



Expanded Program On Immunization

"EPI"

# *Expanded Program on Immunization* *(EPI)*



***In 1974***

*The EPI was launched by WHO*

*EPI*

*Expansion Denotes:*



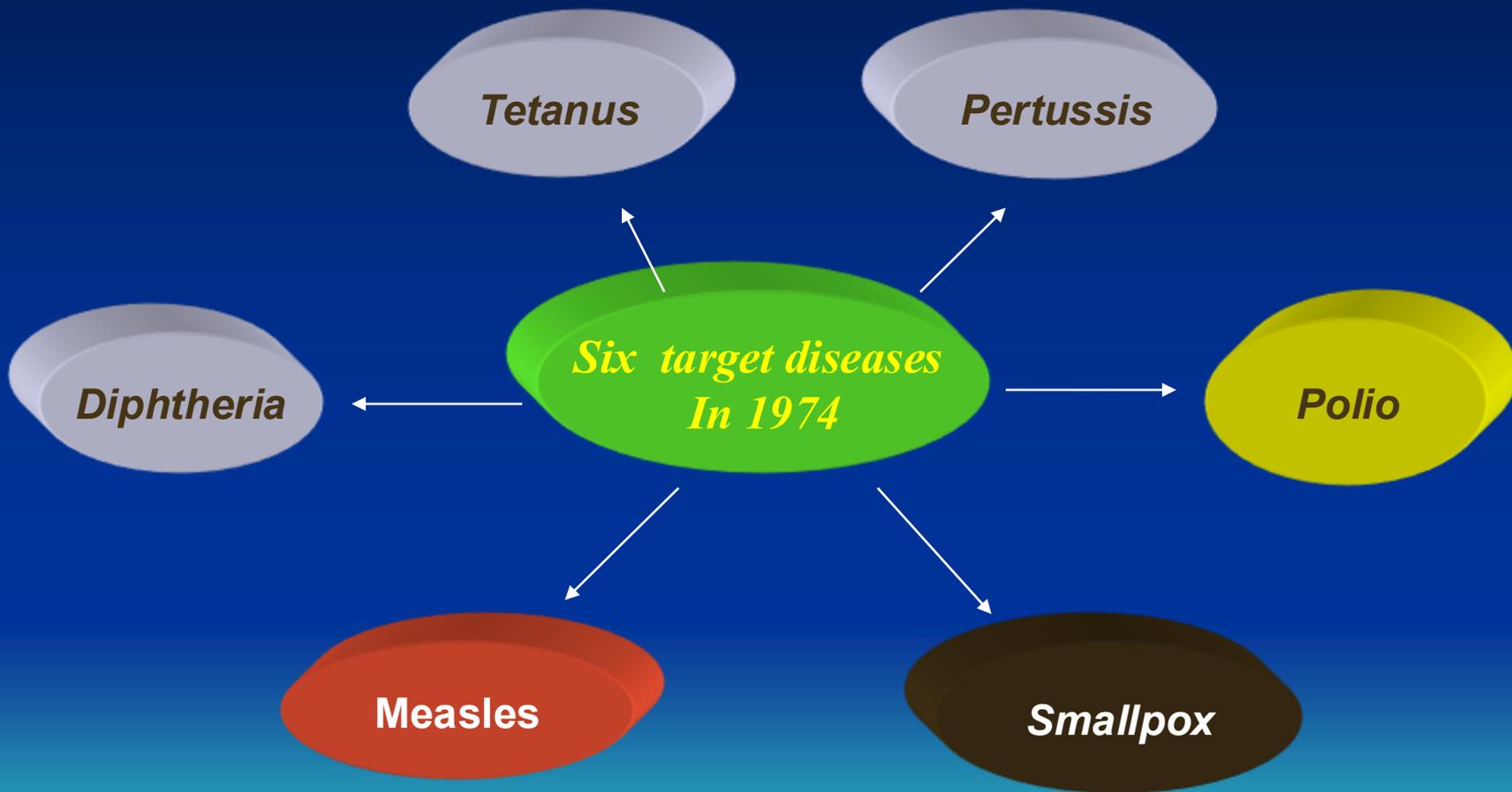
1

*Introduction of additional disease antigens in the vaccine schedule*

2

*Increase in targets to be covered (children and women)*

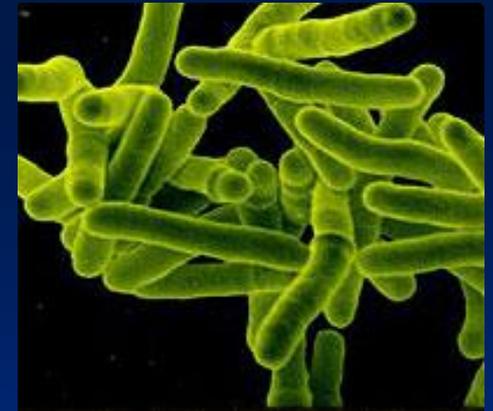
# *EPI In 1974: less than 5% of children were immunized*



