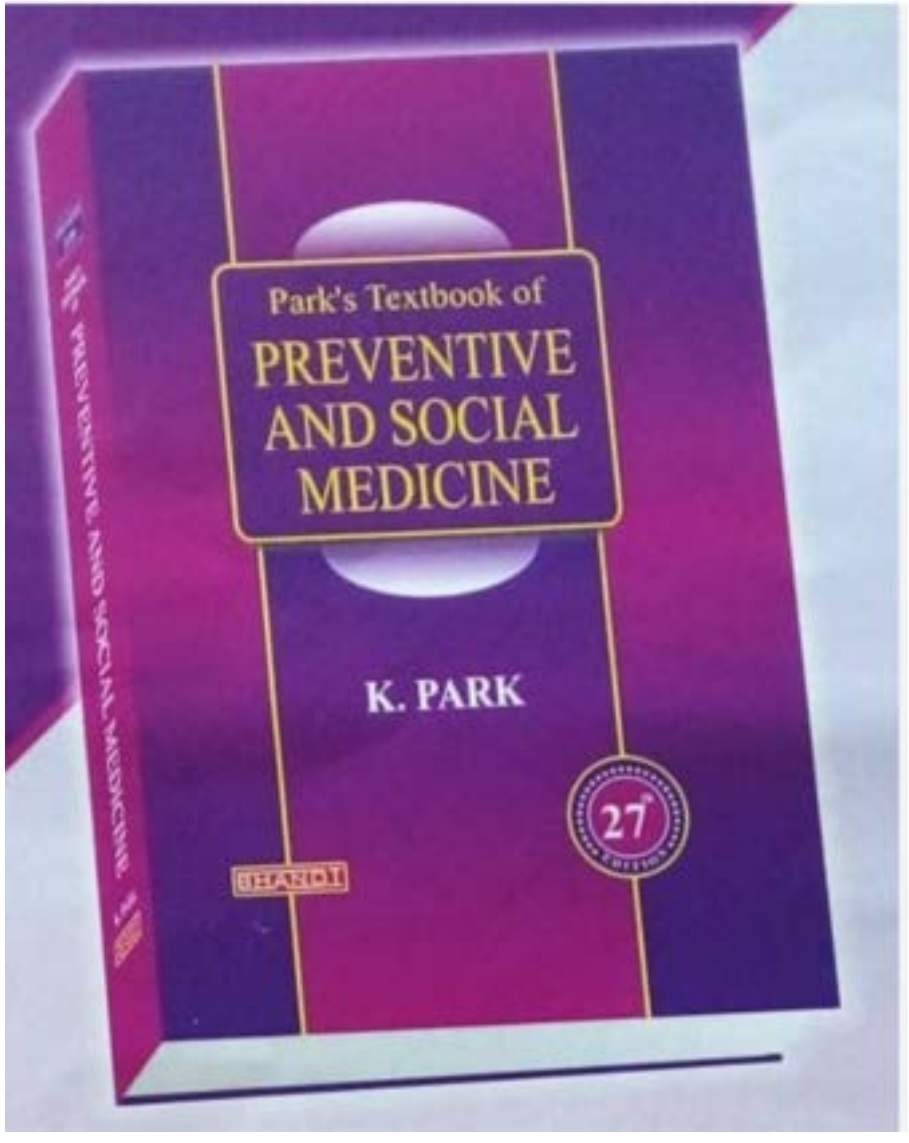
COMPILED MODULE: PARK PSM



CONTENTS

Birth of preventive medicine

Preventive medicine really dates back to the 18th century. It developed as a branch of medicine distinct from public health. Curiously, it came into existence even before the causative agents of disease were known. James Lind (1716–1794), a naval surgeon advocated the intake of fresh fruit and vegetables for the prevention of scurvy in 1753. Edward Jenner (1749–1823) of Great Britain, a pupil of John Hunter, discovered vaccination against smallpox in 1796. These two discoveries marked the beginning of a new era, the era of disease prevention by specific measures.

Preventive medicine got a firm foundation only after the discovery of causative agents of disease and the establishment of the germ theory of disease. The latter part of the 19th century was marked by such discoveries in preventive medicine as Pasteur's anti-rabies treatment (1883), cholera vaccine (1892), diphtheria antitoxin (1894), anti-typhoid vaccine (1898), antiseptics and disinfectants (1827–1912), etc. A further advance was the elucidation of the modes of disease transmission. For example, in 1896, Bruce, a British Army surgeon, demonstrated that the African sleeping sickness was transmitted by tsetse fly. In 1898, Ross demonstrated that malaria was transmitted by the Anopheles. In 1900, Walter Reed and his colleagues demonstrated that yellow fever was transmitted by the

Goalposts for the Human Development Index

DIMENSION	OBSERVED MAXIMUM	MINIMUM
Life expectancy	85	20.0
Mean years of schooling	15	0
Expected years of schooling	18	0
Per capita income (PPP $)	75,000	100

Having defined the minimum and maximum values, the subindices are calculated as follows:

$$\text{Dimension index} = \frac{\text{Actual value} - \text{Minimum value}}{\text{Maximum value} - \text{Minimum value}} \quad (1)$$

The HDI is the geometric mean of the three dimension indices:

$$(I_{Life}^{1/3} \times I_{Education}^{1/3} \times I_{Income}^{1/3}) \quad (2)$$

The construction of HDI methodology can be illustrated with the example of India for the year 2019.

Indicator	Value
Life expectancy at birth (years)	69.7
Mean years of schooling (years)	6.5
Expected years of schooling (years)	12.2
GNI per capita (PPP $)	6,681

$$\text{Life expectancy index} = \frac{69.7 - 20}{85 - 20} = \frac{49.7}{65} = 0.764$$

$$\text{Mean years of schooling index} = \frac{6.5 - 0}{15 - 0} = 0.433$$

$$\text{Expected years of schooling index} = \frac{12.2 - 0}{18.0 - 0} = 0.677$$

$$\text{Education index} = \frac{0.433 + 0.677}{2} = 0.555$$

$$\text{Income index} = \frac{\ln(6{,}681) - \ln(100)}{\ln(75{,}000) - \ln(100)} = 0.634$$

$$\text{Human development index} = \sqrt[3]{0.764 \times 0.555 \times 0.634}$$

$$= 0.645$$

The countries are divided into low HDI (less than 0.550), medium HDI (between 0.550 to 0.699), high HDI (between 0.700 to 0.799), and very high HDI for more than 0.800 values (29).

Disease → impairment → disability → handicap

The WHO *(115)* has defined these terms as follows:

(i) **Impairment** : An impairment is defined as "any loss or abnormality of psychological, physiological or anatomical structure or function", e.g., loss of foot, defective vision or mental retardation. An impairment may be visible or invisible, temporary or permanent, progressive or regressive. Further, one impairment may lead to the development of "secondary" impairments as in the case of leprosy where damage to nerves (primary impairment) may lead to plantar ulcers (secondary impairment).

(ii) **Disability** : Because of an impairment, the affected person may be unable to carry out certain activities considered normal for his age, sex, etc. This inability to carry out certain activities is termed "disability". A disability has been defined as "any restriction or lack of ability to perform an activity in the manner or within the range considered normal for a human being".

(iii) **Handicap** : As a result of disability, the person experiences certain disadvantages in life and is not able to discharge the obligations required of him and play the role expected of him in the society. This is termed "handicap", and is defined as "a disadvantage for a given individual, resulting from an impairment or a disability, that limits or prevents the fulfilment of a role that is normal (depending on age, sex, and social and cultural factors) for that individual".

Taking accidents as an example, the above terms can be explained further as follows *(95)*:

