 200 cells/mm³ if older than 5 years)
 - LAIV, zoster (ZOSTAVAX), and MMRV, regardless of CD4 count
 - Rotavirus is OK to give – weak recommendation in patients with low CD4 count, so clinical judgment is advised
 5. Receiving daily corticosteroid therapy with a dose of 20 mg or greater (or greater than 2 mg/kg/day if weight less than 10 kg) of prednisone or equivalent for 14 days or more
- All vaccines in moderate to severe illness
- Anaphylactic reaction to particular vaccine or any of the components of its formulation
 - Gelatin (MMR vaccine, varicella vaccine, zoster vaccine, yellow fever vaccine)
 - Egg (influenza vaccine, MMR vaccine, yellow fever vaccine)
 - Latex (HPV, RV)

Considerations in special populations (1)

Preterm infants:

- Immunize based on chronological age
- Do not reduce the recommended dose
- Delay Hep B vaccine until the baby is:
 - above 2kg body weight or
 - more than 30 days old

because of reduced immune response (unless the mother is positive for Hep B surface antigen)

Considerations in special populations (2)

Patients receiving corticosteroids:

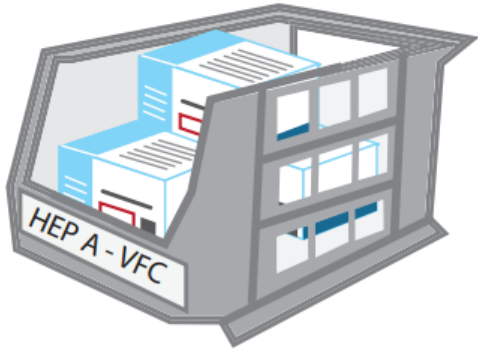
- Live vaccines may be administered to patients receiving the following:
 - Topical corticosteroids
 - Physiologic maintenance doses
 - Low or moderate doses (less than 2 mg/kg/day of prednisone)
- If high doses (≥ 2 mg/kg/day) of systemic steroids are given for less than 14 days \rightarrow live vaccines may be given immediately
- If high doses (≥ 2 mg/kg/day) of systemic steroids are given for more than 14 days \rightarrow live vaccines should be delayed at least 1 month after discontinuing the steroids

Vaccine storage

- Package inserts by manufacturer should be consulted for storage conditions
- Most vaccines require refrigeration ($2^{\circ}\text{C} - 8^{\circ}\text{C}$)
- Some (e.g. ZOSTRAVAX) are required to be frozen ($\leq -15^{\circ}\text{C}$)
- Required storage condition should be maintained during shipping/transport

Storage Best Practices for Refrigerated Vaccines—Fahrenheit (F)

1 Unpack vaccines immediately



1. Place the vaccines in trays or containers for proper air flow.
2. Put vaccines that are first to expire in front.
3. Keep vaccines in original boxes with lids closed to prevent exposure to light.
4. Separate and label by vaccine type and public (VFC) or private vaccine.

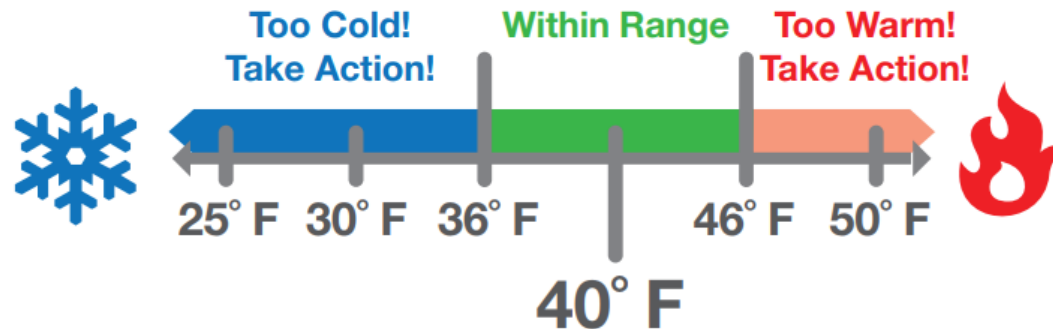
2 Store vaccines at ideal temperature: 40° F



Never freeze refrigerated vaccines!