# *The EPI vaccines*

# BCG

- ❑ *BCG (Bacille Calmette-Guérin)*
- ❑ *It is a live freeze-dried vaccine which must be reconstituted*
- ❑ *Administered intra-dermally*
- ❑ *Using a special needle and syringe.*



# BCG vaccine

- ❑ *It is given at the deltoid region on the left side*
- ❑ *Dose: 0.05 ml*
- ❑ *If given correctly, the injection raises a small "bleb" which looks like the peel of an orange.*



# Potency of BCG

- ❑ *However, the vaccine is only 50%-80% effective against these forms of childhood TB.*
- ❑ *BCG offers some protection against leprosy*
- ❑ *but its protection against adult forms of tuberculosis is uncertain.*

Booster doses of BCG  
are not recommended by WHO

# Triple vaccine (DTP)

- ❑ *The DTP combination vaccine is a liquid vaccine, which must not be frozen.*
- ❑ *It contains vaccine components against diphtheria, Pertussis\*, and tetanus (\*whooping cough).*
- ❑ *The vaccine is given intramuscularly.*
- ❑ *Antero-lateral, **right thigh** or **upper arm***
- ❑ *Three doses are needed for full protection, at least four weeks apart.  
**(2, 4, 6 months)***
- ❑ *Dose: 0.5 ml I. M.*



# Triple vaccine (DTP)

## ❑ *Other variations include:*

- *DT (with a full diphtheria component),*
- *TT (tetanus toxoid alone) for women of childbearing age,*
- *Td (with a reduced diphtheria component) for adults.*
- *Some countries have substituted acellular pertussis vaccine (aP) for the whole cell pertussis component.*



# Oral polio vaccine (OPV)

- ❑ *OPV is a liquid vaccine comprising three serotypes of live attenuated poliovirus.*
- ❑ *The vaccine is administered orally.*
- ❑ *Dose: 2 drops*

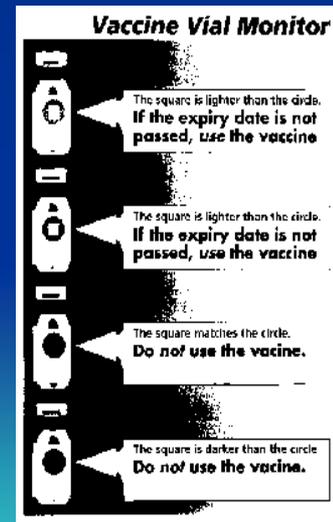


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# Oral polio vaccine (OPV)

- ❑ *Once opened, vials of OPV can be stored and re-used - provided they are kept within the cold chain and not used beyond the expiry date.*
- *Since 1996, the phased introduction of “**vaccine vial monitors**” (VVMs) on vials of OPV ensures that health workers can determine whether vaccine has been damaged by heat or is still safe to use*



# Oral polio vaccine (OPV)

- ❑ *There are two kinds of polio vaccine - an inactivated injectable polio vaccine (IPV) originally developed in 1955 by Dr Jonas Salk,*
- ❑ *and a live attenuated oral polio vaccine (OPV) developed by Dr Albert Sabin in 1961.*
- ❑ *Although both are highly effective against all three types of poliovirus, there are significant differences in the way each vaccine works.*

IPV



OPV

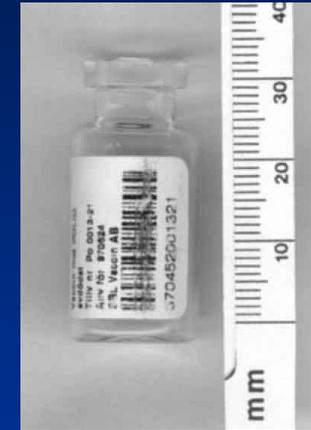


# Oral polio vaccine (OPV)

- OPV is the vaccine of choice for eradication of poliomyelitis. WHY?*
  - It is less expensive (IPV costs five times as much)*
  - and easier to administer than an injectable vaccine.*
  - But the overriding reason is its ability to induce immunity in the gut - the key site where poliovirus multiplies, can be shed in feces for 6 weeks*