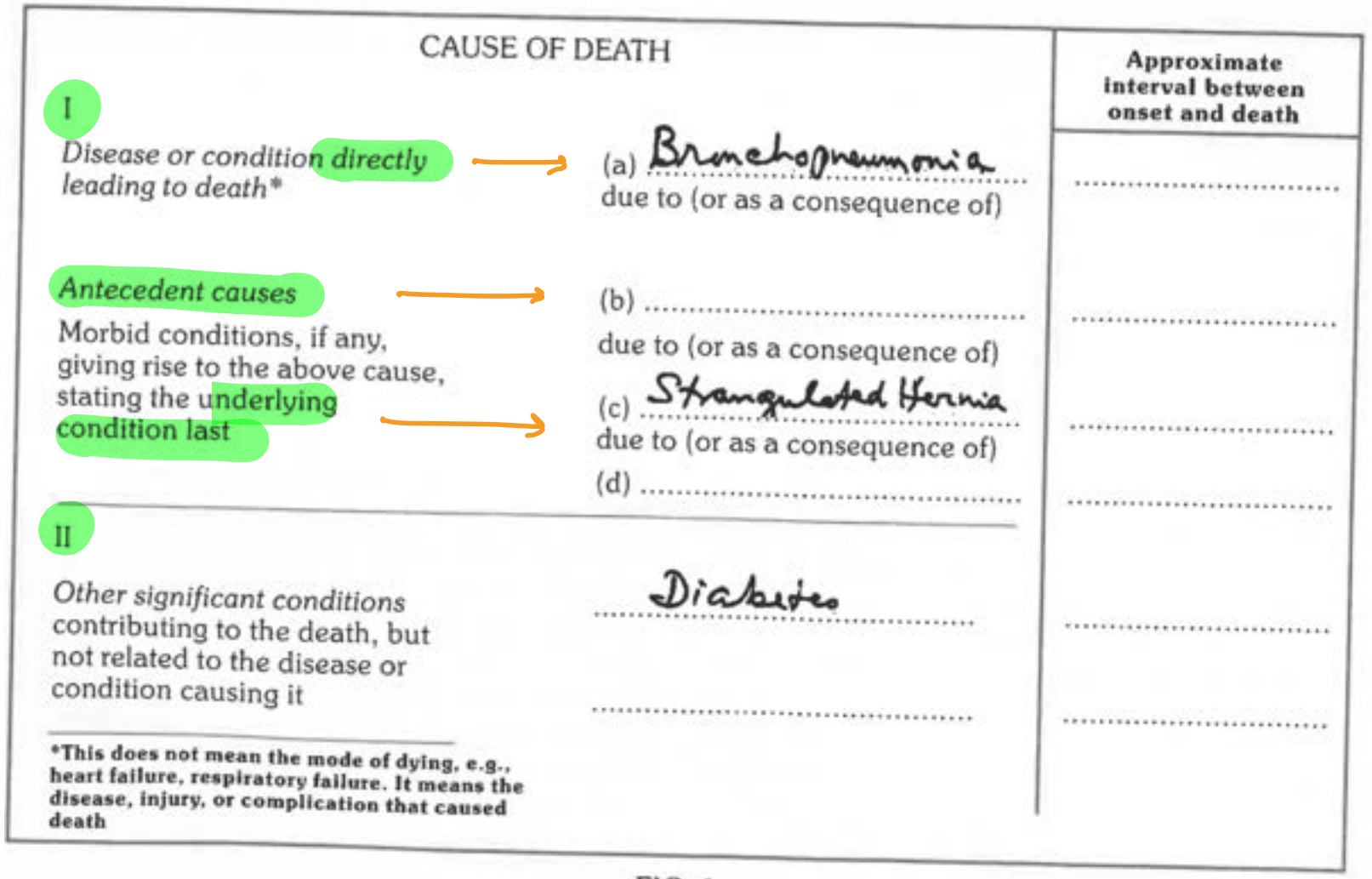
Accident.....	Disease (or disorder)
Loss of foot	Impairment (extrinsic or intrinsic)
Cannot walk	Disability (objectified)
Unemployed	Handicap (socialized)

Surveillance is defined in many ways *(40)* :

Continuous analysis, interpretation, and feedback of systematically collected data, generally using methods distinguished by their practicality, uniformity, and rapidity rather than by accuracy or completeness. By observing trends in time, place, and persons, changes can be observed or anticipated and appropriate action, including investigative or control measures, can be taken. Sources of data may relate directly to disease or to factors influencing disease. Thus they may include mortality and morbidity reports based on death certificates, hospital records, general practice sentinels, or notifications; laboratory diagnosis; outbreak reports; vaccine uptake and side effects; sickness absence records; changes in disease agents, vectors, or reservoirs; serological surveillance through serum banks. The latter can also be seen as an example of biological monitoring.

f) Monitoring

Monitoring is "the performance and analysis of routine measurements aimed at detecting changes in the environment or health status of population" *(33)*. Thus we have monitoring of air pollution, water quality, growth and



CAUSE OF DEATH		Approximate interval between onset and death
I *Disease or condition directly leading to death**	(a) Bronchopneumonia due to (or as a consequence of)	.....
Antecedent causes Morbid conditions, if any, giving rise to the above cause, stating the underlying condition last	(b) ..... due to (or as a consequence of)	.....
	(c) Strangulated Hernia due to (or as a consequence of)	.....
	(d)	.....
II *Other significant conditions* contributing to the death, but not related to the disease or condition causing it	Diabetes	.....
	.....	.....

***This does not mean the mode of dying, e.g., heart failure, respiratory failure. It means the disease, injury, or complication that caused death**

FIG. 1
Death Certificate. The International Standard Form (ICD-10)

Goal	Target
3.1	By 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births.
3.2	By 2030, end preventable deaths of newborns and children under five years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1000 live births, and under-five mortality to at least as low as 25 per 1000 live births.
3.3	By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases.
3.4	By 2030, reduce by one-third premature mortality from non-communicable diseases through prevention and treatment, and promote mental health and well-being.
3.5	Strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol.
3.6	By 2020, halve the number of global deaths and injuries from road traffic accidents.
3.7	By 2030, ensure universal access to sexual and reproductive health-care services, including for family planning, information and education, and the integration of reproductive health into national strategies and programmes.
3.8	Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all.
3.9	By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.
3.a	Strengthen the implementation of the World Health Organization Framework Convention on Tobacco Control in all countries, as appropriate.
3.b	Support the research and development of vaccines and medicines for the communicable and non-communicable diseases that primarily affect developing countries, provide access to affordable essential medicines and vaccines, in accordance with the Doha Declaration on the TRIPS Agreement and Public Health, which affirms the right of developing countries to use to the full the provisions in the Agreement on Trade-Related Aspects of Intellectual Property Rights regarding flexibilities to protect public health, and, in particular, provide access to medicines for all.
3.c	Substantially increase health financing and the recruitment, development, training and retention of the health work-force in developing countries, especially in least-developed countries and small island developing states.
3.d	Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks.

QQ

SDG

12 NMR
25 U5
70 MMR

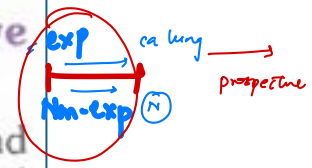
2. Experimental studies Intervention studies

a. Randomized controlled trials	or	Clinical trials	with patients as unit of study
b. Field trials			with healthy people as unit of study
c. Community trials	or	Community intervention studies	with communities as unit of study

3. Combination of retrospective and prospective cohort studies (Ambispective)

In this type of study, both the retrospective and prospective elements are combined. The cohort is identified from past records, and is assessed of date for the outcome. The same cohort is followed up prospectively into future for further assessment of outcome.

Court-Brown and Doll (1957) applied this approach to study the effects of radiation. They assembled a cohort in 1955 consisting of 13,352 patients who had received large doses of radiation therapy for ankylosing spondylitis between 1934 and 1954. The outcome evaluated was death from leukaemia or aplastic anaemia between 1935 and 1954. They found that the death rate from leukaemia or aplastic anaemia was substantially higher in their cohort than that of the general population. A prospective component was added to the study and the cohort was followed, as established in 1955, to identify deaths occurring in subsequent years *(59)*.



Examples of cohort studies

Example 1 : Smoking and lung cancer.

At least eight prospective studies on the relation of smoking to lung cancer had been done. Doll and Hill *(52, 62, 66)*, Hammond and Horn *(67, 68)* and Dorn *(61)* were the first to report their findings.

In October 1951, Doll and Hill sent a questionnaire to 59,600 British doctors listed in the Medical Register of the UK enquiring about their smoking habits. This enabled them to form two cohorts (smokers and non-smokers) who were similar in all other respects like age, education and social class. They received usable replies from 40,701 physicians - 34,494 men and 6,207 women. These were followed for 4 years and 5 months by obtaining notifications of physicians' deaths from the Registrar General, the General Medical Council and the British Medical Association. For every death certified as due to lung cancer, confirmation was obtained by writing to the physician certifying the death and also, when necessary to the hospital or consultant to whom the patient had been referred. The results of the study are shown in Table 19.

Example 2 : The Framingham heart study (51).

The Framingham heart study was initiated in 1948 by the United States Public Health Service to study the relationship of a number of (risk) factors (e.g., serum cholesterol, blood pressure, weight, smoking) to the subsequent development of cardiovascular disease. The town of Framingham (Massachusetts) had a population of 28,000 in 1948. The study was planned for 20 years in view of the slow development of heart disease.