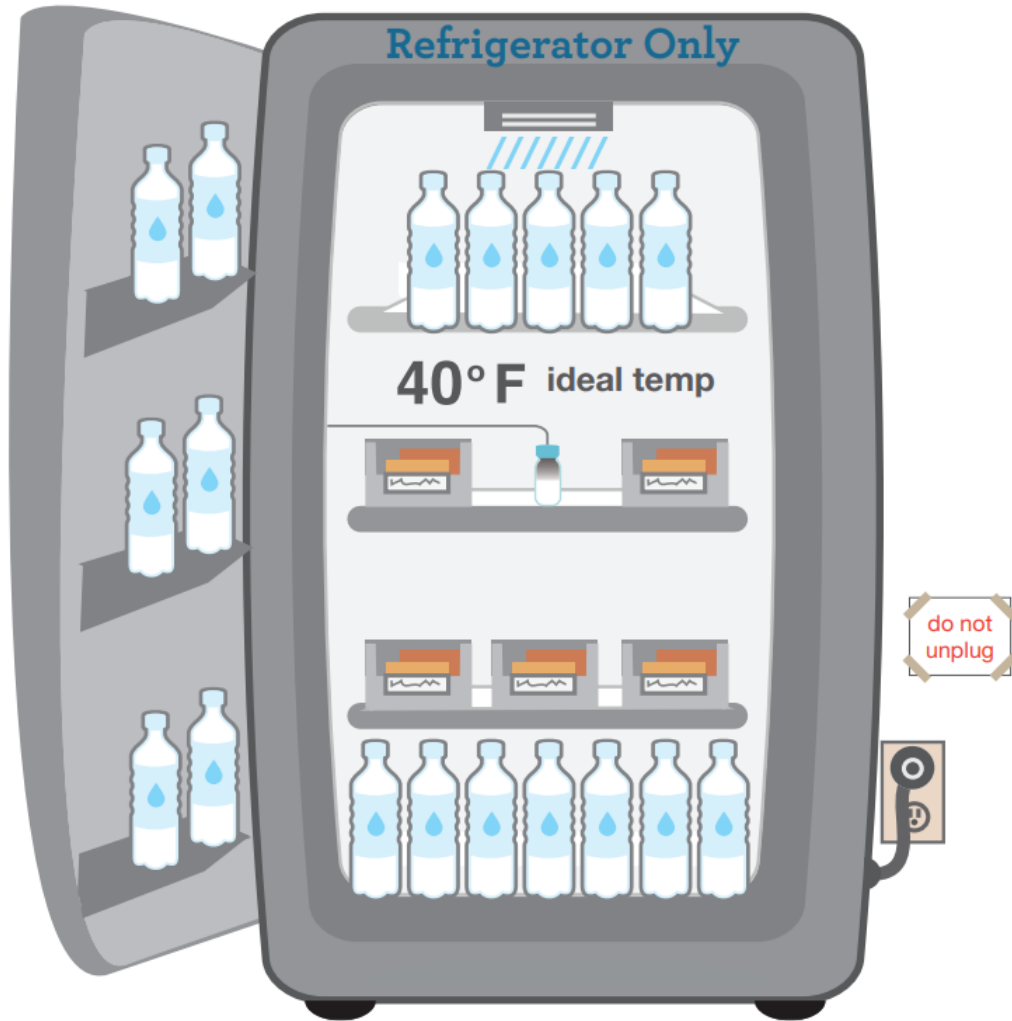
Exception: MMR can be stored in refrigerator or freezer

Refrigerated Vaccines



Report out-of-range temperatures immediately!

3 Use vaccine storage best practices



DO

- ✓ Do make sure the refrigerator door is closed!
- ✓ Do replace crisper bins with water bottles to help maintain consistent temperature.
- ✓ Do label water bottles "Do Not Drink."
- ✓ Do leave 2 to 3 inches between vaccine containers and refrigerator walls.
- ✓ Do post "Do Not Unplug" signs on refrigerator and near electrical outlet.

