**Expanded Programme on Immunization (EPI):**

**Introduction**
Four to five million annual deaths could be prevented by 2015 through sustained and appropriate immunization efforts, backed by financial support. Vaccination is one of the most successful and cost-effective public health interventions.

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

Immunization is a proven tool for controlling and eliminating life-threatening infectious diseases, providing children with essential immunizations in the first few years of life is crucial to any country’s fight against infectious disease.

WHO recognized this more than three decades ago when they chose six diseases — tuberculosis, diphtheria, neonatal tetanus, whooping cough, poliomyelitis and measles — as the targets for an initiative called the Expanded Programme on Immunization (EPI).

**Routine immunization** is the basis of the EPI activities. On a regular basis vaccines for measles, rubella, diphtheria, pertussis, tetanus, polio, hepatitis B and tuberculosis, are provided in health facilities all over the country. Vaccinations are given in static, out-reach and mobile health facilities.

**General objectives of EPI:**
- Reduction in the morbidity and transmission of vaccine preventable diseases, such as pertussis, measles, hepatitis B.
- Reduction in mortality from vaccine preventable diseases.
- Elimination and Eradication of certain diseases, such as smallpox, polio
- Improvement in national economy – less health care cost caring for sick children, less time off work of parents.

**EPI strategies:**
- Provision of effective, safe and potent vaccines to the target population.
- Universal accessibility and use of routine vaccination services through MOH/PHC Centers.
- Improvement of vaccination services through:
  - Training.
  - Cold chain system.
  - Introduction of new vaccines.
  - Ensure adequate and reliable financing.
  - Strengthening surveillance of target diseases.
The Expanded program of immunization (EPI): was introduced and many countries adopted this program, among which Iraq since 1985. Through the application of EPI around the world, millions of death had been prevented. Poliomyelitis is about to be eradicated, about two third of the developing countries have succeeded in eliminating neonatal tetanus.

Low immunization rate:
Low immunization rate and outbreaks of diseases cause a serious threat to non-immune children and adults in all countries worldwide. Rapid growth in international travel and mass population movement have increased potential for diseases to spread, not just across the national borders but to other countries as well.

Causes of low immunization rate:
- Many countries were unable to ensure adequate supplies of vaccines. They could not afford a cost of establishing the safe and efficient vaccine delivery system.
- In developing countries, many children are still without immunization because they are living in remote area or they cannot reach the health services. Immunization drop-out rate is highest among poorest population who may fail to complete the full immunization schedule due to limited access or irregular provision of health services.

National Immunization Schedule:
It is a recommended series of vaccinations including the suggested timing of all doses. It including vaccines given over the child’s first year and tetanus vaccination is given to women of childbearing age.

National Immunization Schedule/Iraq:

<table>
<thead>
<tr>
<th>Child Age</th>
<th>Vaccine</th>
</tr>
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<tbody>
<tr>
<td>- End of 1st week after birth</td>
<td>BCG+OPV0+HBV1</td>
</tr>
<tr>
<td>- End of 2nd month</td>
<td>DPT1+OPV1+HBV2</td>
</tr>
<tr>
<td>- End of 4th month</td>
<td>DPT2+OPV2</td>
</tr>
<tr>
<td>- End of 6th month</td>
<td>DPT3+OPV3+HBV3</td>
</tr>
<tr>
<td>- End of 9th month</td>
<td>Measles</td>
</tr>
<tr>
<td>- End of 15th month</td>
<td>MMR</td>
</tr>
<tr>
<td>- End of 18th month</td>
<td>DPT+OPV (1st booster)</td>
</tr>
<tr>
<td>- School entry (4-6) years</td>
<td>DPT+OPV (2nd booster)</td>
</tr>
<tr>
<td>- 10 years later</td>
<td>Td (full dose tetanus and reduced Dose of Diphtheria)</td>
</tr>
<tr>
<td>*</td>
<td></td>
</tr>
<tr>
<td>*Girls at secondary school entry</td>
<td>Rubella vaccine</td>
</tr>
<tr>
<td>(12 years old)</td>
<td></td>
</tr>
</tbody>
</table>
*Pregnant women

Tetanus toxoid

1\textsuperscript{st} dose (16 weeks) - no protection

2\textsuperscript{nd} dose (4-6 wks later) - 3 years protection

3\textsuperscript{rd} dose (6 months later) - 5 years protection

4\textsuperscript{th} dose (1 year later) - 10 years protection

5\textsuperscript{th} dose (1 year later) - life protection

-if infant develop a sever reaction to DPT (diphtheria, pertussis, tetanus) give DT (diphtheria, tetanus).

