

IMMUNIZATION PROGRAMME

Immunity is a state of resistance of an organism to invading biotic or abiotic pathogens and their harmful effects that prevents the development of infection and maintain the organism integrity by concentrating, neutralising and clearing pathogens.

Our immune system is essential for our survival. Without an immune system, our bodies would be open to attack from bacteria, viruses, parasites and more. It is our immune system that keeps us healthy as we live among a sea of pathogens.

The immune system is spread throughout the body and involves many types of cells, organs, proteins and tissues. Most importantly, it can distinguish our tissue from foreign tissue. Dead and faulty cells are also recognised and cleared away by the immune system.

9. Immunization

Immunization is the process whereby a person is made immune or resistant to an infectious disease, typically by the administration of a vaccine. Vaccines are substances that stimulate the body's own immune system to protect the person against subsequent infection or disease.

Importance of Immunization: It's known that infection contributes to malnutrition in children by affecting growth. Therefore, it becomes very important to prevent infection in children so that they grow well. Immunization is one of the most cost-effective methods of preventing infection and a critical strategy to combat public nutrition problems.

Immunization protects against several dangerous diseases by increasing body's ability to fight these diseases. Thus, immunization prevents

① Lifelong physical and mental disabilities.

①① Death from breaded diseases.

Universal Immunization Programme (UIP):

Immunization programme in India was introduced in 1978 as "Expanded Programme of Immunization (EPI)" by the Ministry of Health and Family Welfare, Govt. of India. In 1985, the programme was modified as UIP to be implemented in phased manner to cover all districts in the country by 1989 to 1990 with one of the largest health programmes in the world.

Ministry of Health and Family Welfare, Govt. of India provides several vaccines to infants, children and pregnant woman through the UIP.

Vaccine Provided under UIP: ① BCG stands for Bacillus

Calmette Guerin vaccines. It's given to infants to protect them from tubercular meningitis and disseminated TB. BCG vaccine is given at birth or as early as possible till one year of age. BCG is given as intra-dermal injection in left upper arm.

⑩ OPV stands for Oral Polio Vaccine. It protects children from Poliomyelitis. OPV is given at birth for zero-dose and 3 doses are given at 6-10-14 weeks, a booster dose is given at 16-24 months of age. OPV is given orally in the form of 2 drops.

⑪ Hepatitis - B : Hepatitis-B vaccine protects from hepatitis-B virus infection. This vaccine is given at birth or as early as possible within 24 hours of birth. Subsequently, 3 doses are given at 6-10-14 weeks in combination with DPT and HIV in the form of pentavalent vaccine. Intra-muscular injection is given at anterolateral site of mid-thigh.

⑫ Pentavalent vaccine : This vaccine is a combined vaccine to protect children from five diseases: diphtheria, tetanus, pertussis, haemophilus and influenza type-B infection and hepatitis-B. 3 doses are given at 6-10-14 weeks of age.

This vaccine is given intra-muscularly on antero lateral side of mid-thigh.

⑤ Rota-virus vaccine (RVV): RV gives protection to infants and childrens against Rota-virus diarrhoea. It's given in select states. 3 doses of vaccine are given at 6-10-14 weeks of age. 5 drops of vaccine are given orally.

⑥ PCV (Pneumococcal Conjugate vaccine): It protects infants and young children against disease caused by the bacterium streptococcus pneumoniae. It is given in select states. The vaccine is given as 2 primary doses at 6-14 weeks of age followed by a booster dose at 4 months of age. It's given as intra-muscular injection in outer-right upper thigh. It should be noted that pentavalent vaccine and PCV are given as 2 separate injections into opposite thighs.

(VII) fIPV (Fractional Inactivated Poliomyelitis

Vaccine): It's used to boost the protection against poliomyelitis. 2 fractional doses of fIPV are given intradermally at 4-14 weeks of age. It's given as intradermal injection at right upper arm.

(VIII) Measles / MR Vaccine: Measles vaccine is used to protect

children from measles. In a few states measles and rubella (MR) vaccines are given in combination to protect from measles and rubella infection. 1st dose of measles or rubella vaccine is given at 9 completed months to 12 months and 2nd dose is given at 16-24 months. It's given as subcutaneous injection in right upper arm.

(IX) JE (Japanese Encephalitis) vaccine: This

vaccine gives protection against Japanese encephalitis disease.

