

IMMUNIZATION , COLD CHAIN, EPI AND UIP

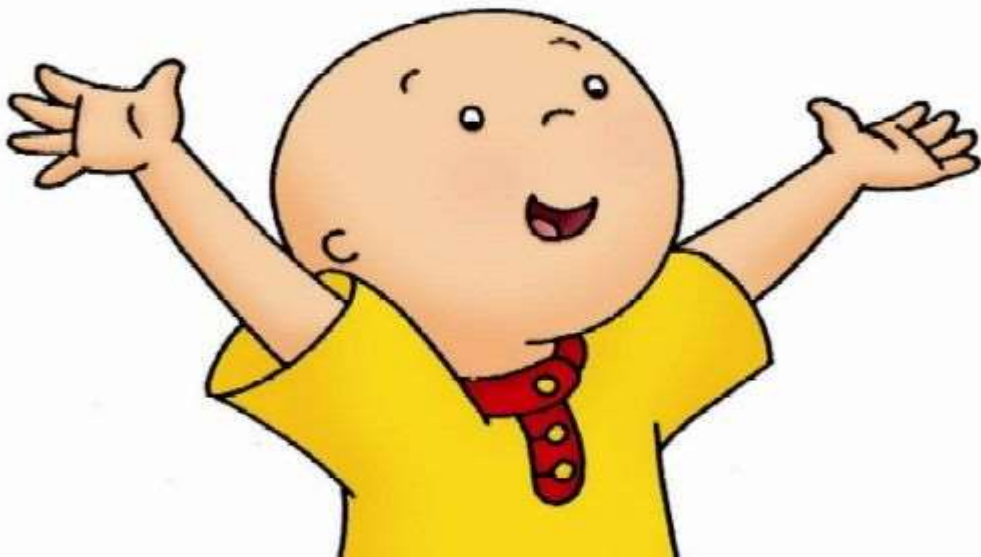


INTRODUCTION

Immunization is a process of protecting an individual from a disease through introduction of live, or killed or attenuated organisms in the individual system. Immunization against vaccine preventable disease is essential to reduce the mortality, morbidity and handicapped conditions. It is mass mean of protecting the largest number of people from various disease. It is give resistance to an infectious disease by producing or augmenting the immunity. Artificially acquired immunity is developed by the immunization.

IMMUNITY

Immunity is the security against a particular disease and nonsusceptibility to the invasive or pathogenic effects of foreign microorganisms or to the toxic effect of antigenic substances.



VACCINES

Vaccines are immunological substances which produce specific protection against given disease. It stimulates active production of protective antibody and other immune mechanisms.





IMMUNIZING AGENTS

Live attenuated (LAV)

- Tuberculosis (BCG)
- Oral polio vaccine (OPV)
- Measles
- Rotavirus
- Yellow fever

Inactivated (killed antigen)

- Whole-cell pertussis (wP)
- Inactivated polio virus (IPV)

Subunit (purified antigen)

- Acellular pertussis (aP),
- *Haemophilus influenzae* type B (Hib),
- Pneumococcal (PCV-7, PCV-10, PCV-13)
- Hepatitis B (HepB)

Toxoid (inactivated toxins)

- Tetanus toxoid (TT),
- Diphtheria toxoid

IMMUNIZATION
OF
CHILDREN



BCG VACCINATION

- ❑ Bacillus calmette- Guerin (BCG) vaccine is **live attenuated bacterial vaccine** produced from “**Danish- 1331**” strain of **tubercle bacilli**. It produces active immunity to protect the child from tuberculosis.





- ❑ **Type of vaccine**
 - Live
 - Freeze dried powder

- ❑ The presently available and used BCG vaccine is heat stable and in freeze dried form. It should be kept away from direct light and stored in a cool environment below 10°C ($2-8^{\circ}\text{C}$).

- ❑ Normal saline is recommended as a diluents for reconstituting the vaccine. The reconstituted vaccine may be used up within 3 hours and then the left over vaccine should be discarded

BCG vaccine



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- ❑ The BCG vaccine is administered at birth in institutional deliveries or as soon as possible after birth, or at a weeks, if not given at birth.
 - ❑ The standard site is the middle of deltoid muscles over the left upper arm, i.e. Just above the insertion of the deltoid muscles, if it injected too high, too forward or too backward, the adjacent lymph node become involved and tender.
 - ❑ The vaccine is given using a special tuberculin syringe in intradermal route. The dose is 0.05ml in neonates and 0.1 ml in infant. A satisfactor injection should produce a wheel of 5mm in diameter.
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- ❑ The vaccine must not be contaminated with an antiseptic or detergent. If alcohol is used to swab the skin, it must be allowed to evaporate before the vaccine is injected.
- ❑ Following BCG vaccination, a papule appears in 2 to 3 weeks at the site of correct intradermal injection of a patient vaccine. In 4 to 5 weeks papule grow in size and than sub site or breaks into a shallow ulcer. It may be open and covered with crust ulcer heals in 8 to 12 weeks leaving a small scar.