DON'T

- ✗ Don't use dormitory-style refrigerator.
- ✗ Don't use top shelf for vaccine storage.
- ✗ Don't put food or beverages in refrigerator.
- ✗ Don't put vaccines on door shelves or on floor of refrigerator.
- ✗ Don't drink from or remove water bottles.

Vaccination before Hajj

- Recommended vaccination
 - Annual influenza (flu) vaccination
 - If not already administered
 - MCV (Meningococcal ACWY)
 - Provides immunity for 3-5 years
- Requirement to obtain Umra/Hajj visa for Saudi Arabia in most countries

Vaccination and travel

- Depends on which country the person is travelling to
- Generally, following vaccines are used depending on the country to be visited:
 - Yellow fever vaccine
 - Meningococcal vaccine
 - Typhoid vaccine
 - Hepatitis A vaccine
 - Hepatitis B vaccine
 - Polio vaccine
 - Rabies vaccine
 - Cholera vaccine
 - Japanese encephalitis vaccine
- Detailed info about which vaccines should be administered based on the country to be visited, can be accessed from:

<https://wwwnc.cdc.gov/travel/destinations/list>

Some immunizations for travel

Vaccines	Adult dose	Pediatric age/dose	Standard primary schedule	Duration of protection
Hepatitis A				
Havrix	1 mL IM (1440 EU)	1 to 18 years: 0.5 mL IM (720 EU).	0 and 6 to 12 months.	Probably lifelong after completion of primary series.*
Vaqta	1 mL IM (50 units)	1 to 18 years: 0.5 mL IM (25 units).	0 and 6 to 18 months.	
Hepatitis B				
Engerix-B	1 mL IM (20 mcg)	Birth to 19 years: 0.5 mL IM (10 mcg).	0, 1, and 6 months.* ^Δ	Probably lifelong after completion of primary series.
Recombivax-HB	1 mL IM (10 mcg)	Birth to 19 years: 0.5 mL IM (5 mcg).	0, 1, and 6 months. ^{Δ,⊖}	
Hepilisav-B	0.5 mL IM (20 mcg)	Not approved for <18 years.	0, 28 days.	
Hepatitis A/B				
Twinrix	1 mL IM (720 EU/20 mcg)	Not approved for <18 years.	0, 1, and 6 months (alternative: 0, 7, and 21 to 30 days).	Booster recommended at 12 months with accelerated schedule; otherwise, probably lifelong after completion of primary series.
Japanese encephalitis				
Ixiaro (JE-VC)	Age 18 to 65: 0.5 mL IM/dose; two doses given on days 0 and 7 OR on days 0 and 28 Age >65: 0.5 mL IM/dose; two doses given on days 0 and 28	Age 2 months to <3 years: 0.25 mL IM/dose; two doses given on days 0 and 28. Age ≥3 years: Same as for adults >65.	Schedule varies with age (see preceding columns).	A single booster >1 year after completion of primary series if ongoing risk. [§]
Meningococcal				
Menveo	0.5 mL IM (10 mcg serogroup A, 5 mcg serogroup C, Y, W135)	≥2 years: 0.5 mL IM (10 mcg serogroup A, 5 mcg serogroup C, Y, W135).	≥2 to 55 years: Single dose. [¥]	Repeat every 5 years [†] if ongoing risk.
Menactra	0.5 mL IM (4 mcg of each antigen)	≥9 months: 0.5 mL IM 4 mcg of each antigen.	9 to 23 months: 0, 3 months. ≥2 to 55 years: Single dose.	Repeat every 5 years [†] if ongoing risk.
Rabies				
Imovax	1 mL IM (≥2.5 international units of rabies antigen)	Birth: 1 mL IM (≥2.5 international units of rabies antigen).	0, 7, and 21 or 28 days. [†]	Routine boosters not necessary; for those engaging in frequent high-risk activities (cavers, veterinarians, laboratory workers), serologic testing is recommended every 2 years with booster doses if low levels.**
RabAvert	1 mL IM (≥2.5 international units of rabies antigen)	Birth: 1 mL IM (≥2.5 international units of rabies antigen).	0, 7, and 21 or 28 days. [†]	
Typhoid				
Vivotif	1 cap PO (contains 2 to 6 × 10 ¹¹ viable colony-forming units of <i>S. Typhi</i> Ty21a)	≥6 years: 1 cap PO (contains 2 to 6 × 10 ¹¹ viable colony-forming units of <i>S. Typhi</i> Ty21a).	1 cap every other day × 4 doses.	Repeat every 5 years if ongoing risk.
Typhim Vi	0.5 mL IM (25 mcg)	≥2 years: 0.5 mL IM (25 mcg).	Single dose.	Repeat every 2 years (3 years in Canada) if ongoing risk.
Yellow fever				
YF-Vax	0.5 mL SC (4.74 log ^{**} plaque forming units of 17D204 attenuated YF virus)	≥9 months: 0.5 mL SC (4.74 log ^{**} plaque forming units of 17D204 attenuated YF virus).	Single dose.	Booster dose every 10 years if ongoing risk.
Cholera				
Vaxchora	100 mL PO (lyophilized <i>V. cholerae</i> CVD 103-HgR)	Not approved for <18 years.	Single dose.	No specific recommendation; consider booster every 6 months if at continued risk.

