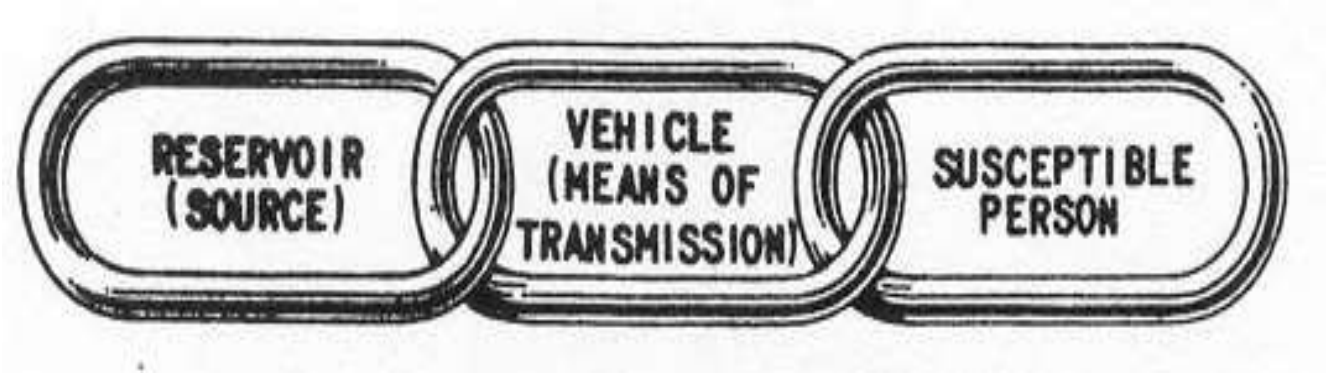
Disease prevention and control



Disease control

- Measures designed to prevent or reduce incidence, prevalence and consequences of disease

Pre- requisites for efficient control:

- Community participation
- Political support
- Inter - sectoral co-ordination

Preventive measures

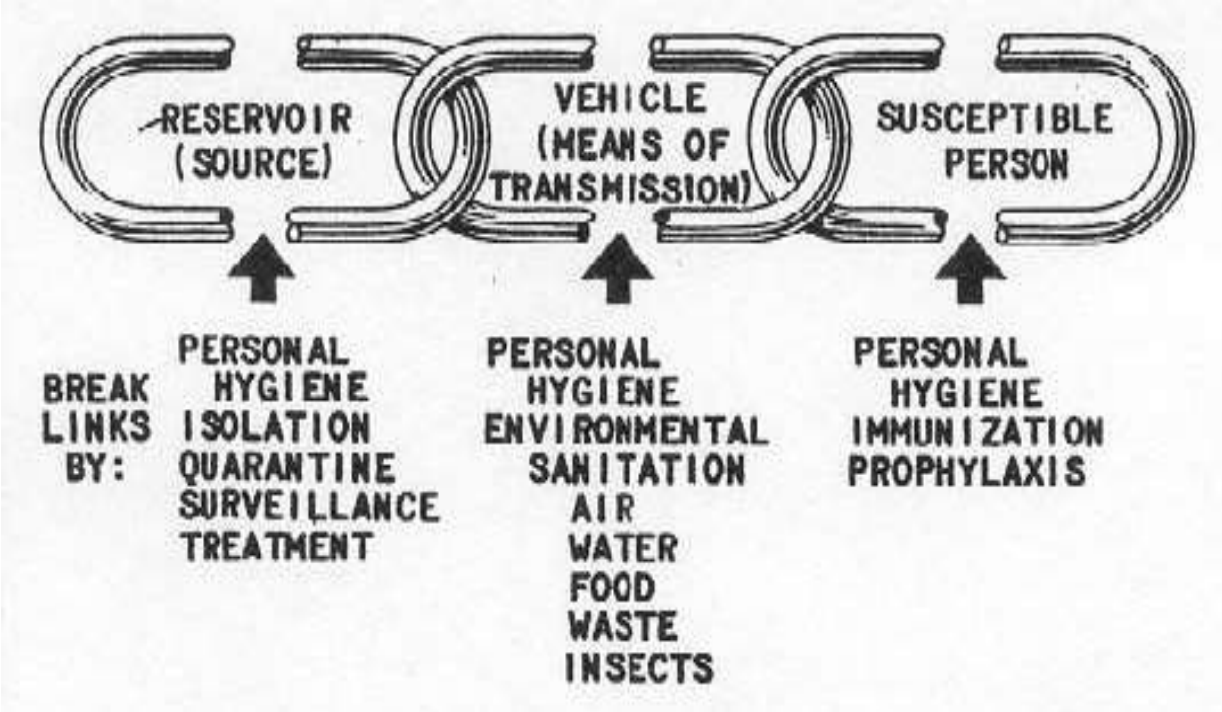
I. Controlling the reservoir

II. Interruption of transmission

III. Susceptible host (people at risk)

I. Controlling the reservoir

- If first link (agent factors) is the weakest – control measure is elimination of reservoir



Methods of reservoir control

1. Early diagnosis
2. Notification
3. Isolation
4. Treatment
5. Quarantine
6. Surveillance
7. Disinfection

1. Early diagnosis

- First step in control of communicable diseases

Needed for:

- Treating the patient
- Epidemiological investigation – tracing source of infection from index case
- To study time, place and person distribution
- Institution of preventive and control measures

2. Notification

- Detected or suspected → notify local health authority
- Source of epidemiological investigation

Notified by:

- Attending physician
- Head of the family
- Any lay person
- Verified by local health authority

International Health Regulation (IHR)

- Prescribed diseases are notified by National health authority to WHO Geneva:

1. Those diseases subject to International Health Regulation (1969), Third Annotated Edition, 1983 – Cholera, Plague and Yellow fever.

2. Diseases under surveillance by WHO – louse-borne typhus fever, relapsing fever, paralytic polio, malaria, viral influenza-A, SARS, smallpox.

3. Epidemiological investigations

- Identify source of infection
- Factors influencing the spread of disease

4. Isolation

Definition:

- "**Separation**, for the **period of communicability** of infected persons or animals from others in such places and under such conditions, as to **prevent or limit** the direct or indirect **transmission** of the infectious agent from those infected to those who are **susceptible**, or who may the agent to others"

4. Isolation

Infection control by:

1. Physical isolation of case or carrier
2. Treatment until free from infection

Purpose of isolation

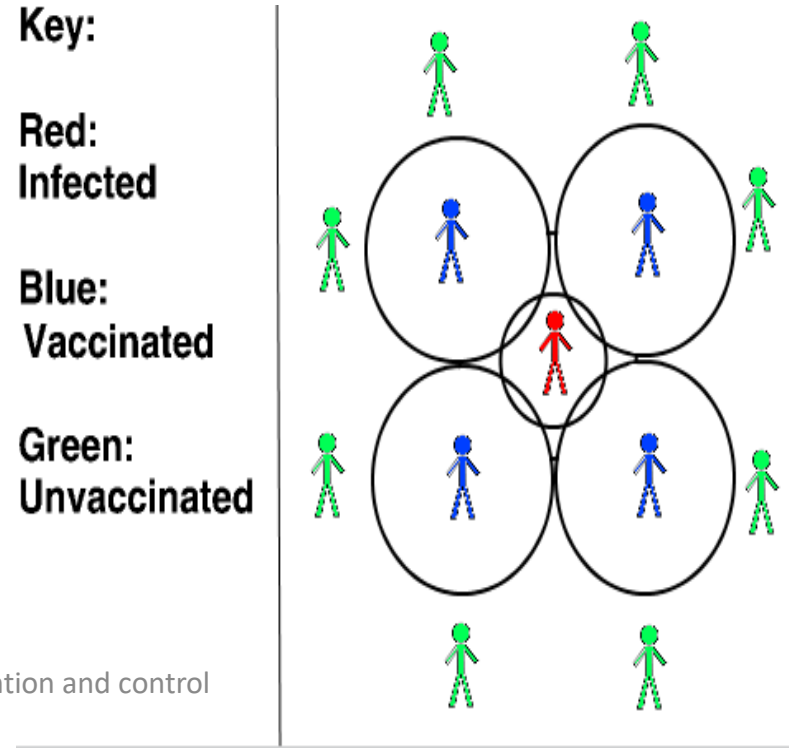
- Prevent transmission from reservoir to susceptible host