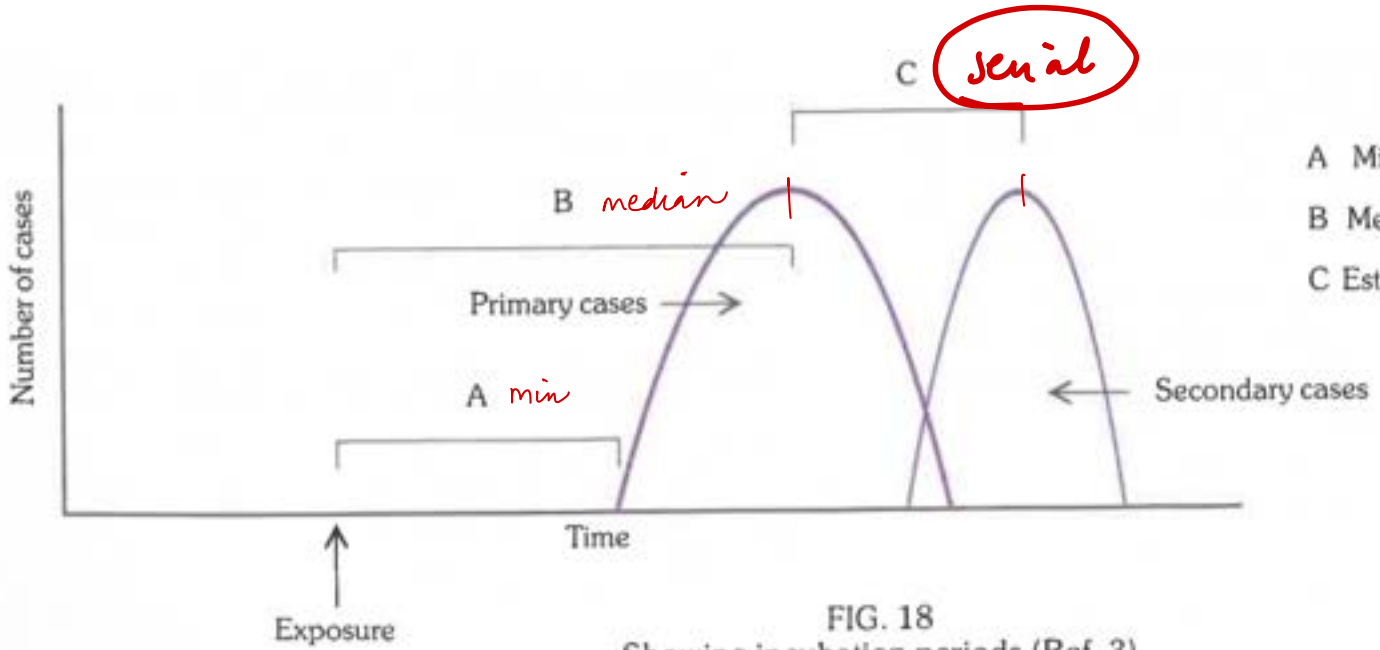
NCD

The other widely reported risk-factor intervention trials in coronary heart disease are : (a) The Stanford Three Community Study (b) The North Karelia Project in Finland (c) The Oslo Study, and (d) The Multiple Risk Factor Intervention Trial (MRFIT) in USA.

1. Biological agents

These are living agents of disease, viz, viruses, rickettsiae, fungi, bacteria, protozoa and metazoa. These agents exhibit certain "host–related" biological properties such as: (i) **infectivity**: this is the ability of an infectious agent to invade and multiply (produce infection) in a host; (ii) **pathogenicity**: this is the ability to induce clinically apparent illness, and (iii) **virulence**: this is defined as the proportion of clinical cases resulting in severe clinical manifestations (including sequelae). The case fatality rate is one way of measuring virulence *(86)*.

killing power of disease



A Minimum incubation period
B Median incubation period
C Estimate of average incubation period

FIG. 18
Showing incubation periods (Ref. 3)

Sources and reservoir

The starting point for the occurrence of a communicable disease is the existence of a reservoir or source of infection. The **source** of infection is defined as "the person, animal, object or substance from which an infectious agent passes or is disseminated to the host" *(100)*. A **reservoir** is defined as "any person, animal, arthropod, plant, soil or substance (or combination of these) in which an infectious agent lives and multiplies, on which it depends primarily for survival, and where it reproduces itself in such manner that it can be transmitted to a susceptible host" *(100)*. In short, the reservoir is the natural habitat in which the organism metabolizes and replicates.

The terms reservoir and source are not always synonymous. For example, in hookworm infection, the reservoir is man, but the source of infection is the soil contaminated with infective larvae. In tetanus, the reservoir and source are the same, that is soil. In typhoid fever, the reservoir of infection may be a case or carrier, but the source of infection may be faeces or urine of patients or contaminated food, milk or water. Thus the term "source"

ENDEMIC

(En=in; demos=people). It refers to the constant presence of a disease or infectious agent within a given geographic area or population group, without importation from outside; may also refer to the "usual" or expected frequency of the disease within such area or population group. For instance, common cold is endemic because somebody always has one.

The term "hyperendemic" expresses that the disease is constantly present at a high incidence and/or prevalence rate and affects all age groups equally; and the term "holoendemic" a high level of infection beginning early in life and affecting most of the child population, leading to a state of equilibrium such that the adult population shows evidence of the disease much less commonly than do the children, as in the case of malaria *(100)*.

An endemic disease when conditions are favourable may burst into an epidemic (e.g., hepatitis A, typhoid fever). As new control or preventive measures are applied, the endemic status of a disease may change.

A person or other living animal, including birds and arthropods, that affords subsistence or lodgement to an infectious agent under natural (as opposed to experimental) conditions. An *obligate* host means the only host, e.g., man in measles and typhoid fever. Hosts in which the parasite attains maturity or passes its sexual stage are primary or *definitive* hosts; those in which the parasite is in a larval or asexual state are secondary or *intermediate* hosts. A *transport* host is a carrier in which the organism remains alive but does not undergo development *(100)*.

The term zoonoses has been further amplified as follows : (a) *anthropozoonoses* : that is, infections transmitted to man from vertebrate animals, e.g., rabies, plague, hydatid disease, anthrax and trichinosis; (b) *zooanthroponoses* : that is, infections transmitted from man to vertebrate animals, e.g., human tuberculosis in cattle; and (c) *amphixenoses* : that is infections maintained in both man and lower vertebrate animals that may be transmitted in either direction, e.g., *T.cruzi*, and *S.japonicum (100)*.

EPIZOOTIC

An outbreak (epidemic) of disease in an animal population (often with the implication that it may also affect human populations) *(100)*. Only a few zoonotic agents cause major epidemics. Notable among these are the agents of anthrax, brucellosis, rabies, influenza, Rift valley fever, Q fever, Japanese encephalitis and equine encephalitis. The study of epizootic diseases is given the name of epizootiology.

A. **By type** : (a) INCUBATORY CARRIERS : Incubatory carriers are those who shed the infectious agent during the incubation period of disease. That is, they are capable of infecting others before the onset of illness. This usually occurs during the last few days of the incubation period, e.g., measles, mumps, polio, pertussis, influenza, diphtheria and hepatitis B. (b) CONVALESCENT CARRIERS : That is, those who continue to shed the disease agent during the period of convalescence, e.g., typhoid fever, dysentery (bacillary and amoebic), cholera, diphtheria and whooping cough. In these diseases, clinical recovery does not coincide with bacteriological recovery. A convalescent carrier can pose a serious threat to the unprotected household members and those in the immediate environment, as in the case of a typhoid fever patient who may excrete the bacilli for 6–8 weeks. This highlights the importance of bacteriological surveillance of carriers, after clinical recovery. (c) HEALTHY CARRIERS : Healthy carriers emerge from subclinical cases. They are victims of subclinical infection who have developed carrier state without suffering from overt disease, but are nevertheless shedding the disease agent, e.g., poliomyelitis, cholera, meningococcal meningitis, salmonellosis, and diphtheria. It is well to remember that a person whose infection remains subclinical may or may not be a carrier. For example, in polio the infection may remain subclinical and the person may act as a temporary carrier by virtue of shedding the organism. On the other hand, in tuberculosis, most persons with positive tuberculin test do not actively disseminate tubercle bacilli and therefore are not labelled as carrier *(38)*.

(1) *Droplet nuclei* : "Droplet nuclei" are a type of particles implicated in the spread of airborne infection. They are tiny particles (1–10 microns range) that represent the dried residue of droplets *(100)*. They may be formed by (a) evaporation of droplets coughed or sneezed into the air or (b) generated purposefully by a variety of atomizing devices (aerosols). They may also be formed accidentally in microbiological laboratories, in abattoirs, rendering plants or autopsy rooms *(106)*. The droplet nuclei may remain airborne for long periods of time, some retaining and others losing infectivity or virulence. They not only keep floating in the air but may be disseminated by air currents from the point of their origin. Particles in the 1–5 micron range are liable to be easily drawn into the alveoli of the lungs and may be retained there. Diseases spread by droplet nuclei include tuberculosis, influenza, chickenpox, measles, Q fever, COVID-19, and many respiratory infections. (Not considered airborne are droplets and other large particles which promptly settle out). Mention must also be made of the role of airborne spread of toxic air pollutants including "smog" resulting in air pollution epidemics.