❑ **Complication** following this vaccination are uncommon or may be mild. Deep ulceration, local abscess formation, enlargement of auxiliary lymph gland, osteomyelitis, keloid formation over the injection may be developed.

❑ **BCG immunization is contra-indication if the child is suffering from immunodeficiency condition and HIV infected children.** All asymptomatic HIV infected children should receive the BCG vaccine.

❑ The duration of protection is about 15 to 20 years. BCG vaccination is a fundamental component of national Tuberculosis program and play a valuable role in preventing severer from of childhood tuberculosis.

POLIO VACCINE

- Oral polio vaccine was first described by Sabin in 1957. It contains live attenuated polio virus of three strains (type 1,2 and 3).
- There are different types of oral poliovirus vaccine, which may contain one (mOPV), a combination of two (bOPV), or all the three (tOPV) serotypes of attenuated poliovirus.
- The recently available OVP is heat stabilized and can be kept without losing potency at 4* c for a year and for a month at room temperature.
- The no stabilized vaccine should be stored at 20*c in a deep freeze. The OPV is cheaper, easy to administer, protects the individual child from poliomyelitis and prevent spread of wild pathogen virus in the community.

- **Monovalent oral polio vaccines (mOPV):**
These contain only one of the three serotypes of OPV. They are more effective than tOPV in conferring immunity against the targeted serotype, but do not provide protection to the other two types. Monovalent OPVs for type 1 (mOPV1) and type 3 (mOPV3) poliovirus were licensed in 2005
- **Trivalent oral poliovirus vaccine (tOPV)**
Prior to April 2016, tOPV was the predominant vaccine used for routine immunization against poliovirus. Also called the ‘Sabin vaccine’, tOPV consists of live, attenuated polioviruses of all three serotypes.
The trivalent vaccine was withdrawn globally in April 2016
- **Bivalent oral poliovirus vaccine (bOPV)**
Following April 2016, the tOPV was replaced with the bivalent OPV (bOPV) in routine immunization around the world. This is because continued use of tOPV would be a continuous source of type 2 circulating vaccine-derived polioviruses (cVDPV2), despite the wild type 2 virus being eradicated in 1999
Bivalent OPV contains only serotypes 1 and 3.

OPV Vaccine



- **Identification features of bOPV**

The vaccine is available in small glass bottles or plastic tubes having a vaccine vial monitor (VVM) on it. The lid has to be opened and replaced with a plastic dropper.

The dropper supplied with bOPV is white, narrower and smaller as compared to the one supplied with rotavirus vaccine.

- The OPV is very safe vaccine without any adverse effects. Rare cases of vaccine associated paralytic polio may occur. Vaccine potency can be effectively monitors using vaccine vial monitors (VVM)

- **OPV is administered with ‘zero’ dose at birth in institutional deliveries and then 3 dose at one month interval from 6 weeks of age (6weeks, 10 weeks, and 14 weeks)**



- OPV can be given with DPT and BCG at the same time and same day. **The dose is 2 drops** or as stated on the label of the vial and given orally
- **What happens if more than two drops are given?**
Usually there is no problem. Occasionally if too large a dose is given, the child may have mild diarrhea. We give two drops only as this is sufficient and any higher dosage is not needed.
- **It is very important to complete primary course of OPV within 6 months. Because most polio cases occur between 6 months and 3 years.** One booster dose is recommended at 16 to 24 months of age.

Contraindication

Immunocompromised state in self or a household as this is a live vaccine.

Immunocompromised states include HIV positive, malignancy, etc.

IPV is an alternative to bOPV for protecting the immunocompromised individuals.

- After vaccination, breastfeeding can be given, if the child is hungry, but hot drinks, hot milk or hot water should be withheld for ½ hours. The OPV should be administered in a cool room in the clinic rather than a hot, humid and crowded room and the OPV vial should be kept on an ice pack.

- **Zero dose of bOPV**

Zero dose of bOPV is given to the newborn immediately after birth if the opportunity exists. This dose is not to be counted as a part of routine immunization with OPV which begins at 6 weeks. Hence this dose is called as “zero dose”

- The purpose of this dose is to give at least one dose of OPV in case the child does not get a chance to get immunized. Mostly this is possible in institutional births when BCG and hepatitis B (birth dose) is also given along with the zero dose of bOPV.



- **Pulse polio immunization (PPI)**

This is simultaneous administration of bOPV to all the under-5 children of the area.

- PPIs are organized in two rounds, 4–6 weeks apart. These doses of bOPV are over and above the routine immunization with bOPV and are not to be counted.
- All the children including those born on the same day as the PPI day should receive the dose.



IPV VACCINATION

- This vaccine prepared from the virus of the original salk strain grown in monkey's kidney, human diploid or vero cell line and is inactivated by formalin.
- **Type of Vaccine**
Inactivated polio virus (killed virus)
- Presently , it is available as enhanced potency vaccine containing 40,8, and 32 D antigen units against types 1 & 2 and 3 rd polio viruses in 0.5 ml of the vaccine. The vaccine is also available as quadruple vaccine along with DPT.