IM: intramuscular; SC: subcutaneous; PO: by mouth; JE-VC: Vero cell culture-derived Japanese encephalitis.

* Protection likely lasts at least 12 months after a single dose.

[†] An alternate schedule is three doses given at 0, 1, and 2 months, followed by a fourth dose at 12 months.

^Δ An accelerated schedule of 0, 7, and 14 days followed by a booster dose at 6 months has been used but is not FDA-approved.

[⊖] An alternate schedule for adolescents 11 to 15 years old is 0 and 4 to 6 months.

[§] Adults previously vaccinated with JE Vax should receive a primary series of Ixiaro.^[1]

[¥] For children 2 to 5 years old at continued high risk, a second dose may be administered two months after the first.

[†] Repeat after 3 years for children vaccinated at <7 years of age. Considerable published data indicates that protection significantly wanes after 3 years; travelers to the meningitis belt should consider a booster after 3 years due to the high risk of infection compared to risk at home.^[2]

[†] Regimen for pre-exposure prophylaxis. If a previously vaccinated traveler is exposed to a potentially rabid animal, postexposure prophylaxis with 2 additional vaccine doses separated by 3 days should be initiated as soon as possible.

^{**} Minimal acceptable antibody level is complete virus neutralization at a 1:5 serum dilution by the rapid fluorescent focus inhibition test.

References:

- Centers for Disease Control and Prevention (CDC). Recommendations for use of a booster dose of inactivated vero cell culture-derived Japanese encephalitis vaccine: Advisory committee on immunization practices, 2011. *MMWR Morb Mortal Wkly Rep* 2011; 60:661.
- Cohn AC, MacNeil JR, Harrison LH. Effectiveness and Duration of Protection of One Dose of a Meningococcal Conjugate Vaccine. *Pediatrics* 2017; pii: e20162193.

Adapted with special permission from: Treatment Guidelines from The Medical Letter, June 2012; Vol. 10 (118):45. www.medicalletter.org.

For information only.
No need to memorize this.

Immunization schedules

- Note that vaccination/immunization schedule may slightly differ in different countries based on factors such as disease prevalence etc. in that country.
- It is important to memorize Saudi MOH immunization schedule (next two slides).
- CDC immunization schedule (US based) on last few slides is for information only.

Saudi MOH immunization schedule

* **Pneumococcal Conjugate (PCV13).**

** **Monovalent Rota Vaccine.**

*** **(Td) Starts from 7 Years of Age.**

Accessible from:

<https://www.moh.gov.sa/en/HealthAwareness/EducationalContent/HealthTips/Documents/Immunization-Schedule.pdf>