# Injectable polio vaccine (IPV)

- ❑ *IPV provides individual protection against polio paralysis*
- ❑ *but is not capable of preventing the spread of wild poliovirus, since it induces only very low immunity in the gut.*
- ❑ *Because of this, IPV cannot be used to eradicate polio.*



# Oral polio vaccine (OPV)

Age	Vaccines	Hepatitis B (Hep B) vaccine ***	
		Scheme A	Scheme B
Birth	BCG, OPV 0 *	Hep B 1	
6 weeks	DPT 1, OPV 1, HiB 1	Hep B 2	Hep B 1
10 weeks	DPT 2, OPV 2, HiB 2	Hep B 3	Hep B 2
14 weeks	DPT 3, OPV 3, HiB 3		Hep B 3
9 months	Measles, Vitamin A, Yellow Fever **		
Mothers	Vitamin A – 1 dose at delivery or within 6-8 weeks of delivery		
Women of childbearing age, and especially pregnant women	TT1 – as soon as possible in pregnancy or as early as possible in childbearing years		
	TT2 – at least 4 weeks after TT1		
	TT3 – at least 6 months after TT2		
	TT4 and TT5 – at least one year after the previous TT dose		

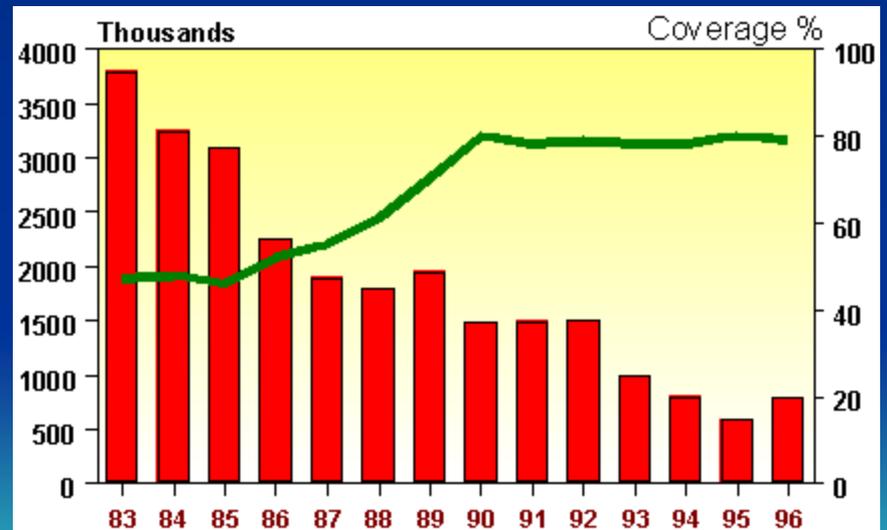


- ❑ *WHO recommends that four doses of OPV should be given before the first birthday.*
- ❑ *However, additional (supplementary) doses are needed to achieve eradication*
- ❑ *During National Immunization Days (NIDs) in 1997, 450 million children - almost two thirds of the world's children under five - were given supplementary doses of polio vaccine.*

# Measles



- *Measles is a highly infectious vaccine preventable disease*



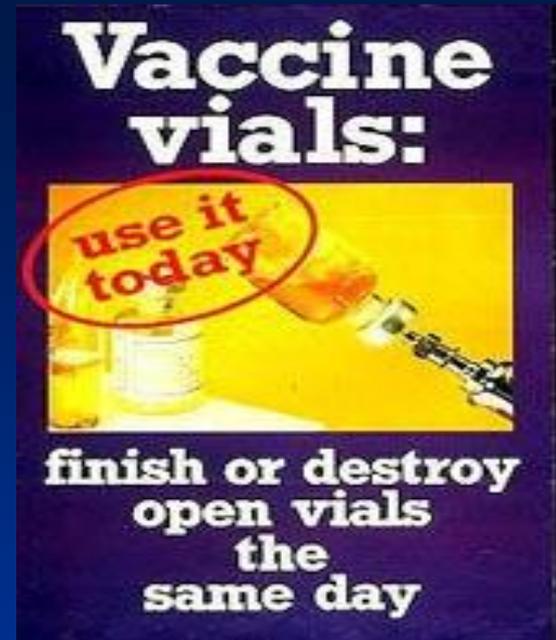
# Measles vaccine

- ❑ *Measles vaccine is a live attenuated freeze-dried vaccine*
- ❑ *It is given subcutaneously, at the right arm*
- ❑ *Dose: 0.5 ml*