IPV Vaccine



- **Three dose of 0.5 ml intramuscularly** along with DPT vaccine, can be given according to the DPT schedule (**6,10, 14, weeks** or 2,3, 4, months or 2, 4, 6, months) the country .The dose is recommended along with DPT at 18 months and 5 years of age .After 6 months 2 dose are required.
- **The full intramuscular dose is given in the anterolateral aspect of RIGHT thigh**
The fractional intradermal dose is given on the RIGHT upper arm
- Local monitor adverse reaction , eg. Pain , swelling , and erythema which is self limiting.
- IPV is more thermostable than OPV, it is recommended to be stored at 4* to 8* c.






DPT VACCINATION

- The DPT is combined vaccine administered for the protection against three diseases, i.e diphtheria, pertussis and tetanus. DPT vaccine is composed of diphtheria toxoid, tetanus toxoid and killed B. Pertussis is bacilli.
- The DPT/DT vaccine should be stored between 4*c and 8*c temperature and should not be frozen. The vaccines will lose potency is kept at room temperature over longer period of time.
- For primary immunization, DPT vaccine is administered in 3 does at 4 weeks interval at 6 weeks, 10 weeks and 14 weeks of age.



- Each dose is 0.5 ml and should be given deep intramuscularly as all vaccine contain mineral carries and adjuvant.
- The site of injection for children below one year of age should be lateral aspect of thigh(vastus lateralis muscle). In older children it may be given in upper and outer quadrant of gluteal muscles.
- The booster does of DPT vaccine is given at 16 to 24 months of age, followed by another booster dose of DT vaccine at the age of 5 to 6 years, without pertusis component.



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- The DPT vaccination usually not recommended after 6 years of age, so children above the age of 5 years, who received the primary course of DPT vaccine earlier, should receive only DT as booster at 5 to 6 years and those who have not received DPT , need only two does of DT vaccines at 4 weeks interval.
 - Following DPT Vaccination mild reaction are common. In 2 to 6 percent Vaccines, mild fever may develop and in 5 to 10 percent cases have swelling, or interaction and pain occur 24 hours.
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- The most severe complications following DPT Vaccination are neurological problems like encephalitis, encephalopathy, prolonged convulsions and Reye Syndrome. These problems are thought to be due to the pertussis component of vaccine.

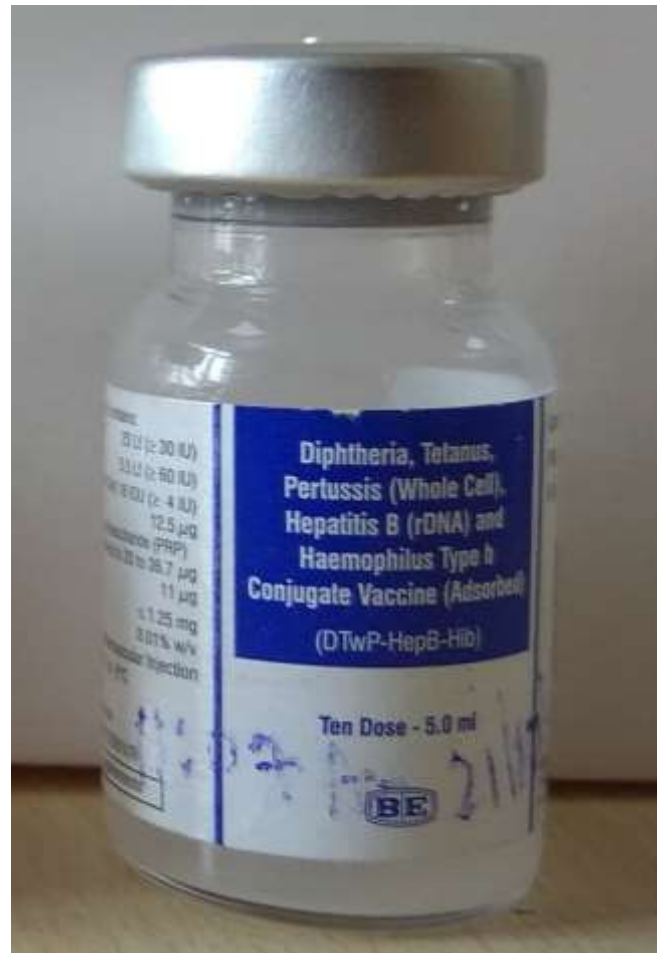




PENTAVALENT VACCINE




- The Government of India has decided to introduce pentavalent vaccine in the national immunization programme in selected states. 1 November 2014 in India, and in Telangana 2015.
 - Pentavalent vaccine provides protection to a child from 5 life-threatening diseases – Diphtheria, Pertussis, Tetanus, Hepatitis B and Hib.
 - DPT (Diphtheria+Pertussis+Tetanus) and Hep B are already part of routine immunization in India; Hib vaccine is a new addition. Together, the combination is called Pentavalent.
 - Hib vaccine can prevent serious diseases caused by Haemophilus influenzae type b like pneumonia, meningitis, bacteremia, epiglottitis, septic arthritis etc.
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PENTAVALENT VACCINE