1-5 μ

Dust within the size range of 0.5 to 3 micron, is a health hazard producing, after a variable period of exposure, a lung disease known as pneumoconiosis, which may gradually cripple a man by reducing his working capacity due to lung fibrosis and other complications. The hazardous effects of dusts on the lungs depend upon a number of factors such as (a) chemical composition (b) fineness (c) concentration of dust in the air (d) period of exposure and (e) health status of the person exposed. Therefore, the threshold limit values for different dusts are different. In addition to the toxic effect of the dust on the lung tissues, the super-imposition of infections like tuberculosis may also influence the pattern of pneumoconiosis. The important dust diseases are silicosis, anthracosis, byssinosis, bagassosis, asbestosis and farmer's lung. As no cure for the pneumoconiosis is known, it is

0.5 - 3 μ

Live attenuated	Killed whole organism	Toxoid/Protein	Polysaccharide	Glycoconjugate	Recombinant
Tuberculosis (BCG)	Typhoid	Diphtheria	Pneumococcus	Hib	HBV
Yellow fever	Cholera	Tetanus	Meningococcus	Pneumococcus	Lyme disease
Polio (OPV)	Plague	Acellular Pertussis	Hib	MenACWY	Cholera toxin B
Measles	Pertussis	Anthrax	Typhoid (Vi)		HPV
Mumps	Influenza	Influenza subunit			COVID-19
Rubella	Typhus				
Typhoid	Polio (IPV)				
Varicella	Rabies				
Rotavirus	JE				
Cholera	TBE				
Cold-adapted influenza	HAV				
Rotavirus reassortants	COVID-19				
Zoster					

BCG – Bacille Calmette-Guerin; HAV – hepatitis A virus; HBV – hepatitis B virus; Hib – Haemophilus influenzae type b; IPV – inactivated polio vaccine; JE – Japanese encephalitis; Men – meningococcus, OPV – oral polio vaccine; TBE – tick-borne encephalitis.

Comparison of characteristics of killed and live vaccines

Characteristic	Killed vaccine	Live vaccine
Number of doses	Mutiple	Single
Need for adjuvant → $Al(OH)_3$	Yes	No
Duration of immunity	Shorter	Longer
Effectiveness of protection (more closely mimics natural infection)	Lower	Greater
Immunoglobulins produced	IgG	IgA and IgG
Mucosal immunity produced	Poor	Yes
Cell-mediated immunity produced	Poor	Yes
Residual virulent virus in vaccine	Possible	No
Reversion to virulence	No	Possible
Excretion of vaccine virus and transmission to non-immune contacts	No	Possible
Interference by other viruses in host	No	Possible
Stability at room temperature	High	Low

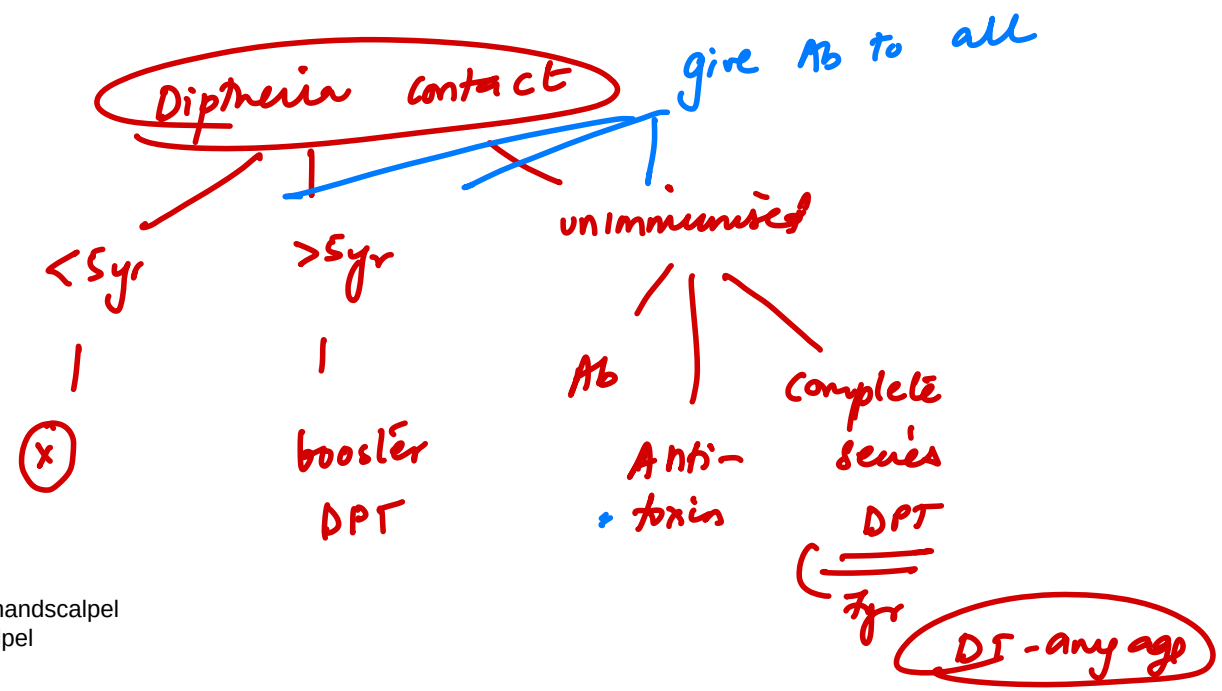
VDPV

Live vaccines should not be administered to persons with immune deficiency diseases or to persons whose immune response may be suppressed because of leukaemia, lymphoma or malignancy or because of therapy with corticosteroids, alkylating agents, antimetabolic agents, or radiation *(117, 118)*. Pregnancy is another contraindication unless the risk of infection exceeds the risk of harm to the foetus of some live vaccines.

When two live vaccines are required they should be given either simultaneously at different sites or with an interval of atleast 3 weeks. In the case of live vaccines, protection is generally achieved with a single dose of vaccine. An additional dose is given to ensure seroconversion, e.g., 95 to 98 per cent of recipient will respond to single dose of measles vaccine. The second dose is given to ensure that 100 per cent of persons are immune. The other exception is polio vaccine which needs three or more doses to be given at spaced intervals to produce effective immunity. Live vaccines usually produce a durable immunity, but not always as long as that of the natural infection.

Passive immunization procedures with antisera

Disease	Passive immunization (ANTISERA)
1. Diphtheria	A dose of 500-1,000 of IU of diphtheria antitoxin is given intramuscularly to susceptible contacts immediately after exposure. Protection does not last more than 2-3 weeks.
2. Tetanus	The usual prophylactic dose is 1,500 units of horse A.T.S. given subcutaneously or intramuscularly, soon after injury.
3. Gas gangrene	A polyvalent antitoxin is used. A patient who has sustained a wound possibly contaminated with spores of gas gangrene should receive a dose of 10,000 IU of *Cl. perfringens. (Cl. welchii)* antitoxin, 5,000 units of *Cl. septicum* antitoxin and 10,000 units of *Cl. oedematiens* antitoxin, intramuscularly, or in urgent cases intravenously.
4. Rabies	Antirabies serum in a dose of 40 IU per kg. of body weight should be given intramuscularly within 72 hours and preferably within 24 hours of exposure. A part of the antiserum is applied locally to the wound.
5. Botulism	When botulism is suspected, 10,000 units of polyvalent antitoxin is recommended every 3 to 4 hours.



2. CONTACTS

Contacts merit special attention. They should be throat swabbed and their immunity status determined. Different situations pose different options : (a) where primary immunization or booster dose was received within the previous 5 years, no further action would be needed (b) where primary course or booster dose of diphtheria toxoid was received more than 5 years before, only a booster dose of diphtheria toxoid need be given (c) non-immunized close contact should receive prophylactic penicillin or erythromycin. They should be given 1000–2000 units of diphtheria antitoxin and actively immunized against diphtheria. Contacts should be placed under medical surveillance and examined daily for evidence of diphtheria for at least a week after exposure. The bacteriological surveillance of close contacts should be continued for several weeks by repeated swabbing.

Agent/ Condition	Target population	Preparation[ab]	Dose[c]	Status
Hepatitis A	Family contacts Institutional outbreaks	IG	(0.02 ml/kg of body weight) (3.2mg/kg of body weight)	Recommended for prevention
	Travellers exposed to unhygienic conditions in tropical or developing countries	IG	0.02-0.05 ml/kg of body weight (3.2-8.0 mg/kg of body weight) every 4 months	
Hepatitis C	Percutaneous or mucosal exposure	IG	0.05 ml/kg of body weight (8 mg/kg of body weight)	Optional for prevention
Hepatitis B	Percutaneous or mucosal exposure	HBIG	0.05-0.07 ml/kg of body weight (8-11 mg/kg of body weight) Repeat in one month	Recommended for prevention
	Newborns of mothers with HBsAg	HBIG	0.05ml (8 mg) at birth, 3, and 6 months	Recommended for prevention
	Sexual contacts of acute hepatitis B patients	HBIG	0.05 ml/kg of body weight (8 mg/kg of body weight) Repeat after one month	Optional for prevention
Rubella	Women exposed during early pregnancy	IG	20 ml	Optional for prevention
Varicella-zoster	Immuno-suppressed contacts of acute cases or newborn contacts	VZIG[d]	15-25 units/kg body weight; minimum 125 units	Recommended for prevention
Measles (rubeola)	Infants less than 1 year old or immuno-suppressed contacts of acute cases exposed less than 6 days previously	IG	0.25 ml/kg of body weight or 0.5 ml/kg of body weight if immuno-suppressed	Recommended for prevention
Rabies	Subjects exposed to rabid animals	RIG	20 IU/kg of body weight	Recommended for prevention
Tetanus	Following significant exposure of unimmunized or incompletely immunized person or immediately on diagnosis of disease	TIG	250 units for prophylaxis 3000-6000 units for therapy	Recommended for prevention or treatment
Rh isoimmunization	Rh (D)-negative mother on delivery of Rh-positive infant, or after uncompleted pregnancy with Rh-positive father, or after transfusion of Rh-positive blood to Rh-negative mother	RhIG	1 vial (200-300 µg) per 15 ml of Rh (+) blood exposure	Recommended for prevention

Peak blood levels are reached in 2 days after intramuscular injection. The half-life is 20–35 days. Generally, immunoglobulins should not be given shortly before or after active immunization to avoid inhibiting the immune response; tetanus and hepatitis B immunization are exceptions to this rule (122).