<ul style="list-style-type: none"> • BCG • Hepatitis B 	<ul style="list-style-type: none"> • درن • التهاب كبدي (ب) 	عند الولادة At Birth
<ul style="list-style-type: none"> • IPV • DTaP • Hepatitis B • Hib • Pneumococcal Conjugate (PCV)* • Rota** 	<ul style="list-style-type: none"> • شلل أطفال معطل • الثلاثي البكتيري • التهاب الكبدي (ب) • المستدمية النزلية • البكتيريا العقدية الرئوية* • فيروس الروتا** 	عمر شهرين 2 Months
<ul style="list-style-type: none"> • IPV • DTaP • Hepatitis B • Hib • Pneumococcal Conjugate (PCV)* • Rota** 	<ul style="list-style-type: none"> • شلل أطفال معطل • الثلاثي البكتيري • التهاب الكبدي (ب) • المستدمية النزلية • البكتيريا العقدية الرئوية* • فيروس الروتا** 	عمر ٤ شهور 4 Months
<ul style="list-style-type: none"> • OPV • IPV • DTaP • Hepatitis B • Hib • Pneumococcal Conjugate (PCV)* 	<ul style="list-style-type: none"> • شلل الأطفال الفموي • شلل أطفال معطل • الثلاثي البكتيري • التهاب الكبدي (ب) • المستدمية النزلية • البكتيريا العقدية الرئوية* 	عمر ٦ اشهر 6 Months
<ul style="list-style-type: none"> • Measles • Meningococcal Conjugate quadrivalent (MCV4) 	<ul style="list-style-type: none"> • الحصبة المفرد • الحمى الشوكية الرباعي المقترن 	عمر ٩ أشهر 9 Months
<ul style="list-style-type: none"> • OPV • MMR • Pneumococcal Conjugate (PCV)* • Meningococcal Conjugate quadrivalent (MCV4) 	<ul style="list-style-type: none"> • شلل الأطفال الفموي • الثلاثي الفيروسي • البكتيريا العقدية الرئوية* • الحمى الشوكية الرباعي المقترن 	عمر ١٢ شهر 12 Months
<ul style="list-style-type: none"> • OPV • DTaP • Hib • MMR • Vericella • Hepatitis A 	<ul style="list-style-type: none"> • شلل الأطفال الفموي • الثلاثي البكتيري • المستدمية النزلية • الثلاثي الفيروسي • الجدري المائي • التهاب الكبدي (أ) 	عمر ١٨ شهر 18 Months
<ul style="list-style-type: none"> • Hepatitis A 	<ul style="list-style-type: none"> • التهاب الكبدي (أ) 	عمر ٢٤ شهر 24 Months
<ul style="list-style-type: none"> • OPV • DTaP(Td)*** • MMR • Varicella 	<ul style="list-style-type: none"> • شلل الأطفال الفموي • الثلاثي البكتيري (الثنائي البكتيري)*** • الثلاثي الفيروسي • الجدري المائي 	عند دخول الصف الأول الإبتدائي School Entry

How to memorize Saudi MOH schedule?

- Birth – BB (BCG & Hep B)
- 2 months – DR BHIP
- 4 months – DR BHIP
- 6 months – DO BHIP
- 9 months – MeaM
- 12 months – MMR MOP
- 18 months – MMR DOV AH
- 24 months – A

- School entry (4-6 years) – MMR DOV

B = Hep B

D = DTaP

R = RV

H = Hib

I = IPV

P = PCV

O = OPV

Mea = Measles

M = MCV4

MMR = MMR

V = Varicella

A = Hep A

Center for Disease Control (CDC) Recommendations

- 2018 Immunization Schedules and Resources:

<https://www.cdc.gov/vaccines/schedules/index.html>

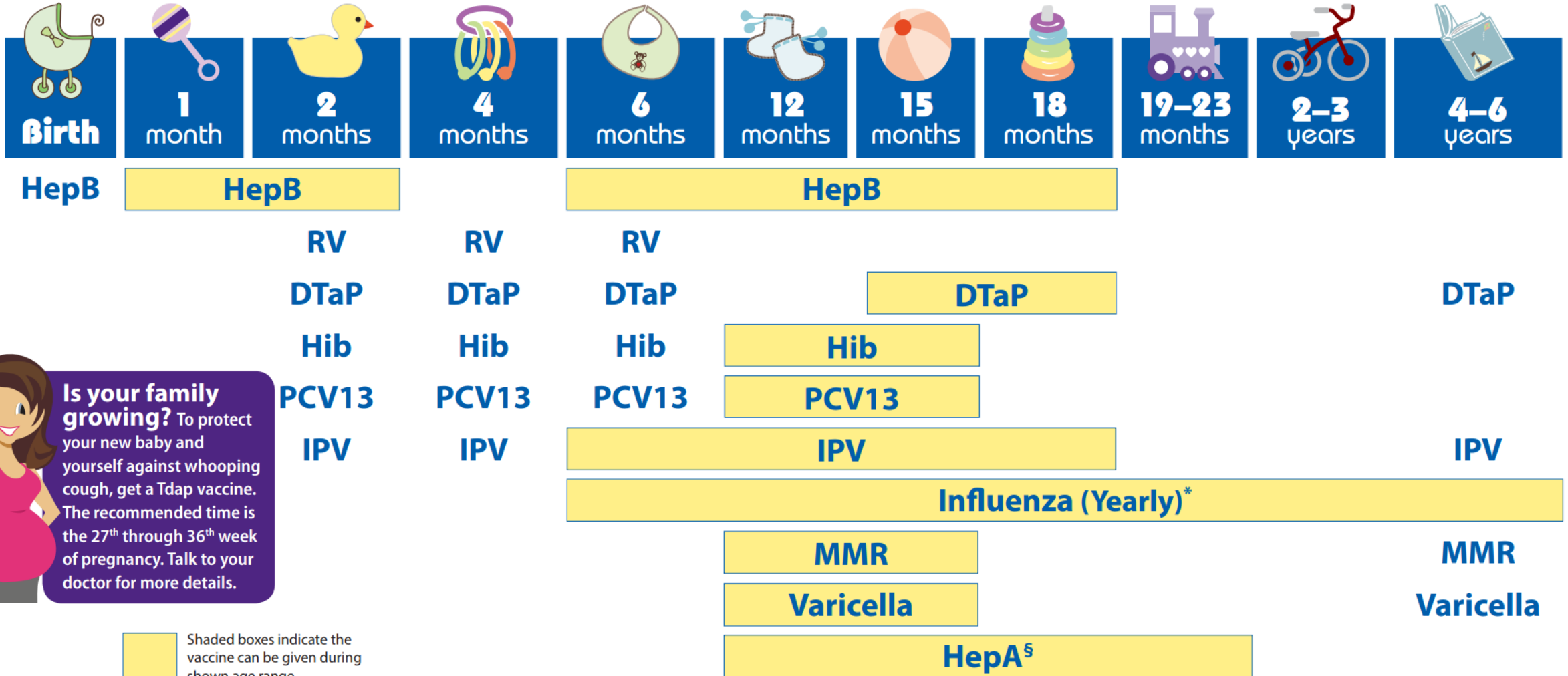
- Children and Adolescents Aged 18 Years or Younger

<https://www.cdc.gov/vaccines/schedules/downloads/child/0-18yrs-child-combined-schedule.pdf>

- Adults Aged 19 Years or Older

<https://www.cdc.gov/vaccines/schedules/downloads/adult/adult-combined-schedule.pdf>

2018 Recommended Immunizations for Children from Birth Through 6 Years Old



Is your family growing? To protect your new baby and yourself against whooping cough, get a Tdap vaccine. The recommended time is the 27th through 36th week of pregnancy. Talk to your doctor for more details.

Shaded boxes indicate the vaccine can be given during shown age range.

Talk to your child's doctor or nurse about the vaccines recommended for their age.

	Flu <i>Influenza</i>	Tdap Tetanus, diphtheria, pertussis	HPV Human papillomavirus	Meningococcal		Pneumococcal	Hepatitis B	Hepatitis A	Inactivated Polio	MMR Measles, mumps, rubella	Chickenpox <i>Varicella</i>
				MenACWY	MenB						
7-8 Years	Green	Orange		Purple		Purple	Orange	Purple	Orange	Orange	Orange
9-10 Years	Green	Orange	Purple, Blue	Purple		Purple	Orange	Purple	Orange	Orange	Orange
11-12 Years	Green	Green	Green	Green		Purple	Orange	Purple	Orange	Orange	Orange
13-15 Years	Green	Orange	Orange	Orange		Purple	Orange	Purple	Orange	Orange	Orange
16-18 Years	Green	Orange	Orange	Green, Orange		Purple	Orange	Purple	Orange	Orange	Orange

More information:

Preteens and teens should get a flu vaccine every year.