- In UIP, pentavalent vaccine comes in a liquid form in a vial which contains 10 doses. Each dose is 0.5 ml to be given by intra muscular injection in anterolateral aspect of the mid-thigh using AD (auto disabled) syringes.
 - Pentavalent vaccine is a freeze sensitive vaccine, and should be stored and transported at +2 to +8 degree celsius in ice lined refrigerators and vaccine carriers with conditioned ice packs.
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MEASLES VACCINATION

- Measles Vaccine is live attenuated and tissue culture vaccine available as freeze dried product. It is safe and effective. Heat stable measles Vaccine and its diluting fluid should be stored at 2 to 8*c temperature to maintain their potency.
- The measles vaccine is administered at the age of 9 months before the age maternal antibody protects the infants. Single dose of vaccine is given with 0.5ml amount in subcutaneous route.
- MR vaccine is be administered in two doses; replacing the measles vaccine.
 - The first dose is to be given between 9 and 12 months of age and
 - The second dose is to be given at 16-24 months of ageDuring an epidemic it can be given at 6 months of age also but not to be counted and should be repeated at the usual age of 9 months.
- The freeze dived vaccine should be reconsolidated with diluting fluid and must be kept on ice and to be used with in after 4 hours of opening the vial as after reconstitution is vulnerable to contamination which can lead to toxic shock syndrome (TSS) in the recipient.




Measles vaccine



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- Toxic shock syndrome (TSS) may develop if the contaminated vaccine or if the same vial is used for or if the same vial is used for more than one session on the same day or next day. The features of TSS are severe watery diarrhea, vomiting and high fever which usually develop within few hours of measles vaccination. This condition may cause death within 48 hours and case fatality rates are high.
 - Measles vaccine is contraindication in infant below 6 month of age acute illness, convulsions, allergy, malnutrition, malignancy and immunosuppressive therapy(steroid, antimetabolites, etc)
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- After the measles vaccination, reaction may develop as fever and rash on 5 to 10 days after immunization. This may found in 15 to 20 percent of vaccines.

Storage of vaccine



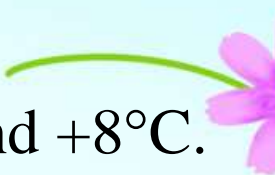

- The vaccine can be stored for a long term , e.g.,at PHC -15°C to -20°C , in the deep freezer.
 - The MR vaccine is very sensitive and should always be protected from sunlight.
 - The vaccine must be stored between 2°C and 8°C for a few weeks at the place of use such as the subcenter.
 - The diluent should also be stored at $+2^{\circ}\text{C}$ to $+8^{\circ}\text{C}$.
 - The reconstituted vaccine should be kept on ice and used within 4 hours.
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HEPATITIS 'B' VACCINATION

- Hepatitis 'B' Vaccination is now included in the immunization schedule, in some state of India, as routine vaccine. But due to economical constraints, it is not included as seventh vaccine, in the National immunization schedule.
- The hepatitis 'B' vaccine is given **intramuscularly with the 3 dose** in general at 0,1 and 6 month or 4 dose of the vaccine is **0.5ml for the child below 10year and 1ml above 10year at the same time interval**. Antibody response attained after 3 dose. Immunity levels provide protection for about 3 to 5 years. Booster dose may be administered after 3 to 5 years.

Hepatitis B vaccine



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- Hepatitis B vaccine is given for pre-exposures and post exposure prophylaxis, examples of post exposure prophylaxis is protection of neonates born to carries mother and individuals accidentally exposed parent rally to HBV infection through transfusion, outs injuries and needle sticks.
 - High risk children for HBV infections should be immunized with hepatitis B vaccine, e.g preoperated and multiple blood transfusion (in case of thalassemia, haemophilia) haemodialysis. IV drug user, sexual contact with carries of HBV etc
 - Hepatitis B vaccine should be stored between $+2^{\circ}\text{C}$ and $+8^{\circ}\text{C}$. Not to be frozen. Discard if vaccine has been frozen.
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ROTAVIRUS VACCINE

- Rotavirus is most common cause of **severe diarrhoea in infant.**
- **Type of Vaccine**
Live attenuated liquid vaccine
- **Route of administration**
Oral
- It recommended as oral vaccine of 3 doses at an interval of 4 weeks for the infants 6 to 26 weeks of age. Under UIP, Rotavirus vaccine is administered at 6, 10 and 14 weeks of age, along with other routine vaccines.
- **Dose**
5 drops (0.5 ml)



- **Storage:**

At State, Regional and district stores:

The Rotavirus Vaccine should be stored at -20°C , in the walk-in freezers (WIFs) or deep freezers (DFs).

Storage below the district level:

RVV should be stored at $+2^{\circ}\text{C}$ to $+8^{\circ}\text{C}$, in ice-lined refrigerators (ILRs).

In the ILR, Rotavirus vaccine should be stored at or above BCG level.



Rota virus



JAPANESE ENCEPHALITIS VACCINE

- Japanese encephalitis is an important viral disease causing fatal condition in children. Vaccination JE is significant preventive measure as the specific drug are not available for treatment.