VACCINE - Ig

Rabies - local site

Antibiotics

Antibiotics are used during the manufacturing phase to prevent bacterial contamination of the tissue culture cells in which the viruses are grown. For example, MMR vaccine and IPV each contains less than 25 micrograms of neomycin per dose (less than 0.000025g). Persons who are known to be allergic to neomycin should be closely observed after vaccination so that any allergic reaction can be treated at once *(115)*.

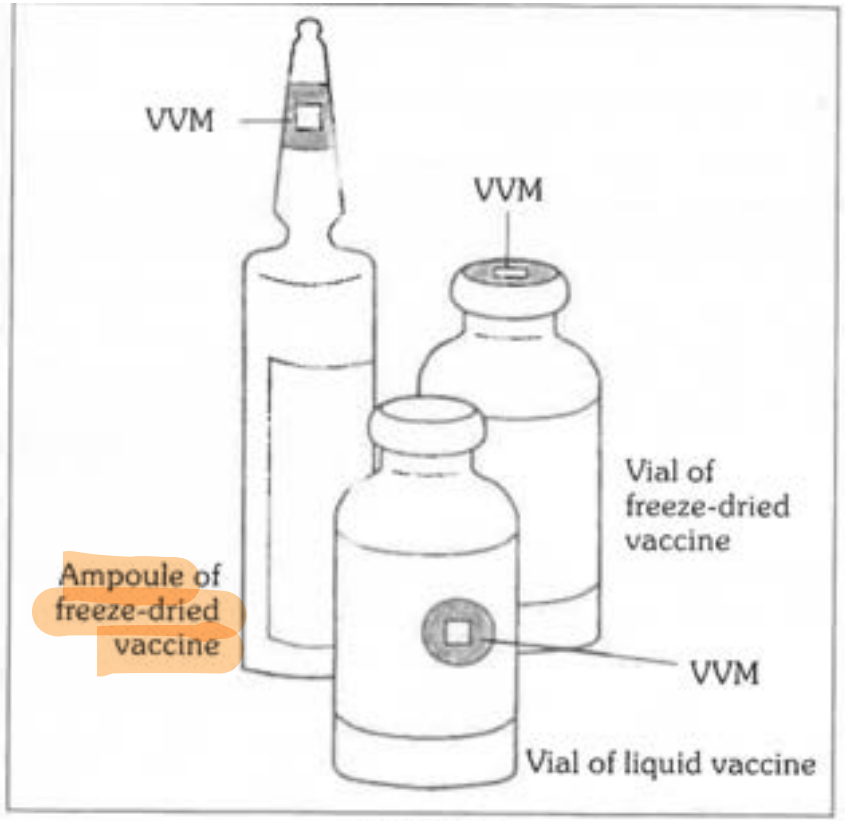


FIG. 25
Location of VVMs on ampoules and vials

There are currently four types of VVM, chosen to match the heat sensitivity of the vaccine. These four types are VVM2, VVM7, VVM14 and VVM30. The VVM number is the time in days that it takes for the inner square to reach the colour indicating a discard point, if the vial is exposed to a constant temperature of 37°C.

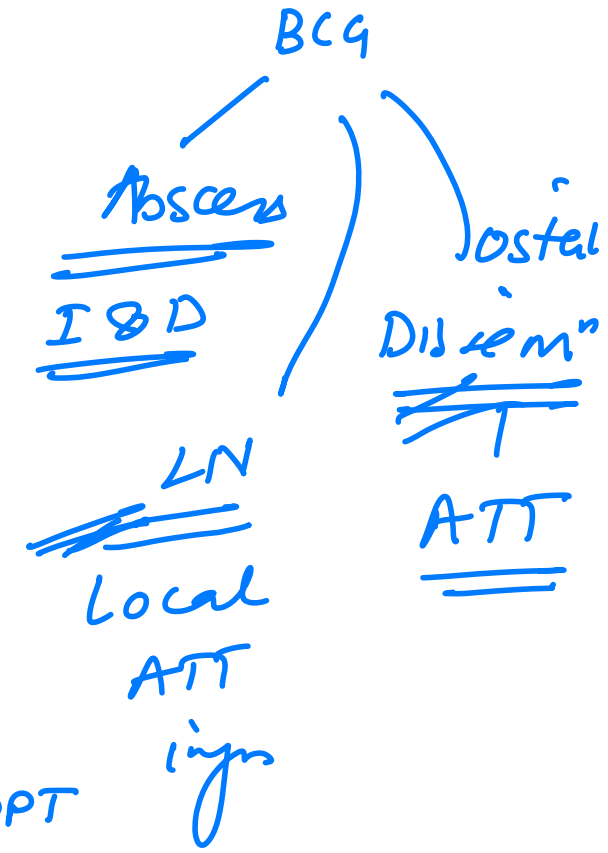
The case definitions and treatments of adverse events following immunization are as follows *(115, 130)* :

Adverse event	Case definition	Treatment	Vaccines
Acute flaccid paralysis (vaccine associated paralytic poliomyelitis)	Acute onset of flaccid paralysis within 4 to 30 days of receipt of oral poliovirus (OPV), or within 4 to 75 days after contact with a vaccine recipient with isolation of vaccine virus and absence of wild polio virus in the stool, and neurological deficits remaining 60 days after onset, or death.	No specific treatment available; supportive care.	OPV
Anaphylactoid reaction (acute hypersensitivity reaction)	Exaggerated acute allergic reaction, occurring within 2 hours after immunization, characterized by one or more of the following: • wheezing and shortness of breath due to bronchospasm • laryngospasm/laryngeal oedema • one or more skin manifestations, e.g. hives, facial oedema, or generalized oedema. Less severe allergic reactions do not need to be reported.	Self-limiting; anti-histamines may be helpful.	All
Anaphylaxis	Severe immediate (within 1 hour) allergic reaction leading to circulatory failure with or without bronchospasm and/or laryngospasm/laryngeal oedema	Adrenaline injection	All
Arthralgia	Joint pain usually including the small peripheral joints. Persistent, if lasting longer than 10 days, transient; if lasting up to 10 days.	Self-limiting; analgesics	Rubella, MMR
Brachial neuritis	Dysfunction of nerves supplying the arm/shoulder without other involvement of nervous system. A deep steady, often severe aching pain in the shoulder and upper arm followed in days or weeks by weakness and wasting in arm/shoulder muscles. Sensory loss may be present, but is less prominent. May present on the same or the opposite side to the injection and sometimes affects both arms.	Symptomatic only; analgesics.	Tetanus

Disseminated BCG infections	Widespread infection occurring within 1 to 12 months after BCG vaccination and confirmed by isolation of *Mycobacterium bovis* BCG strain. Usually in immunocompromised individuals.	Should be treated with anti-tuberculous regimens including isoniazid and rifampicin.	BCG
Encephalopathy	Acute onset of major illness characterized by any two of the following three conditions: • seizures • severe alteration in level of consciousness lasting for one day or more • distinct change in behaviour lasting one day or more. Needs to occur within 48 hours of DTP vaccine or from 7 to 12 days after measles or MMR vaccine, to be related to immunization.	No specific treatment available; supportive care.	Measles, Pertussis
Fever	The fever can be classified (based on rectal temperature) as mild (38 to 38.9°C), high (39 to 40.4°C) and extreme (40.5°C or higher). Fever on its own does not need to be reported.	Symptomatic; paracetamol.	All
Hypotonic, hyporesponsive episode (HHE or shock-collapse)	Event of sudden onset occurring within 48 (usually less than 12) hours of vaccination and lasting from one minute to several hours, in children younger than 10 years of age. All of the following must be present : • limpness (hypotonic) • reduced responsiveness (hyporesponsive) • pallor or cyanosis – or failure to observed/recall.	The episode is transient and self-limiting, and does not require specific treatment. It is not a contraindication to further doses of the vaccine.	Mainly DTP, rarely others