# Measles vaccine

- ❑ *Once the vaccine has been reconstituted, it must be protected from the light and kept as cool as possible.*
- ❑ *Any doses remaining in an opened vial at the end of a vaccination session must be discarded.*



# MMR vaccine

- ❑ *The vaccine contains the three live viruses which have been weakened against measles, mumps and rubella*
- ❑ *It is offered to all children aged 12 months and over .*
- ❑ *A second dose is offered at the time of the pre-school booster, if not before .*
- ❑ *The vaccine is very effective and after 2 doses almost 100% of people are protected*
- ❑ *The dose is: 0.5 ml, subcutaneously, at right arm*



MMR



# Hepatitis B vaccine

- ❑ *This liquid vaccine requires three doses intramuscularly, at least four weeks apart. Dose :0.5 ml.*
- ❑ *It must not be frozen.*
- ❑ *If transmission of the disease is mainly perinatal (e.g. South East Asia) the earlier schedule is recommended.*  
*otherwise*
- ❑ *The vaccine is given at the same time as each dose of DTP.*



# *Hepatitis B vaccine*

- ❑ *Two kinds of vaccine are available:*
  - ❑ *an inactivated plasma-derived vaccine (available since 1981)*
  - ❑ *and a more expensive genetically engineered (DNA recombinant) vaccine (on the market since 1986).*

# Hepatitis B vaccine

- ❑ *Hepatitis B vaccine is the first vaccine to be developed against a form of cancer (liver cancer)*
- ❑ *More than 2 billion people alive today have at some time in their lives been infected with hepatitis B virus (HBV).*
- ❑ *Of these, about 350 million remain chronically infected carriers - a ticking time bomb that can transmit the disease for many years before going on to develop cirrhosis of the liver or liver cancer.*
- ❑ *Every year there are about 4 million acute clinical cases of hepatitis B and about a million deaths.*
- ❑ *Primary liver cancer caused by hepatitis B is now one of the principal causes of cancer **death in many parts of Africa, Asia, and the Pacific Basin.***

# Vitamin A deficiency

- ❑ *Within immunization programs,*
  - ❑ *vitamin A can be given to mothers immediately after birth (to enrich breast milk),*
  - ❑ *to young children receiving routine immunization or during campaigns,*
  - ❑ *and as part of treatment of measles cases.*
- ❑ *Vitamin A supplement, as part of EPI, is given along with measles vaccine*
- ❑ *Two doses of vitamin A (100,000 IU) are usually administered at 9<sup>th</sup> and 18<sup>th</sup> months of age*

# Vitamin A deficiency

□ *By combining vitamin A with measles vaccine, WHO aims to benefit children in two ways.*

*[1] By offering two interventions instead of one: the service is more efficient, is seen to be more attractive, and vaccine coverage rises - thus further reducing the incidence of measles.*

*[2] By raising the vitamin A status of high risk infants: not only does the measles case fatality rate fall, but there is a reduction in overall mortality.*

# *Immunization schedule recommended*

## by WHO “EPI”

<i>Age</i>	<i>Vaccines</i>	<i>Hepatitis B (Hep B) vaccine ***</i>	
		<i>Scheme A</i>	<i>Scheme B</i>
Birth	BCG, OPV 0 *	Hep B 1	
6 weeks	DPT 1, OPV 1, Hib 1	Hep B 2	Hep B 1
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Mothers	Vitamin A – 1 dose at delivery or within 6-8 weeks of delivery		
Women of childbearing age, and especially pregnant women	TT1 – as soon as possible in pregnancy or as early as possible in childbearing years TT2 – at least 4 weeks after TT1 TT3 – at least 6 months after TT2 TT4 and TT5 – at least one year after the previous TT dose		