Preteens and teens should get one shot of Tdap at age 11 or 12 years.

All 11-12 year olds should get a 2-shot series of HPV vaccine at least 6 months apart. A 3-shot series is needed for those with weakened immune systems and those age 15 or older.

All 11-12 year olds should get a single shot of a meningococcal conjugate (MenACWY) vaccine. A booster shot is recommended at age 16.

Teens, 16-18 years old, **may** be vaccinated with a serogroup B meningococcal (MenB) vaccine.



These shaded boxes indicate when the vaccine is recommended for all children unless your doctor tells you that your child cannot safely receive the vaccine.



These shaded boxes indicate the vaccine should be given if a child is catching-up on missed vaccines.



These shaded boxes indicate the vaccine is recommended for children with certain health or lifestyle conditions that put them at an increased risk for serious diseases. See vaccine-specific recommendations at www.cdc.gov/vaccines/pubs/ACIP-list.htm.



This shaded box indicates children not at increased risk may get the vaccine if they wish after speaking to a provider.

If you are this age,

talk to your health care professional about these vaccines

If you are this age, ↓	Flu Influenza	Tdap or Td Tetanus, diphtheria, pertussis	Shingles Zoster		Pneumococcal		Meningococcal		MMR Measles, mumps, rubella	HPV Human papillomavirus		Chickenpox Varicella	Hepatitis A	Hepatitis B	Hib <i>Haemophilus influenzae</i> type b
			RZV	ZVL	PCV13	PPSV23	MenACWY	MenB		for women	for men				
19 - 21 years	Green	Green			Blue	Blue	Blue	Blue	Green	Green	Green	Green	Blue	Blue	Blue
22 - 26 years	Green	Green			Blue	Blue	Blue	Blue	Green	Green	Blue	Green	Blue	Blue	Blue
27 - 49 years	Green	Green			Blue	Blue	Blue	Blue	Green			Green	Blue	Blue	Blue
50 - 64 years	Green	Green	Green	Green	Blue	Blue	Blue	Blue	Green If born in 1957 or later			Green	Blue	Blue	Blue
65+ year	Green	Green	Green	Green	Blue	Blue	Blue	Blue				Green	Blue	Blue	Blue

More Information:

You should get flu vaccine every year.

You should get 1 dose of Tdap if you did not get it as a child or adult. You should also get a Td booster every 10 years. Women should get 1 dose of Tdap during every pregnancy.

There are 2 types of zoster vaccine. You should get 2 doses of RZV at age 50 years or older (preferred) or 1 dose of ZVL at age 60 years or older, even if you had shingles before.

There are 2 types of pneumococcal vaccine. You should get 1 dose of PCV13 and at least 1 dose of PPSV23 depending on your age and health condition.

There are 2 types of meningococcal vaccine. You may need one or both types depending on your health condition.

You should get this vaccine if you did not get it when you were a child.

You should get HPV vaccine if you are a woman through age 26 years or a man through age 21 years and did not already complete the series.

If you have this health condition,

talk to your health care professional about these vaccines



	Flu Influenza	Tdap or Td Tetanus, diphtheria, pertussis	Shingles Zoster		Pneumococcal		Meningococcal		MMR Measles, mumps, rubella	HPV Human papillomavirus		Chickenpox Varicella	Hepatitis A	Hepatitis B	Hib <i>Haemophilus influenzae</i> type b
			RZV	ZVL	PCV13	PPSV23	MenACWY	MenB		for women	for men				
Pregnancy	Green	Green		Should Not Get Vaccine	Green	Green	Blue	Blue	Should Not Get Vaccine	Green	Green	Should Not Get Vaccine	Blue	Blue	Green
Weakened Immune System	Green	Green		Should Not Get Vaccine	Green	Green	Blue	Blue	Should Not Get Vaccine	Green	Green	Should Not Get Vaccine	Blue	Blue	Green
HIV: CD4 count less than 200	Green	Green		Should Not Get Vaccine	Green	Green	Blue	Blue	Should Not Get Vaccine	Green	Green	Should Not Get Vaccine	Blue	Blue	Green
HIV: CD4 count 200 or greater	Green	Green			Green	Green	Blue	Blue	Green	Green	Green		Blue	Blue	Green
Kidney disease or poor kidney function	Green	Green	Green	Green	Green	Green	Blue	Blue	Green	Green	Green		Blue	Blue	Green
Spleen removed or does not work well	Green	Green			Green	Green	Blue	Blue	Green	Green	Green		Blue	Blue	Green
Heart disease Chronic lung disease Chronic alcoholism	Green	Green			Green	Green	Blue	Blue	Green	Green	Green		Blue	Blue	Green
Diabetes (Type 1 or Type 2)	Green	Green			Green	Green	Blue	Blue	Green	Green	Green		Blue	Blue	Green
Chronic Liver Disease	Green	Green			Green	Green	Blue	Blue	Green	Green	Green		Blue	Blue	Green