It is given in selected district endemic for Japanese encephalities. This vaccine is given in 2 doses: 1st dose is given at 9 completed months to 12 months of age and 2nd dose at 16-24 months. It's given as subcutaneous injection.

(X) DPT booster (Diphtheria, Pertussis, Tetanus)

DPT is a combined vaccine: It protects children from diphtheria, pertussis, tetanus. This vaccine is given at 16-24 months of age (DPT-1st booster) and DPT 2nd booster is given at 5-6 years of age. DPT 1st booster is given as intramuscular injection in antero-lateral side of mid-thigh in left leg. DPT 2nd booster is given as intramuscular injection in left upper arm.

(XI) TT (Tetanus Toxoid) vaccine: This vaccine is used to provide protection against tetanus. TT vaccine is given at 10 years and 15 years of age when previous injection of pentavalent vaccine and DPT vaccine are given. A pregnant woman TT-1 is given early in pregnancy and TT-2 is

given 4 weeks after given birth. TT-booster is given when 2 doses of TT are given in pregnancy in last 3 years. TT is given as intra-muscular injection in upper arm.

WHO recommended vaccines for foreign travellers :

- ① Adult-Diphtheria and Tetanus vaccine
- ② Hepatitis - A vaccine
- ③ Hepatitis - B vaccine
- ④ Oral Polio Vaccine (OPV)
- ⑤ Typhoid vaccine
- ⑥ Varicella vaccine
- ⑦ Japanese encephalities (JE vaccine)
- ⑧ Meningococcal vaccine
- ⑨ Rabies vaccine
- ⑩ Yellow fever vaccine (YF vaccine)

Timing	Vaccine name
Birth	BCG, HBV1
2 months	Hexa1(HBV, DTaP, HiB, IPV), Rota1, PCV1
4 months	Hexa2(HBV, DTaP, HiB, IPV), Rota2, PCV2
6 months	Hexa3(HBV, DTaP, HiB, IPV), OPV1, PCV3
9 months	Measles, MCV1
12 months	OPV2, MMR1, PCV4, MCV2
18 months	OPV3, DTaP, Hib, MMR2, varicella, HAV1
24 months	HAV2

BCG - bacille calmette guerin,

HBV - hepatitis B vaccine, DTaP - diphtheria-tetanus-acellular pertussis,

Hib - haemophilus influenzae type B vaccine, Rota - rotavirus vaccine,

PCV - pneumococcal conjugate vaccine, IPV - injectable polio vaccine,

OPV - oral polio vaccine, MMR - measles-mumps-rubella vaccine,

HAV - hepatitis A vaccine, MCV - meningococcal vaccine

Age	The National immunization schedule	2014 Indian Academy of Pediatrics
0 (at birth)	BCG, OPV0, HBV0*	BCG, OPV0, HBV1
6 weeks	DTwP1, OPV1, HBV1*, HiB1*	DTwP1, IPV1, HBV2, HiB1, Rotavirus 1, PCV1
10 weeks	DTwP2, OPV2, HBV2*, HiB2*	DTwP2, IPV2, HiB2, Rotavirus 2, PCV2
14 weeks	DTwP3, OPV3, HBV3*, HiB3*	DTwP3, IPV3, HiB3, Rotavirus 3, PCV3
6 months	-	OPV1, HBV3
9 months	Measles, Vitamin A	OPV2, MMR1 (9-12 months) typhoid conjugate vaccine
12 months	-	HAV1
15 months	MMR*	MMR2, varicella 1, PCV booster
16-24 months	DTwP B1, OPV B1, Vitamin A2, Japanese Encephalitis*	16-18 months DTwP B1/DTaP B1/IPV B1, HiB B1 (18 months) HAV2
2 years	-	Typhoid booster
5 years	DTwP B2	4-6 years DTwP B2/DTaP B2, OPV3, varicella 2, typhoid booster
10 years	TT	10-12 years Tdap/Td, HPV
16 years	TT	

*Implemented in selected states, districts, and cities. B1: First booster dose, B2: Second booster dose, BCG: Bacillus Calmette Guerin, DT: Diphtheria toxoid and tetanus toxoid, DTwP: Diphtheria, tetanus toxoid, whole cell pertussis, DTaP: Diphtheria, tetanus toxoid, acellular pertussis, HAV: Hepatitis A vaccine, Td: Tetanus toxoid with reduced diphtheria, Tdap: Reduced diphtheria toxoid and acellular pertussis vaccine, HBV: Hepatitis B vaccine, HiB: *Haemophilus influenzae b*, HPV: Human papillomavirus vaccine, MMR: Measles, mumps and rubella, OPV: Oral poliovirus vaccine, PCV: Pneumococcal conjugate vaccine, TT: Tetanus toxoid