CI for DPT → give DT

Injection site abscess	Fluctuant or draining fluid-filled lesion at the site of injection. Bacterial if evidence of infection (e.g. purulent, inflammatory signs, fever, culture), sterile abscess if not.	Incise and drain; antibiotics if bacterial.	All
Lymphadenitis (includes suppurative lymphadenitis)	Either at least one lymph nodes enlarged to >1.5 cm in size (one adult finger width), or a draining sinus over a lymph node. Almost exclusively caused by BCG and then occurring within 2 to 6 months after receipt of BCG vaccine, on the same side as inoculation (mostly axilliary).	Heals spontaneously (over months) and best not to treat unless lesion is sticking to skin. If so,or already draining, surgical drainage and local instillation of anti-tuberculous drug. Systemic treatment with anti-tuberculous drugs is ineffective.	BCG
Osteitis/ Osteomyelitis	Inflammation of the bone with isolation of *Mycobacterium bovis* BCG strain.	Should be treated with anti-tuberculous regimens including isoniazid and rifampicin.	BCG
Persistent inconsolable screaming	Inconsolable continuous crying lasting 3 hours or longer accompanied by high-pitched screaming.	Settles within a day or so; analgesics may help	DTP, Pertussis → DPT
Seizures	Occurrence of generalized convulsions that are not accompanied by focal neurological signs or symptoms. Febrile seizures: if temperature elevated >38°C (rectal) Afebrile seizures : if temperature normal.	Self-limiting supportive care; paracetamol and cooling if febrile; rarely anticonvulsants.	All, especially Pertussis, Measles
Sepsis	Acute onset of severe generalized illness due to bacterial infection and confirmed (if possible) by positive blood culture. Needs to be reported as possible indicator of programme error.	Critical to recognize and treat early. Urgent transfer to hospital for parenteral antibiotics and fluids	All



Severe local reaction	Redness and/or swelling centred at the site of injection and one or more of the following: • swelling beyond the nearest joint • pain, redness, and swelling of more than 3 days duration • requires hospitalization. Local reactions of lesser intensity occur commonly and are trivial and do not need to be reported.	Settles spontaneously within a few days to a week. Symptomatic treatment with analgesics. Antibiotics are inappropriate.	All
Thrombocytopenia	Serum platelet count of less than 50,000/ml leading to bruising and/or bleeding.	Usually mild and self-limiting; occasionally may need steroid or platelets.	MMR
Toxic shock syndrome (TSS)	Abrupt onset of fever, vomiting and watery diarrhoea within a few hours of immunization. Often leading to death within 24 to 48 hours. Needs to be reported as possible indicator of programme error.	Critical to recognize and treat early. Urgent transfer to hospital for parenteral antibiotics and fluids.	All

TABLE 39
Contraindications to vaccines

Vaccine	Contraindications
All	An anaphylactic reaction[a] following a previous dose of a particular vaccine is a true contraindication to further immunization with the antigen concerned and a subsequent dose should not be given, OR, Current serious illness.
Live vaccines (MMR, BCG, yellow fever)	Pregnancy. Radiation therapy (i.e. total-body radiation).
Yellow fever	Egg allergy. Immunodeficiency (from medication, disease or symptomatic HIV infection[b]).
BCG	Symptomatic HIV infection.
Influenza, yellow fever	History of anaphylactic reactions[a] following egg ingestion. No vaccines prepared in hen's egg tissues (i.e. yellow fever and influenza vaccines) should be given. (Vaccine viruses propagated in chicken fibroblast cells, e.g. measles or MMR vaccines, can however usually be given.)
Pertussis-containing	Anaphylactic reaction to a previous dose. Evolving neurological disease (e.g. uncontrolled epilepsy or progressive encephalopathy). Vaccines containing the whole-cell pertussis component should not be given to children with this problem. Acellular vaccine is less reactogenic and is used in many industrialized countries instead of whole-cell pertussis vaccine.

[a] Generalized urticaria, difficulty in breathing, swelling of the mouth and throat, hypotension or shock.

[b] In many industrialized countries yellow fever vaccine is administered to individuals with symptomatic HIV infection or who are suffering from other immunodeficiency diseases, provided that their CD_4 count is at least 400 cells/mm^3 and if they plan to visit areas where epidemic or endemic yellow fever actually occurs.

TABLE 41

Active Immunization recommended under special circumstances

	Disease	Immunization
1.	Cholera	Two types of safe and effective oral cholera vaccines currently available. Given orally in two doses between seven days and six weeks apart.
2.	Plague	Given subcutaneously or intramuscularly in 2 doses at an interval of 7 to 14 days. Immunity starts 5 to 7 days after inoculation and lasts for about 6 months.
3.	Typhoid fever	Two vaccines are available for prevention of typhoid. Typhoid polysaccharide vaccine is injectable given subcutaneously or intramuscularly. One dose is required. Confers protection after 7 days. The other is oral Ty21a vaccine, administered on 1, 3 and 5th day. Protective immunity achieved 7 days after 3rd dose.
4.	Influenza	Inactivated vaccines are widely used. Two adequately spaced doses (1.0 ml each) of an aqueous or saline vaccine are recommended for primary immunization, although one dose may be given when an epidemic is threatened. The immunity lasts for about 3 to 6 months. Oil-adjuvanted vaccines give immunity of longer duration, but they tend to produce unpleasant local reaction.
5.	Yellow fever	The dose of the vaccine (17 D vaccine) is 0.5 ml given subcutaneously. Immunity begins 10-12 days after vaccination, and extends upto 10 years.

ORAL VACCINE (27)

Three types of oral cholera vaccines are available : (a) Dukoral (WC-rBS), (b) Sanchol and mORCVAX and (c) Euvichol. The live attenuated single-dose vaccine (CVD103-HgR) is no longer produced.

(a) Dukoral (WC-rBS)

Dukoral is a monovalent vaccine based on formalin and heat-killed whole cells (WC) of *V. cholerae* O1 (classical and El Tor, Inaba and Ogawa) plus recombinant cholera toxin B subunit. The vaccine is provided in 3 ml single-dose vials together with the bicarbonate buffer (effervescent granules in sachets to protect the toxin B subunit from being destroyed by gastric acid). Vaccine and buffer are mixed in 150 ml of water (chlorinated or not) for persons aged >5 years and in 75 ml of water for children aged 2–5 years. The vaccine has a shelf life of 3 years at 2–8°C and remains stable for 1 month at 37°C.

Vaccine schedule and administration

According to the manufacturer, primary immunization consists of 2 oral doses given ≥7 days apart (but <6 weeks apart) for adults and children aged ≥6 years. Children aged 2–5 years should receive 3 doses ≥7 days apart (but <6 weeks apart). Intake of food and drink should be avoided for 1 hour before and after vaccination. If the interval between the primary immunization doses is delayed for >6 weeks, primary immunization should be restarted. Protection may be expected about 1 week after the last scheduled dose.

Provided there is continued risk of *V. cholerae* infection, 1 booster dose is recommended by manufacturer, after 2 years for adults and children aged ≥6 years. If the interval between the primary series and booster immunization is >2 years, primary immunization must be repeated. For children aged 2–5 years 1 booster dose is recommended every 6 months, and if the interval between primary immunization and the booster is >6 months, primary immunization must be repeated.

Dukoral is not licensed for children aged <2 years.

(b) Sanchol and mORCVAX

The closely related bivalent oral cholera vaccines are based on serogroups O1 and O139. Unlike Dukoral, these vaccines do not contain the bacterial toxin B subunit therefore it does not require buffer. According to the manufacturer, vaccine should be administered orally in 2 liquid doses 14 days apart for individuals aged ≥1 year. A booster dose is recommended after 2 years *(27)*.

Live attenuated influenza vaccine

Live attenuated influenza vaccine (LAIV) was approved for use in 2003. It contains the same influenza viruses as IIV. The viruses are cold-adapted, and replicate effectively in the mucosa of the nasopharynx. The vaccine viruses are grown in chicken eggs, and the final product contains residual egg protein. The vaccine is provided in a single-dose sprayer unit; half of the dose is sprayed into each nostril. LAIV dose not contain thimerosal or any other preservative. LAIV is approved for use only in healthy, non-pregnant persons 2 to 49 years of age. Vaccinated children can shed vaccine virus in nasopharyngeal secretions for up to 3 weeks.

LAIV is 87 per cent effective against culture confirmed influenza in children 60–84 months old; results in 27 per cent reduction in febrile otitis media; 28 per cent reduction in otitis media with accompanying antibiotic use.

Inactivated influenza vaccine (IIVs)

IIVs are available since 1940. Trivalent IIVs contain three inactivated viruses: type A (H_1N_1), type A (H_3N_2), and type B. Quadrivalent influenza vaccines were introduced in the year 2013–2014 season. They contain the same antigens as trivalent vaccines, with addition of another B strain virus, increasing the likelihood for adequate protection. IIV is administered by intramuscular or intradermal route. The vaccine is available in both paediatric (0.25 ml) and adult (0.5 ml) dose formulation. One dose of IIV may be administered annually for persons 9 years of age and older. Children 6 months through 8 years of age receiving influenza vaccine for the first time should receive two doses administered at least 28 days apart. Annual immunization is recommended *(18)*.