-OPV= oral polio vaccine.

- MMR= measles, mumps, rubella.

\textbf{Forms of immunization}

\textbf{A. Active immunization:}

development of sensitized lymphocytes and active antibodies by giving immunogenic material from organism (viral/bacterial protein, \textit{killed viral particles}, or changed virus/bacterial particles).

Protects for many years.

E.g injectable polio vaccine.

\textbf{B. Live virus immunization:}

Uses live, but modified, non-pathogenic \textit{(live attenuated virus/bacterial particles)}.

Generally must be refrigerated to preserve potency

Examples – oral polio, measles, varicella, oral typhoid fever

\textbf{C. Toxoid immunization:}

Uses \textit{modified version of toxin} that causes disease.

Examples – tetanus, diphtheria.

\textbf{D. Passive immunization:}

Giving \textit{preformed antibodies}, from animal or human origin

Protects for short period, usually months only

Examples – gamma globulin for hepatitis or measles protection, tetanus immune globulin, rabies immune globulin.

\textbf{E. Biosynthetic vaccines :} (such as Hib /H influenza B) contain synthetic substances.

\textbf{Vaccine Handling & Storage (Cold Chain):}

“Cold Chain” is the system of transporting and storing vaccines

“Cold chain” refers to the process used to maintain optimal conditions during the transport, storage, and handling of vaccines, starting at the manufacturer and ending with the administration of the vaccine to the client.
The optimum temperature for **refrigerated vaccines** is between +2°C and +8°C. For **frozen vaccines** the optimum temperature is -15°C or lower. In addition, protection from light is a necessary condition for some vaccines.

**Cold Chain Management:**
Anyone handling vaccines is responsible for their potency, at each step in transport, storage and administration of vaccines. Vaccines are delicate biological substances that can become less effective or destroyed if they are:
- Frozen
- Allowed to get too hot
- Exposed to direct sunlight or fluorescent light

Vaccines should be maintained within the recommended temperature range. The optimum temperature for **refrigerated vaccines** is between +2°C and +8°C. For **frozen vaccines** the optimum temperature is -15°C or lower. In addition, protection from light is a necessary condition for some vaccines.

**Importance of Maintaining the Cold Chain**
Vaccines are sensitive biological products which may become less effective, or even destroyed, when exposed to temperatures outside the recommended range. Cold-sensitive vaccines experience an immediate loss of potency following freezing. Vaccines exposed to temperatures above the recommended temperature range experience some loss of potency with each episode of exposure. Repetitive exposure to heat episodes results in a cumulative loss of potency that is not reversible.

**Maintaining the potency of vaccines is important for several reasons:**
- There is a need to ensure that an effective product is being used. Vaccine failures caused by administration of compromised vaccine may result in the re-emergence or occurrence of vaccine preventable disease.
- Careful management of resources is important. Vaccines are expensive and can be in short supply. Loss of vaccines may result in the cancellation of immunization clinics resulting in lost opportunities to immunize.
- Revaccination of people who have received an ineffective vaccine is professionally uncomfortable and may cause a loss of public confidence in vaccines and/or the health care system.

**The cold chain (vaccine preservation)**
Many equipments are needed in transfer and storage of vaccines like freezers, refrigerators, cool boxes, vaccine carriers, cold rooms and thermometers.

**Methods used to detect heat exposure:**
1. **Cold chain monitor; (CCM)** a card with special color index is supplied with each vaccine pack, if the color changes to a certain degree it means
2- **Vaccine viral monitor (VVM):** a sticker present on the vaccine vial with two lines, purple and white, when the vaccine is exposed to heat the white line become purple too, this vaccine must be discarded.

**Vaccine waste management:**
It is the process of destruction of expired or remnants of used vaccines, all theses vaccines must be destroyed by incineration in a remote place especially the live attenuated vaccines because the virus is still alive and environmental temp. may enhance it's growth and become potent because of mutation and result in environmental contamination and spread of disease. All syringes and materials used in vaccination must be incinerated too.

**Herd immunity:**
If the vast majority of the population is immune to a particular agent, the ability of that pathogen to infect another host is reduced; the cycle of transmission is interrupted, and the pathogen cannot reproduce and dies out. This concept, called community immunity or herd immunity, is important to disease eradication because if the number of susceptible individuals can be reduced to a small number through vaccination, the pathogen itself can also be eliminated.