Types:

1. Standard isolation
2. Strict isolation
3. Protective isolation
4. High security isolation
5. Hospital isolation → preferred

Ring immunization

- Encircling infected persons with a barrier of immune persons from whom the infection is unable to spread
- Applied worldwide in small pox eradication in 1960s and 70s



Recommended periods of isolation

Disease	Duration of isolation
Chickenpox	Until all leasion crusted; usually about 6 days after onset of rash
Measles	From the day of onset of catarrhal stage through 3rd day of rash
German measles	None, except that women in the first trimester or sexually active, non immune women in child bearing years not using contraceptive measures should not be exposed
Cholera, Diphtheria	3 days after starting Tetracyclines, until 48 hours of antibiotics (or negative cultures after treatment)
Shigellosis Salmonellosis	Until 3 consecutive negative stool cultures
Hepatitis A	3 weeks
Influenza	3 days after onset
Polio	2 weeks adult, 6 weeks paediatric
TB	Until 3 weeks of effective chemotherapy
Herpes zoster	6 days after onset of rash
Mumps	Until swelling subsides
Pertussis	4 weeks or until paroxysms cease
Meningococcal	Until first 6 hours of effective antibiotic therapy are completed

5. Treatment

- Reduces the communicability of disease
- Cuts short duration of illness and prevents development of secondary cases

Types:

- Individual treatment
- Mass treatment
- Inadequate treatment → drug resistance

6. Quarantine

Definition:

- **Limitation of** freedom of **movement** of such **well persons** or domestic animals exposed to communicable disease for a period of time not longer than the longest usual incubation period of the disease, in such manner as to prevent effective contact with those not so exposed”

6. Quarantine

Aim: prevent the spread of disease, reservoirs of disease or vectors of disease

- Refers to restrictions for healthy contact

Applied by health authority to:

1. Ship
2. An aircraft
3. A train
4. Road vehicle
5. Other means of transport

Types of Quarantine

1. Absolute quarantine

2. **Modified quarantine:** selective partial limitation of freedom of movement, e.g., exclusion of children from schools.

3. **Segregation:** “separation for special consideration, control of observation of some part of a group of persons from others to facilitate control of a communicable disease, e.g., removal of susceptible children to homes of immune persons”

II. Interruption of transmission

- Changing some components of man's environment to prevent the infective agent from a patient or carrier from entering the body of susceptible person.

Example:

- water treatment → eliminates risk of water borne diseases
- Clean practices
- Vector-control measures
- Wearing masks

III. The susceptible host

- Third link in chain of transmission

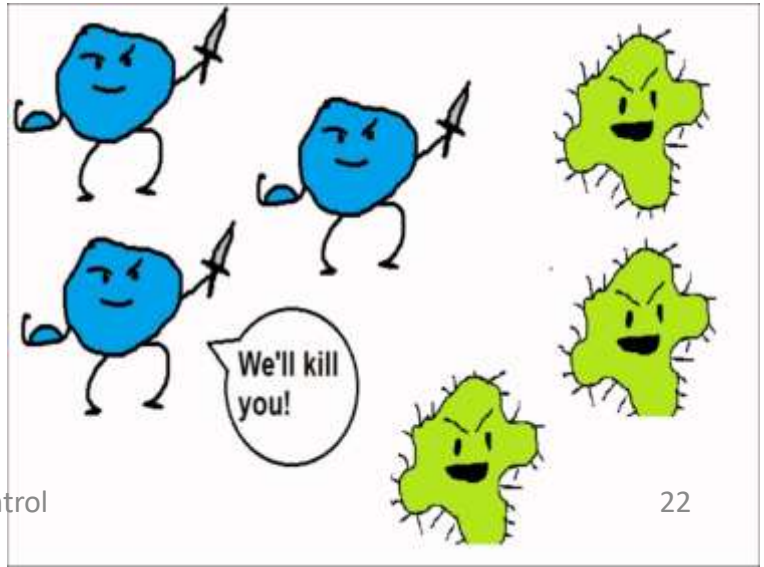
Prevention of disease by:

1. Active immunization
2. Passive immunization
3. Chemoprophylaxis
4. Non specific measures

Who is said to be immune?