The following is a summary of treatment recommendations.

(1) Patients who have severe or progressive clinical illness should be treated with oseltamivir. Treatment should be initiated as soon as possible.

   (a) This recommendation applies to all patient groups, including pregnant women, and young children <2 years, including neonates.

   (b) In patients with severe or progressive illness not responding to normal treatment regimens, higher doses of oseltamivir and longer duration of

Rotavirus vaccine *(9)*

Two live, oral, attenuated rotavirus vaccines were licensed in 2006 : the monovalent human rotavirus vaccine (Rotarix™) and the pentavalent bovine-human, reassortant vaccine (Rota Teq™). Both vaccines have demonstrated very good safety and efficacy profiles in large clinical trials. The rotavirus vaccines are now introduced for routine use in a number of industrialized and developing countries.

The Rotarix™ vaccine is administered orally in a 2-dose schedule to infants of approximately 2 and 4 months of age. The first dose can already be administered at the age of 6 weeks and should be given no later than at the age of 12 weeks. The interval between the 2 doses should be at least 4 weeks. The 2-dose schedule should be completed by age 16 weeks, and no later than by 24 weeks of age.

For RotaTeq™, the recommended schedule is 3 oral doses at ages 2, 4 and 6 months. The first dose should be administered between ages 6–12 weeks and subsequent doses at intervals of 4–10 weeks. Vaccination should not be initiated for infants aged >12 weeks. All 3 doses should be administered before the age of 32 weeks.

There is a potentially higher risk of intussusception when the first dose of these vaccines is given to infants aged >12 weeks; consequently, current rotavirus vaccines should not be used in catch-up vaccination campaigns, where the exact age of the vaccinees may be difficult to ascertain.

(iv) FLY CONTROL : Flies breeding in association with human or animal faeces should be controlled.

Questions about all vaccines (47)

Q. If the mother/caregiver permits administration of only one injection during an infant's first visit at 9 months of age, which vaccine should be given ?

A. At 9 months of age, the priority is to give measles vaccine with OPV and Vitamin-A.

Q. Which vaccines can be given to a child between 1–5 years of age, who has never been vaccinated ?

A. The child should be given DPT1, OPV-1, measles and 2 ml of vitamin A solution. It should then be given the second and third doses of DPT and OPV at one month intervals. Measles second dose is also to be given as per the schedule. The booster dose of OPV/DPT can be given at a minimum of 6 months after administering OPV3/DPT3.

Q. Which vaccines can be given to a child between 5–7 years of age, who has never been vaccinated ?

A. The child should be given first, second and third doses of DPT at one month intervals. The booster dose of DPT can be given at a minimum of 6 months after administering DPT3 upto 7 years of age.

Q. Should one re-start with the first dose of a vaccine if a child is brought late for a dose ?

A. Do not start the schedule all over again even if the child is brought late for a dose. Pick up where the schedule was left off. For example: If a child who has received BCG, HepB-1, DPT-1 and OPV-1 at 5 months of age, returns at 11 months of age, vaccinate the child with DPT-2, HepB-2, OPV-2 and measles and do not start from DPT-1, HepB-1 again.

Q. Why it is not advisable to clean the injection site with a spirit swab before vaccination ?

A. This is because some of the live components of the vaccine are killed if they come in contact with spirit.

DPT vaccine

Q. If a child could not receive DPT1, 2, 3 and OPV 1, 2, 3 according to the schedule, upto what age can the vaccine be given ?

A. The DPT vaccine can be given upto 7 years of age and OPV can be given upto 5 years of age. If a child has received previous doses but not completed the schedule, do not restart the schedule and instead administer the remaining doses needed to complete the series.

Q. Why should there be a minimum gap of 4 weeks between two doses of DPT ?

A. This is because decreasing the interval between two doses may not obtain optimal antibody production for protection.

Q. Why give the DPT vaccine in the antero-lateral mid thigh and not the gluteal region ?

A. DPT is given in the antero-lateral mid-thigh and not the gluteal region to prevent damage to the sciatic nerve. Moreover, the vaccine deposited in the fat of gluteal region does not invoke the appropriate immune response.

Q. What should one do if the child is found allergic to DPT or develops encephalopathy after DPT ?

A. A child who is allergic to DPT or develops encephalopathy after DPT should be given the DTaP/DT vaccine instead of DPT for the remaining doses, as it is usually the P (whole cell Pertussis) component of the vaccine which causes the allergy/encephalopathy. It may be purchased with locally available resources.

Q. Why DT is replaced by DPT vaccine for children above 2 years of age ?

A. As pertussis cases were reported in higher age group children and the risk of AEFIs were not found to be more after DPT vaccine as compared to DT vaccine.

Measles vaccine

Q. Why give the measles vaccine only on the right upper arm ?

A. The measles vaccine is given on the right upper arm to maintain uniformity and to help surveyors in verifying the receipt of the vaccine.

Q. If a child has received the measles vaccine before 9 months of age, is it necessary to repeat the vaccine later ?

A. Yes, the measles vaccine needs to be administered, according to the National Immunization Schedule i.e. after the completion of 9 months until 12 months of age and at 16–24 months. If not administered in the ideal age for measles vaccine, it can be administered upto 5 years of age.

Q. What is measles catch-up campaign ?

A. A measles catch-up campaign is a special campaign to vaccinate all children in a wide age group in a state or a district with one dose of measles vaccine. The catch-up campaign dose is given to all children, both immunized and un-immunized, who belong to the target age group of 9 months to 10 years. The goal of a catch-up campaign is to quickly make the population immune from measles and reduce deaths from measles. A catch-up campaign must immunize nearly 100% of target age group children.

TT vaccine

Q. If a girl has received all doses of DPT and TT as per the NIS till 16 years of age and she gets pregnant at 20 years, should she get one dose of TT during pregnancy ?

A. Give 2 doses of TT during the pregnancy as per the schedule.

Q. Is TT at 10 years and 16 years meant only for girls ?

A. No, it is to be given to both boys and girls.

Q. Can TT be given in the first trimester of pregnancy ?

A. Yes, it should be given as soon as pregnancy is diagnosed.

Hepatitis B vaccine

Q. Up to what age can hepatitis B vaccine be given ?

A. According to the National Immunization Schedule, Hepatitis B vaccine should be given with the first, second and third doses of DPT till one year of age.

Q. Why give the birth dose of hepatitis B vaccine only within 24 hours of birth ?

A. The birth dose of Hepatitis B vaccine is effective in preventing perinatal transmission of Hepatitis B if given within the first 24 hours.

JE vaccine

Q. If a child 16–24 months of age has been immunized with JE vaccine during an SIA, can it receive the JE vaccine again, as part of routine immunization ?

A. No, currently this is a single dose vaccine and should not be repeated.

Q. If a child above 2 years (24 months) of age has not received the JE vaccine through either RI or an SIA, should she/he be given the JE vaccine ?

A. Yes, the child is eligible to receive a dose of the JE vaccine, through RI, till the age of 15 years.

Q. Why 2nd dose of measles vaccine is introduced in the National Immunization Programme ?

A. Measles is highly infectious disease causing illness and death due to complications such as diarrhoea, pneumonia or brain infection. One dose of measles vaccine at 9 months of age protects 85% of infants. With 2nd dose the aim is to protect all the children who remain unprotected after first dose.

Q. If a child comes late for the first dose, then can it get the second dose ?

A. All efforts should be made to immunize the children at the right age i.e. first dose at completed 9 months to 12 months and second dose at 16–24 months. However if a child comes late then give two doses of measles vaccine at one month interval until 5 years of age.

Q. If a child received one dose of measles vaccine during an SIA campaign, should it receive the routine dose of measles vaccine ?

A. Yes, the child should receive routine doses of measles vaccine according to the Immunization Schedule irrespective of the measles SIA dose.

BCG vaccine

Q. Why give BCG vaccine only on the left upper arm ?

A. BCG is given on the left upper arm to maintain uniformity and for helping surveyors in verifying the receipt of the vaccine.

Q. Why do we give 0.05 ml dose of BCG to newborns (below 1 month of age) ?

A. This is because the skin of newborns is thin and an intra-dermal injection of 0.1 ml may break the skin or penetrate into the deeper tissue and cause local abscess and enlarged axillary lymph nodes. Dose of 0.05 ml is sufficient to elicit adequate protection.

Q. Why is BCG given only upto one year of age ?

A. Most children acquire natural clinical/sub-clinical tuberculosis infection by the age of one year. This too protects against severe forms of childhood tuberculosis e.g. TB meningitis and miliary disease.