More Information:

You should get flu vaccine every year.

You should get 1 dose of Tdap if you did not get it as a child or adult. You should also get a Td booster every 10 years. Women should get 1 dose of Tdap vaccine during every pregnancy.

There are 2 types of zoster vaccine. You should get 2 doses of RZV at age 50 years or older (preferred) or 1 dose of ZVL at age 60 years or older, even if you had shingles before.

There are 2 types of pneumococcal vaccine. You should get 1 dose of PCV13 and at least 1 dose of PPSV23 depending on your age and health condition.

There are 2 types of meningococcal vaccine. You may need one or both types depending on your health condition.

You should get this vaccine if you did not get it when you were a child.

You should get HPV vaccine if you are a woman through age 26 years or a man through age 21 years and did not already complete the series.

You should get Hib vaccine if you do not have a spleen, have sickle cell disease, or received a bone marrow transplant.



Recommended For You: This vaccine is recommended for you *unless* your health care professional tells you that you do not need it or should not get it.



May Be Recommended For You: This vaccine is recommended for you if you have certain other risk factors due to your health condition. Talk to your health care professional to see if you need this vaccine.



YOU SHOULD NOT GET THIS VACCINE

Key considerations (1)

1. DTaP is indicated for the prevention of diphtheria, tetanus, and pertussis in children less than 7 years of age. DT is indicated for the prevention of diphtheria and tetanus in children less than 7 years of age who have a history of anaphylactic or neurologic reaction to the pertussis vaccine.
2. Patients aged 11 to 12 years should receive one Tdap dose. Adults should receive one Td booster every 10 years. Adults should replace one Td booster with a Tdap dose once in their lifetime. Pregnant females receive one Tdap dose in the third trimester of every pregnancy.
3. Hep B vaccine is given in a three-dose series at 0, 1, and 6 months. It is the only vaccine that is currently scheduled to be given at birth (along with BCG) in KSA.
4. Administration of the HPV vaccine can cause syncope. Therefore, patients should remain seated for at least 15 minutes after receiving the vaccine.

Key considerations (2)

5. The first dose of the RV vaccine should be given before 14 weeks & 6 days. The last dose should be administered before 8 months.
6. Hep A vaccine is recommended for travel to most parts of the world.
7. There is no vaccine available to provide protection against Hepatitis C.
8. Influenza viruses undergo shifts and drifts, therefore, every year new influenza (flu) vaccine is formulated that must be administered every year.
9. New influenza season starts approximately in Nov every year & new vaccination must start in Oct. It takes about two weeks after vaccination for antibodies to develop in the body and provide protection against influenza virus infection.
10. Zoster vaccine must not be administered to the patient currently being treated for shingles or postherpetic neuralgia (PHN). It can be administered once the symptoms are resolved.

References

- Center for Disease Control (CDC) Immunization Schedule, 2018
- Comprehensive Pharmacy Review for NAPLEX, 8th Edition, Wolters Kluwer & Lippincott Williams and Wilkins, 2013
- NAPLEX Review Guide, 3rd Edition, McGraw-Hill, 2018
- Saudi Ministry of Health (MOH) Immunization Schedule, 2018
- The APhA Complete Review for Pharmacy, 7th Edition, 2010