Currently, there are three types of JE vaccines in use:

1. The mouse brain-derived inactivated (Killed) vaccine.
2. The cell culture-derived inactivated (Killed) vaccine.
3. The cell culture-derived live, attenuated vaccine using SA 14-14-2 strain of JE virus.

Under the National program, the live attenuated (SA 14-14-2), cell culture-derived vaccine is used in India. It is presently manufactured in P. R. China. It is imported from there for use in India.

- **Type of vaccine**
Live

Japanese encephalitis vaccine





- **Route of administration**

Subcutaneous

- **Dose**




0.5 mL

- **Site**

Left upper arm

- **Schedule under NIS**

Two doses of JE vaccine are administered in all JE endemic districts of the country.

1. The first dose is given at the age of 9–12 months along with the first dose of measles vaccine and
 2. The second dose is given at the age of 16 – 24 months along with DPT and OPV booster dose and measles second dose.
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- **Storage**

- +2°C to +8°C
 - Protect from light
 - Diluents to be stored at +2°C to +8°C WHO
 - Diluent must not be frozen
 - Reconstitute only one vial of JE vaccine at one time and use vaccine within 6 hours of reconstitution
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- Contraindication is high fever, diabetes mellitus, liver and heart disease and immune deficiency state.



VITAMIN A VACCINE

- **Concentration of vitamin A in the solution**
1,00,000 IU per mL
- **Oil used**
Arachis oil (peanut oil)
- **A total doses recommended**
Nine doses till 5 years of age.
- The spoon supplied with the bottle has a marking inside. This indicates a volume of 1 mL. Completely filled spoon measures 2 mL.



VITAMIN A VACCINE

- **Mention the dosage schedule under NIS.**
 1. **First dose is 1 mL (1 lakh units) at 9 months of age.** This is given along with the MR-1, PCV-Booster and JE-1 (if applicable) which are also administered at the same age.
 2. **Second dose is 2 mL (2 lakh units) at 16-24 months of age.** This is given along with DPT and OPV boosters, MR – 2 and JE – 2 (if applicable).
 3. **The 3rd, 4th, 5th, 6th, 7th, 8th, and 9th doses of 2 mL each at 6 monthly intervals beginning 6 months after the second dose**
- The minimum gap between any two doses of vitamin A should be 6 months as the liver can store enough vitamin A for 6-9 months. Too frequent doses may lead to vitamin A toxicity.

VITAMIN A VACCINE

- **Dose different for those children who show clinical signs of vitamin A deficiency**
 - Administer 2,00,000 IU of vitamin A immediately after diagnosis, followed by another dose of 2,00,000 IU 1–4 weeks later.
- **Storage instructions**

Vitamin A solution must be kept away from direct sunlight and should be used only till the expiry date printed on the bottle.



Vitamin A vaccine







OTHER AVAILABLE VACCINE



TYPHOID VACCINATION

- Immunization against typhoid does not give 100 percent protection but it reduces the incidence and severity of infection. **It can be given at any age after one year.** Typhoid vaccine is not now included in National Immunization Programme.
- The available injectable typhoid vaccines are:-
 - (a) monovalent anti typhoid vaccine
 - (b) bivalent anti typhoid vaccine
 - (c) TAB Vaccine

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- Primary immunization with anti typhoid vaccine should consist of 2 dose to subcutaneous injection, each dose of 0.5 ml, at 4 to 6 weeks interval. The children between 1 to 10 years required smaller dose with 0.25ml.
 - Immunity develops in 10 to 21 days after inoculation and gives protection for about 3 years, so booster dose is needed in every 3 years.
 - This vaccine should be stored at 2 to 4* c temperature and should not be frozen.
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- Following typhoid vaccination, local reactions occurs as pain, swelling and tenderness at injection side. General symptoms like malaise headache and fever may occur usually subside within 36 hours.
- Recently oral typhoid vaccines (Typhoid) are available as safe and highly immunogenic.



RABIES VACCINES

- Rabies or hydrophobia is fatal disease and transmitted through bite of the infected animal. Incubation period of the disease is long, so post exposure prophylaxis is possible.
- There are three types of rabies vaccines available for vaccination.
 1. Cell- Culture vaccines
 - Human diploid cell (HDC)
 - Purified chick embryo cell (PCEC)
 2. Duck embryo vaccines(DEV)



3. Older conventional, nervous tissue vaccines (NTV) derived from sheep brain or from suckling mouse brain.

- The HDC and PCEC Vaccine are effective and safe but they are costly. Any of the following schedules may be used: (two are IM and one is ID)
 1. **IM: Five doses of cell culture vaccine, 1 mL or 0.5ml each, intramuscular on days 0, 3, 7, 14 and 28 (Essen regimen)**
 2. **IM: Abbreviated (4 doses in 3 visits) multisite schedule, i.e., the 2-1-1 regimen (Zareb regimen): 2 intramuscular doses on day 0 (one on each side) followed by 1 IM dose each on day 7 and day 21**
 3. **The intradermal schedules is:
Two- site ID injections of 0.1ml each, on days 0, 3, 7 and 28; the day 14 dose is missed (2-2-2-0-2 regimen)**
- **DEV is not available in India.**





- The old NTV is cheaper but having high risk of neuroparalytic reaction. This old anti rabies vaccine is administered in a dose of 1 or 2 ml for 14 days over abdominal wall or as prescribed depending upon severity of bite exposure.