TABLE

Common vaccines for international travel⁶

Vaccine	Brand	Dose	Route	Age	Schedule	Booster
Hepatitis A (adult)	Havrix	1 mL	IM	≥19 y	0 and 6-12 mo	None
	Vaqta	1 mL	IM	≥19 y	0 and 6-18 mo	None
Hepatitis A (pediatric)	Havrix	0.5 mL	IM	1-18 y	0 and 6-12 mo	None
	Vaqta	0.5 mL	IM	1-18 y	0 and 6-18 mo	None
Combined hepatitis A and hepatitis B	Twinrix	1 mL	IM	≥18 y	0, 1, 6 mo; accelerated schedule: 0, 7, 21-30 d, 12 mo	None
Hepatitis B (adult)	Engerix-B	1 mL	IM	≥20 y	0, 1, 6 mo; accelerated schedule: 0, 1, 2, 12 mo	None
	Recombivax HB	1 mL	IM	≥20 y	>0, 1, 6 mo	None
Hepatitis B (pediatric)	Engerix-B	0.5 mL	IM	≤19 y	0, 1, 6 mo; accelerated schedule: 0, 1, 2, 12 mo	None
	Recombivax HB (primary)	0.5 mL	IM	≤19 y	0, 1, 6 mo	None
	Recombivax HB (adolescent accelerated)	1 mL	IM	11-15 y	0, 4-6 mo	None
Inactivated polio (adult)	Ipol	0.5 mL	SC or IM	≥18 y	1 dose at ≥18 y, if patient has received polio vaccine series	None
Japanese encephalitis	Ixiaro	0.5 mL	IM	≥17 y	0 and 28 d	≥1 y after primary series
		0.5 mL	IM	3-16 y	0 and 28 d	Data unavailable
		0.25 mL	IM	2 mo-2 y	0 and 28 d	Data unavailable
Meningococcal conjugate (MenACWY)	Menactra (MenACWY-D)	0.5 mL	IM	9-23 mo	2-dose primary series separated by 3 mo	If last dose at <7 y of age, give an additional dose 3 y after the last dose If last dose at ≥7 y of age, give a booster dose 5 y after the last dose
		0.5 mL	IM	2-55 y	1 dose	
	Menveo (MenACWY-CRM)	0.5 mL	IM	2-12 mo	2, 4, 6, 12 mo	
		0.5 mL	IM	7-23 mo	2-dose series separated by 3 mo	
		0.5 mL	IM	2-55 y	1 dose	
Meningococcal polysaccharide (MPSV4)	Menomune	0.5 mL	SC	≥2 y	1 dose	If multiple doses are anticipated at ≥56 y, MenACWY should be used instead
Rabies	Imovax	1 mL	IM	All ages	Preexposure series: 0, 7, 21 or 28 d	None
	RabAvert	1 mL	IM	All ages	Preexposure series: 0, 7, 21 or 28 d	None
Typhoid capsular polysaccharide	Typhim Vi	0.5 mL	IM	≥2 y	1 dose	Every 2 y
Typhoid oral, live, attenuated	Vivotif	1 pill	Oral	≥6 y	1 pill every other day for 4 doses	Every 5 y
Yellow fever	YF-Vax	0.5 mL	SC	≥9 mo	1 dose	See text

IM, intramuscular; SC, subcutaneous.

Vaccine	Age group/Indication	Recommended schedule
DTaP*	2 mos–6 yrs	Primary (3 doses) <ul style="list-style-type: none"> • 1 dose at ages 2, 4, and 6 mos 1st booster <ul style="list-style-type: none"> • 1 dose at age 15–18 mos 2nd booster <ul style="list-style-type: none"> • 1 dose at age 4–6 yrs
Tdap†	7–10 yrs [§]	Not routinely recommended; refer to “Persons with incomplete or unknown vaccine history”
	11–18 yrs	11–12 yrs, 1 dose 13–18 yrs, 1 dose if not vaccinated previously with Tdap
	≥19 yrs	1 dose if not vaccinated previously with Tdap
	Pregnant women [¶]	1 dose each pregnancy; preferred at