# HepB vaccination schedule

<i>Age</i>	<i># of Doses</i>	<i>Schedule</i>	<i>Dose Recombivax HB*</i>	<i>Dose Energix-B**</i>
<i>Infants with HBsAg-negative mother</i>	<i>3</i>	<i>0 to 2, 1 to 4, and 6 to 18 months</i>	<i>5.0 µg (0.5 mL)</i>	<i>10 µg (0.5 mL)</i>
<i>Infants with HBsAg-positive mother</i>	<i>3</i>	<i>Hepatitis B immune globulin and vaccination within 12 hours of birth, then vaccine at 1 to 2 and 6 months</i>	<i>5.0 µg (0.5 mL)</i>	<i>10 µg (0.5 mL)</i>

# Vaccine Contraindications

# *Notes to be considered in Immunization schedule*

1

*All EPI antigens are safe and effective when administered simultaneously but at different sites*

## *Notes to be considered in Immunization schedule*

2

*Doses of the vaccine at less than the recommended 4 weeks interval may lessen the antibody response.*

*They should not be counted as part of the primary series*

# *Notes to be considered in Immunization schedule*

3

*Lengthening the interval between the doses of the same vaccine leads to higher antibody levels*

*However it is important to complete the primary series early on before the age of high risk of infection*

## *Notes to be considered in Immunization schedule*

4

*Live attenuated vaccines generally produce long lasting immunity through a single dose*

*(e.g. 95% of recipients will respond to a single dose of measles; a second dose of MMR assumes 100% protection)*

## *Notes to be considered in Immunization schedule*

5

*In Inactivated and killed vaccines, the first dose does not provide protection. The protective immune level develops after the 2<sup>nd</sup> or 3<sup>rd</sup> dose.*

*Periodic boosting is required*

## *Notes to be considered in Immunization schedule*

6

*Children with HIV infection should not receive live attenuated vaccines  
(However, Measles vaccine must be given)*

# *Notes to be considered in Immunization schedule*

7

*Tetanus immunoglobulin (250 IU)  
must be given to babies:*

- Born outside hospitals*
- Seen within 10 days of delivery*
- Whose mothers were not given at least two documented doses of tetanus toxoid during pregnancy*

# *Absolute contraindications to immunizations*

1

*History of anaphylactic reaction following ingestion of eggs is a contraindication to vaccines prepared in hen's eggs (e.g. yellow fever and influenza vaccines)*

# *Absolute contraindications to immunizations*

## 2

*Subsequent doses of pertussis vaccine are absolutely contraindicated if:*

- 1. The child Suffers from fever of 40.5 degree Celsius not due to other causes (within 48 hours)*
- 2. Collapse or shock*
- 3. Convulsions with or without fever within 3 hours of vaccination*

# *Absolute contraindications to immunizations*

3

HIV infection is an absolute contraindication to administration of live attenuated vaccine

*(However, routine vaccination with measles vaccine is a must as early as possible (6 month of age), in addition to the scheduled dose at nine months)*

# *Temporary contraindications to immunizations*

1

*Pregnancy:*

*The only vaccine that can be administered during pregnancy is TT*

# *Temporary contraindications to immunizations*

2

*Severe illness that needs  
hospitalization*

# *Temporary contraindications to immunizations*

3

## *Immuno-suppression*

*Live attenuated vaccines should not be given during intake of immunosuppressant therapy, leukamia, lymphoma, or cancer*

# *Temporary contraindications to immunizations*

4

*Recent receipt of blood as it contains antibodies that neutralize the vaccine antigens*

*It is recommended to postpone vaccination 14-21 days after the receipt of blood*

# *The strategy for vaccine delivery*

## *1. The static immunization strategy*

*Immunization services are provided through PHC centers, hospitals, and vaccine qualified clinics*

## *2. The national immunization days (NIDs)*

*This is a periodic immunization of all the eligible targets in a defined age group over a large geographic area, and within a short period of time*

*(e.g 2 doses of polio during 1-3 days to be repeated after 4-6 weeks)*

## *3. The outreach immunization service*

*The health team identify the risk areas in order to vaccinate the targets at their residence*

# *False contraindications to immunization*

- 1. Minor illnesses e.g. URT or diarrhoea with low fever*
- 2. Allergy e.g. asthma, hay fever, ...etc*
- 3. Premature or small for date infants*
- 4. Malnutrition*
- 5. Child being breast fed*
- 6. Family history of convulsions*
- 7. Treatment with antibiotics*
- 8. Dermatitis, or localized skin lesion*
- 9. Chronic disease of the heart, lungs, kidneys or liver*
- 10 Stable neurological condition e.g. Down's syndrome*
- 11. History of Jaundice at birth*