HAEMOPHILUS INFLUENZAE VACCINES

- H. Influenza type 'B' (Hib) is an important cause of meningitis and pneumonia among children below five years of age. At present several Hib vaccines are available which are safe and effective.
- At least four conjugated polysaccharide Hib vaccines are available. Any one of these can be used. Hib vaccine is also available in combination with DPT as DPT-Hib and with DPT and hepatitis B as DPT-HB-Hib.



- Routinely, Hib vaccine can be given at the age of 2 month and second dose after 8 weeks along with DPT vaccine. A booster dose is recommended at 12 to 18 month of age.
- The does is 1.5ml and given in IM route with no know adverse reaction or absolute contraindications except hypersensitivity to the vaccine as 3 dose primary course at 2-4-6 month or 1.5-3-5 months of age.



COMBINED DPT-HB VACCINES

- The combined DPT and hepatitis 'B' vaccine are now available to protect from four disease. It is cost-effective reduced number of visit for immunization and has better coverage.
- It can be give as primary immunization during first 6 month of age with 3 dose (0.5ml each dose) intramuscularly at 4to 6 weeks interval.



HEPATITIS 'A' VACCINES

- Several inactivated and live attenuated vaccine against hepatitis 'A' have been developed. The dose, age and time of vaccination vary from one manufacture to other. No vaccine is licensed for children below one year age.
- No vaccine is licensed for children below one of age.
- A combined vaccine of inactivated hepatitis A and recombinant hepatitis B vaccine has been licensed.

VARICELLA VACCINES

- Varicella vaccines is live attenuated vaccine for the protection against Chickenpox. It is safe, well-tolerated but expensive.
- It is recommended as single dose **with 0.5ml subcutaneously for all age group.**
- Another type of varicella vaccine can be administered as single dose for the children **one year to 12 year and above 13 years as two doses at 6 to 10 weeks interval.**
- If the **vaccines is administrated within 3 days of exposure to a case of chickenpox, it provides 80 to 90 percent protection.**

INFLUENZA VACCINES

- Influenza vaccines is prepared from killed virus for protection against influenza type A and B infection.
- It can be administered subcutaneously with 0.2ml of an oily emulsion preparation or 1.0ml of saline preparation as single dose.
- It should not given during acute febrile illness. The vaccine is recommended for children older than 6 month, previously unimmunized children should receive 2 dose at 4 weeks interval.

CHOLERA VACCINE

- Cholera vaccine is whole cell killed vaccine, available for parental administration, having poor protectively, which lasts for only 3 to 6 month.
- The available cholera vaccine is administered by subcutaneous injection with two dose at 4 to 6 weeks interval. The dose is 0.2ml for children below 2 years and 0.3 ml above two years.
- This vaccination may cause reactions like local pain, erythema, edema and abscess.

MUMPS VACCINE

- **Mumps vaccine is live attenuated viral vaccine** and gives long immunity with protective value of 75 to 90 percent. It is usually available, combined with measles and rubella vaccine as MMR.
- **Mumps or MMR vaccine may be given after 12 to 15 month of age in subcutaneous route.**



RUBELLA VACCINE

- Rubella vaccine is also live attenuated viral vaccine protect against the occurrence of congenital rubella syndrome in offspring.
- The vaccine is administered to girl between one year of age and puberty.
- The dose is 0.5ml subcutaneously, as single administration. The recommended minimum age is 12 to 15 month, only after maternal antibodies have disappeared.
- The adverse reaction rubella vaccine are skin rash, lymphadenopathy and arthralgia, which are usually self limiting.
- The vaccine is contraindication in pregnancy and immunosuppression.

PNEUMOCOCCAL VACCINE

- Currently available polyvalent pneumococcal vaccine can protect children from infections caused by streptococcus pneumonia resulting pneumonia, meningitis, otitis media.
- The vaccine are not immunogenic in children below 2 year of age **it is indicated in children above 2 years of age** and having nephrotic syndrome, chronic renal failure, HIV, splenectomy etc.
- The vaccine is given **intramus or subcutaneously with 0.5ml amount.**



- Revaccination is recommended for children less than 10 year of age and are at high risk of several pneumococcal infection. It is given after 3 to 5 years of primary immunization.
- The adverse reaction may found as anaphylaxis's, local pain full swelling, fever.



MENINGOCOCCAL VACCINE

- A quadrivalent vaccine is available of *Neisseria meningitidis* from subgroup A, C, Y and W 135. Routine vaccination against meningococcal disease is not recommended.
- It is indicated during epidemics for all contacts and for high risk children with asplenia and complement deficiencies
- The vaccines is administered deep subcutaneously single dose of 0.5ml, in children older than two year of age. Second dose is needed after 1 year if the first does is given between 2 and 4 years of age when 1st does is given after 4 years of age, than next dose should be administrated only after another 5 year. The vaccine may have some adverse reactions like local tenderness, edema, and fever.