Immunity

- Immunity is defined as the **resistance against an infecting organism**
- The immune mechanism of the body is capable of **recognising, destroying and eliminating** infectious micro organisms
- The immune mechanism is due to the body



Immunity

Antigen:

Foreign protein, on introduction into body produces specific antibody

Immunity

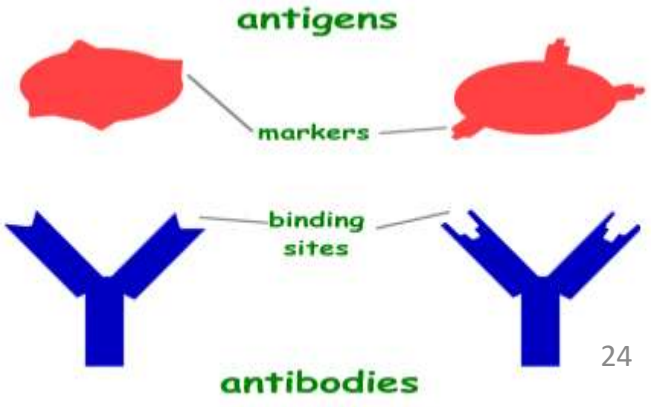
Antibody:

1. Protein substance produced in response to the antigen

2. It recognises the disease producing organism and destroys it

3. It protects the body against the disease

4. Antibodies are produced by spleen, lymph nodes plasma cells



Types of immunity

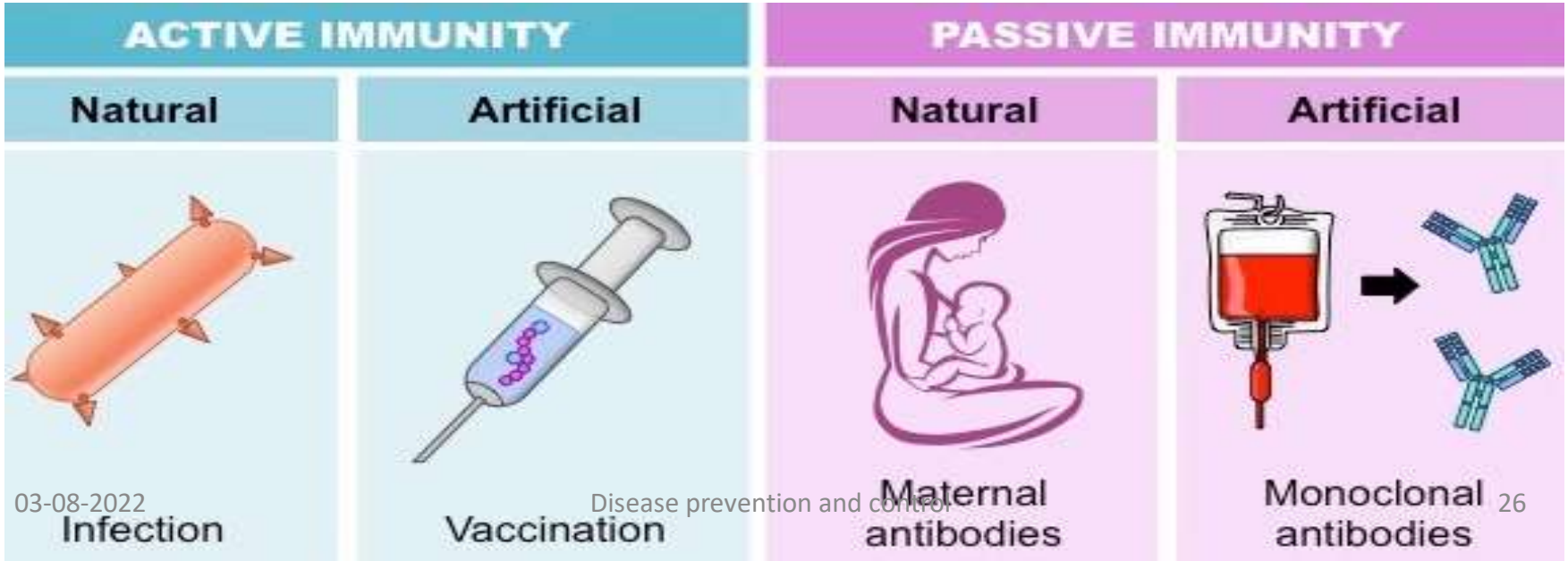
Natural immunity:

- This type of immunity is inherited from birth itself
- It provides natural resistance against diseases
- Man is naturally resistant to a virus called Rinderpest in cattle

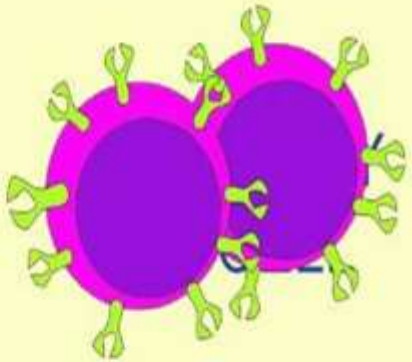
Types of immunity

Artificial Immunity:

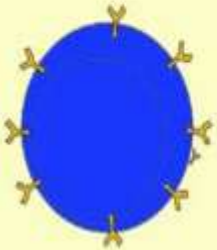
- Produced by vaccines
- **Active Immunity** – Infection, Vaccines, Toxoid
- **Passive Immunity** – Antisera, Immunoglobulins



ACTIVE IMMUNITY

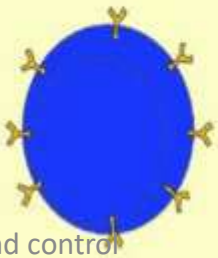


PASSIVE IMMUNITY



IgG from mother crosses placenta

IgA from mother secreted in milk



Immunisation

- It is defined a production of immunity or resistance in the body by means of immunological agents

1. Passive immunisation
2. Active immunisation

- Primary
- Secondary (Booster)

Primary immunisation

- It is carried out in infants and children to induce primary immunity
- It consists of administering 2 or more vaccines or toxoid at suitable intervals

Secondary immunisation

- Booster dose of antigen
- It is carried out during epidemic or travelling out to endemic zones
- Production of IgM and IgG Antibody

Passive immunity

- Administration of antibody containing preparation
- Useful in individuals who cannot produce antibodies

Immunization schedule

- May 1974 – WHO launched "**Expanded immunization programme"** to protect against 6 vaccine preventable diseases
- 1990 – UNICEF sponsored **"Universal Child Immunization"**
- November 19, 1985 – Indian version **"Universal Immunization programme"**

Immunisation schedule

Vaccine preventable diseases:

1. Diphtheria
2. Pertussis
3. Tetanus
4. Polio
5. Tuberculosis
6. Measles

National Immunisation Schedule

- It was launched on Nov 19, 1985

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 Pregnant Women

Vaccine	When to give	Dose	Route	Site
Td-1	Early in pregnancy	0.5ml	Intra-muscular	Upper Arm
Td-2	4 weeks after Td-1	0.5ml	Intra-muscular	Upper Arm
Td-Booster	If received 2 Td doses in a pregnancy within the last 3 yrs	0.5ml	Intra-muscular	Upper Arm

For Infants

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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

Vaccine	When to give16-24 months	Dose	Route	Site
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
Td	10 years & 16 years	0.5 ml	Intra-muscular	Upper Arm

Chemoprophylaxis

- Protection from, or prevention of, disease

Achieved by:

1. **Causal prophylaxis** → complete prevention of infection by early elimination of the invading or migrating causal agent

2. **Clinical prophylaxis** → prevention of clinical symptoms

Non specific measures

- Interrupt pathways of transmission
- Improvement in quality of life
- Legislative measures

Surveillance

- Must follow control measures

Definition:

- “Continuous scrutiny of all aspects of occurrence and spread of disease that are pertinent to effective control”

Types of surveillance

1. **Individual surveillance:** infected persons until they are no longer a risk
2. **Local surveillance:** Malaria surveillance
3. **National population surveillance:** surveillance of small pox after its eradication
4. **International surveillance:** WHO maintains surveillance

Thank you