National Immunization Schedule (NIS) for Infants, Children and Pregnant Women

Vaccine	When to give	Dose	Route	Site
For Pregnant Women				
TT-1	Early in pregnancy	0.5 ml	Intra-muscular	Upper Arm
TT-2	4 weeks after TT-1*	0.5 ml	Intra-muscular	Upper Arm
TT- Booster	If received 2 TT doses in a pregnancy within the last 3 yrs*	0.5 ml	Intra-muscular	Upper Arm
For Infants				
BCG	At birth or as early as possible till one year of age	0.1ml (0.05ml until 1 month age)	Intra-dermal	Left Upper Arm
Hepatitis B - Birth dose	At birth or as early as possible within 24 hours	0.5 ml	Intra-muscular	Antero-lateral side of mid-thigh
OPV-0	At birth or as early as possible within the first 15 days	2 drops	Oral	Oral
OPV 1, 2 & 3	At 6 weeks, 10 weeks & 14 weeks (OPV can be given till 5 years of age)	2 drops	Oral	Oral
Pentavalent 1, 2 & 3	At 6 weeks, 10 weeks & 14 weeks (can be given till one year of age)	0.5 ml	Intra-muscular	Antero-lateral side of mid-thigh
Rotavirus#	At 6 weeks, 10 weeks & 14 weeks (can be given till one year of age)	5 drops	Oral	Oral
IPV	Two fractional dose at 6 and 14 weeks of age	0.1 ml	Intra dermal two fractional dose	Intra-dermal: Right upper arm
Measles /MR 1st Dose\$	9 completed months-12 months. (can be given till 5 years of age)	0.5 ml	Sub-cutaneous	Right upper Arm
JE - 1^{**}	9 completed months-12 months.	0.5 ml	Sub-cutaneous	Left upper Arm
Vitamin A (1st dose)	At 9 completed months with measles-Rubella	1 ml (1 lakh IU)	Oral	Oral
For Children				
DPT booster-1	16-24 months	0.5 ml	Intra-muscular	Antero-lateral side of mid-thigh
Measles/ MR 2nd dose \$	16-24 months	0.5 ml	Sub-cutaneous	Right upper Arm
OPV Booster	16-24 months	2 drops	Oral	Oral
JE-2	16-24 months	0.5 ml	Sub-cutaneous	Left Upper Arm
Vitamin A^{***} (2nd to 9th dose)	16-18 months. Then one dose every 6 months up to the age of 5 years.	2 ml (2 lakh IU)	Oral	Oral
DPT Booster-2	5-6 years	0.5 ml.	Intra-muscular	Upper Arm
TT	10 years & 16 years	0.5 ml	Intra-muscular	Upper Arm

- *Give TT-2 or Booster doses before 36 weeks of pregnancy. However, give these even if more than 36 weeks have passed. Give TT to a woman in labour, if she has not previously received TT.
- **JE Vaccine is introduced in select endemic districts after the campaign.
- *** The 2nd to 9th doses of Vitamin A can be administered to children 1-5 years old during biannual rounds, in collaboration with ICDS.
- #Phased introduction, at present in Andhra Pradesh, Haryana, Himachal Pradesh and Orissa from 2016 & expanded in Madhya Pradesh, Assam, Rajasthan, and Tripura in February 2017 and planned in Tamil Nadu & Uttar Pradesh in 2017.
- \$ Phased introduction, at present in five states namely Karnataka, Tamil Nadu, Goa, Lakshadweep and Puducherry. (As of Feb' 2017)

National immunization schedule

Eligibility	Vaccine/s
At Birth	BCG OPV – 0 Hepatitis – B
6 weeks of age	OPV – 1 Pentavalent vaccine – 1 Rota virus – 1 (in AP, Orissa, Haryana and HP only at present)
10 weeks of age	OPV – 2 Pentavalent vaccine – 2 Rota virus – 2 (in AP, Orissa, Haryana and HP only at present)
14 weeks of age	OPV – 3 IPV Pentavalent vaccine – 3 Rota virus – 3 (in AP, Orissa, Haryana and HP only, at present)
9 months of age	Measles Vitamin A – first dose
16 – 24 months of age	DPT – first Booster OPV booster Measles 2 nd dose Vitamin A – second dose followed by every 6 months till 5 yr. age JE (in endemic districts only)
5 – 6 years of age	DPT second booster
10 and 16 years of age	TT

IAP IMMUNIZATION TIME-TABLE

AGE	VACCINES	COMMENTS
BIRTH	BCG, OPV0 Hep – B1	administer these vaccine to all newborn before discharge
6 WEEK S	DTWP1,IP V 1 Hib 1, Rotavirus 1 PCV	<p>DTP- DTaP vaccine /combination should preferably be avoided for the primary series .</p> <p>Polio – All dose of IPV may be replaced with OPV if administration of farmer is not feasible.</p> <p>Rotavirus – 2 dose of RV1 and 3 dose of RV5</p> <ul style="list-style-type: none"> • RV1 should be employed in 10 &14 weeks. • Schedule, instead of 6 &10 weeks.

10 weeks	DTWP 2 IPV 2, Hib 2 Rotavirus 2 PCV 2	Rotavirus • If rotavirus 1 is chosen , the first dose should given at 10 weeks.
14 weeks	DTWP 3 , IPV 3 Hib 3 Rotavirus 3 PCV 3	Rotavirus •Only 2 doses of RV 1 are recommended present.
6 months	OPV 1 Hep B 3	The final 3 rd & 4 th dose in the Hep B vaccine series should be administered no earlier than age 24 weeks & at 16 weeks after the first dose
9 months	OPV 2 MMR 1	MMR • Measles vaccine ideally should not be administered before completing 9 month

9 to 12 month	Typhoid Conjugate vaccine	<ul style="list-style-type: none"> • currently two ,typhoid conjugate vaccine, typhoid – TCV & peda typh available in market
12 months	Hep – A1	<ul style="list-style-type: none"> •Single dose for live attenuated H 2 strain Hep A vaccine
15 months	MMR 2 Varicella 1 PCV booster	<p>MMR</p> <ul style="list-style-type: none"> •The 2nd dose must follow in 2nd year of life
16 to 18 months	DTWP B1 DTap B1,IPV B1 Hib B1	

18months to 2 years	Hep A 2 Typhoid booster	
4 to 6 years	DTWP B2 DTap B2 OPV 3 Varicella Typhoid booster	Varicella •2 nd dose can be given at any time 3 month after the first dose
10 to 12 years	Tdap/Td HPV	Tdap • Is preferred to Td followed by Td every 10 year HPV •Only 2 nd dose of either of the two HPV vaccines for adolescent /pre – adolescent 9- 14 years

COLD CHAIN

- The 'Cold Chain' is a system of storage, transport and distribution of vaccines in the state of efficiency and potency at recommended temperature from the manufacturer to the actual recipient of vaccine. The failure of cold chain system may lead to ineffective protection against the vaccine preventable disease. Maintenance of cold chain is the corner stone for the success of immunization program.
- For short term storage vaccines i.e for 1 to 2 month + 2°C to 8°C is the safe zone and for long term



The Essential Elements Of The Cold Chain



COLD CHAIN EQUIPMENTS

(A) Walk- In Cold Room/Walk-in Cooler (WIC)

Walk in cold room located at regional centres where large dose of vaccines will be stored upto 3 months and vaccines are supplied to 4 to 5 districts.

1. Walk-in Cooler & Freezer



Walk-in Cooler
(+2° C to +8° C)



Walk-in Freezer
(-15° to -25° C)



(B) Deep Freezer

These will be used to prepare frozen ice packs which will be used in day carriers, vaccines at 20*c e.g BCG, OPV and measles. Deep freezer will be used for long term storage. Alcohol stem thermometer will be used to monitor the temperature.



(C) Icelined Refrigerators (ILR)

- Vaccines are stored for short-term duration. ILR will be supplied to all primary health centers. Post- partum and family planning centers. Dial thermometers are used to monitor temperature. Apart from vaccines, no other items are stored in the ILR.



(D) Cold Boxes

- To transport the vaccines to periphery centres cold boxes are used.



(E) Vaccine Carriers

- Small quantity of vaccine for outreach places are transported in vaccine carriers, where the vaccine vials are side packed with four fully frozen ice packs and the carriers are closed tightly.



(F) Day Carrier

- To carry small quantities of vaccine to near by session, day carriers are used

3.Day carriers

- *Used to carry very small quantities of vaccines(6 to 8 vials)*
- *For a near by session*
- *2 icepacks are used*
- *For only 2 hours period*





Immunization Status Of Child

- If the child is vaccinated against 6 killer diseases first doses of vaccines is called as, primary vaccination, and the under five children are vaccine then the child is said to be fully immunized and if he had one or other vaccine, not complete dose will be called as partially immunized.



EXPANDED PROGRAMME OF IMMUNISATION

The EPI was launched in India in 1978 with an aim to reduce morbidity and mortality due to the VPD. The target diseases are tuberculosis, diphtheria, and measles. Typhoid is also included in the routine immunization programme. The EPI is an essential component of primary health care.





➤ The Salient Objectives Of The EPI Are:-




1. Creating Community awareness by spreading information about these disease and the respective vaccines.
2. Increasing the production of the vaccines.
3. Total coverage of children and pregnant women
4. Training personnel for implementation
5. Monitoring and
6. Research



UNIVERSAL IMMUNISATION PROGRAMME

Universal Immunization Programme is a vaccination program launched by the Government of India in 1985. Vaccine against six target disease are to be administered in the first year of life. The National goals of immunisation are 85 percent coverage for DPT, Polio and typhoid, and 100 percent for TT in pregnant women. The UIP is a time bound programme with definite targets. It aim at child survival as a whole.

GOAL: Hundred percent coverage of children with full immunization

- To develop newer vaccines
 - To improve vaccine production technologies.
 - To equip the health care professionals with adequate knowledge of epidemiology of disease.
 - To propagate the message on principle and practice of immunization
 - The national health policy is also aimed at achieving universal immunization coverage of the eligible population.
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