Q. If no scar appears after administering BCG, should one re-vaccinate the child ?

A. There is no need to re-vaccinate the child, even if there is no scar.

OPV

Q. Till what age can a child be given OPV ?

A. OPV can be given to children till 5 years of age.

Q. Can OPV and vitamin A be given together with DPT-booster dose ?

A. Yes.

Q. Can an infant be breast-fed immediately after OPV ?

A. Yes.

Differences between smallpox and chickenpox

	Smallpox	Chickenpox
1.	*Incubation :* About 12 days (range: 7–17 days).	About 15 days (range 7–21 days)
2.	*Prodromal symptoms:* Severe.	Usually mild.
3.	*Distribution of rash :*	
	(a) centrifugal	(a) centripetal
	(b) palms and soles frequently involved	(b) seldom affected
	(c) axilla usually free	(c) axilla affected
	(d) rash predominant on extensor surfaces and bony prominences.	(d) rash mostly on flexor surfaces.
4.	*Characteristics of the rash:*	
	(a) deep-seated	(a) superficial
	(b) vesicles multilocular and umbilicated	(b) unilocular; dew-drop like appearance
	(c) only one stage of rash may be seen at one time	(c) rash pleomorphic, i.e., different stages of the rash evident at one given time, because rash appears in successive crops
	(d) No area of inflammation is seen around the vesicles.	(d) an area of inflammation is seen around the vesicles.
5.	*Evolution of rash :*	
	(a) evolution of rash is slow, deliberate and majestic, passing through definite stages of macule, papule, vesicle and pustule.	(a) evolution of rash very rapid
	(b) scabs begin to form 10–14 days after the rash appears	(b) scabs begin to form 4–7 days after the rash appears
6.	*Fever :* Fever subsides with the appearance of rash, but may rise again in the pustular stage (secondary rise of fever).	Temperature rises with each fresh crop of rash.

Vaccine: Varicella vaccine is recommended for post exposure administration to un-vaccinated healthy people aged ≥12 months and without other evidence of immunity, to prevent or modify the disease. The vaccine should be administered as soon as possible within 5 days after exposure to rash, if there is no contraindication to use. Among children, protective efficacy was reported as ≥90 per cent when vaccination occurred within 3 days of exposure. However, administration of a second dose is recommended for exposed people to bring them up-to-date on vaccination and for best protection against future exposure *(9)*.

1. VARICELLA-ZOSTER IMMUNOGLOBULIN (VZIG)

Varicella-Zoster Immunoglobulin *(VZIG)* given within 72 hours of exposure has been recommended for prevention of chickenpox in exposed susceptible individuals particularly in immunosuppressed persons. These include (a) susceptible persons receiving immunosuppressive therapy; (b) persons with congenital cellular immunodeficiency; (c) persons with acquired immunodeficiency including HIV/AIDS; (d) susceptible and exposed persons, in particular pregnant women; (e) newborns; and (f) premature infants of low birth weight. It has no therapeutic value in established disease. *VZIG* is given by intramuscular injection in a dose of 12.5 units/kg body weight up to a maximum of 625 units, with a repeat dose in 3 weeks, if a high-risk patient remains exposed. Because *VZIG* appears to bind the varicella vaccine, the two should not be given concomitantly *(4)*.

Monkey pox

the skin eruption usually begins within 1–3 days of appearance of fever. The rash tends to be more concentrated on the face and extremities rather than on the trunk. It affects the face (in 95 per cent of cases), and palms of the hands and soles of the feet (in 75 per cent of cases). Also affected are oral mucous membranes (in 70 per cent of cases), genitalia (30 per cent), and conjunctivae (20 per cent), as well as the cornea. The rash evolves sequentially from macules (lesions with a flat base) to papules (slightly raised firm lesions), vesicles (lesions filled with clear fluid), pustules (lesions filled with yellowish fluid), and crusts which dry up and fall off. The number of lesions varies from a few to several thousand. In severe cases, lesions can coalesce until large sections of skin slough off.

Treatment

Clinical care for monkeypox should be fully optimized to alleviate symptoms, manage complications and prevent long-term sequelae. Patients should be offered fluids and food to maintain adequate nutritional status. Secondary bacterial infections should be treated as indicated. An antiviral agent known as tecovirimat that was developed for smallpox was licensed by the European Medical Association (EMA) for monkeypox in 2022 based on data in animal and human studies. It is not yet widely available.

Vaccination against smallpox was demonstrated through several observational studies to be about 85 per cent effective in preventing monkeypox. Prior smallpox vaccination may result in milder illness. A still newer vaccine based on a modified attenuated vaccinia virus (Ankara strain) was approved for the prevention of monkeypox in 2019 *(1)*. This is a two-dose vaccine for which availability is limited.

2022 ✓

Adult patient diagnosed with COVID-19

Mild disease	Moderate disease	Severe disease
Upper respiratory tract symptoms and/or fever WITHOUT shortness of breath or hypoxia	Any one of : 1. Respiratory rate ≥ 24/min, breathlessness 2. SpO_2 : 90% to ≤ 93% on room air	Any one of : 1. Respiratory rate > 30/min, breathlessness 2. SpO_2 < 90% on room air
Home Isolation & Care (Refer to relevant guideline)	ADMIT IN WARD	ADMIT IN HDU/ICU

MUST DOs

- Physical distancing, indoor mask use, strict hand hygiene
- Symptomatic management (hydration, anti-pyretics, anti-tussive)
- Stay in contact with treating physician
- Monitor temperature and oxygen saturation (by applying a SpO_2 probe to fingers)

Seek immediate medical attention if :

- Difficulty in breathing or SpO_2 <93%
- High grade fever/severe cough, particularly if lasting for >5 days
- A low threshold to be kept for those with any of the high-risk features*

MAY DOs

Therapies based on low certainty of evidence especially for those with high-risk of progression*

Inhalational Budesonide (given via Metered dose inhaler/Dry powder inhaler) at a dose of 800 mcg BD for 5 days) to be given if symptoms (fever and/or cough) are persistent beyond 5 days of disease onset

*High-risk for severe disease or mortality

- Age > 60 years
- Cardiovascular disease, hypertension, and CAD
- Diabetes mellitus and other immunocompromised states (such as HIV)
- Active tuberculosis
- Chronic lung/kidney/liver disease
- Cerebrovascular disease
- Obesity

Oxygen Support :

- Target SpO_2 : 92-96% (88-92% in patients with COPD)
- Preferred devices for oxygenation : non-rebreathing face mask
- Awake proning encouraged in all patients requiring supplemental oxygen therapy (sequential position changes every 2 hours)

Anti-inflammatory or immunomodulatory therapy :

- Inj. Methylprednisolone 0.5 to 1 mg/kg in 2 divided doses (or an equivalent dose of dexamethasone) usually for a duration of 5 to 10 days
- Patients may be initiated or switched to oral route if stable and/or improving
- There is no evidence for benefit for injectable steroids in those NOT requiring oxygen supplementation, or on continuation after discharge
- Anti-inflammatory or immunomodulatory therapy (such as steroids) can have risk of secondary infection such as invasive mucormycosis when used too early, at higher dose or for longer than required

Anticoagulation :

- Conventional dose prophylactic unfractionated heparin or Low Molecular Weight Heparin (weight based e.g. enoxaparin 0.5mg/kg per day SC). There should be no contraindication or high risk of bleeding

Monitoring :

- Clinical Monitoring : breathing rate, Hemodynamic instability, Change in oxygen requirement
- Serial CXR; HRCT chest to be done ONLY if there is worsening
- Lab monitoring : CRP, D-dimer, blood sugar 48 to 72 hrly; CBC, KFT, LFT 24 to 48 hrly

Respiratory support :

- Consider use of NIV (Helmet or face mask interface depending on availability) in patients with increasing oxygen requirement, if work of breathing is LOW
- Consider use of HFNC in patients with increasing oxygen requirement
- Intubation should be prioritized in patients with high work of breathing/if NIV is not tolerated
- Use institutional protocol for ventilator management when required

Anti-inflammatory or immunomodulatory therapy :

- Inj Methylprednisolone 1 to 2 mg/kg IV in 2 divided doses (or an equivalent dose of dexamethasone) usually for a duration 5 to 10 days
- Anti-inflammatory or immunomodulatory therapy (such as steroids) can have risk of secondary infection such as invasive mucormycosis when used too early, at higher dose or for longer than required

Supportive measures :

- Maintain euvolemia (if available, use dynamic measures for assessing fluid responsiveness)
- If sepsis/septic shock : manage as per existing protocol and local antibiogram

Monitoring :

- Clinical Monitoring : work of breathing, Hemodynamic instability, Change in oxygen requirement
- Serial CXR; HRCT chest to be done ONLY if there is worsening
- Lab monitoring : CRP, D-dimer, blood sugar 48 to 72 hrly; CBC, KFT, LFT 24 to 48 hrly

If [illegible] more than 2–3 weeks, investigate for tuberculosis and other conditions

After clinical improvement, discharge as per revised discharge criteria

The CT Range in RT-PCR

The ICMR has defined a basic CT range for RT-PCR tests to help diagnose the COVID-19 infection:

- *More than 35* : If the CT value in the report is 35 or more, it is considered to be a negative report. Additionally, it could also mean that the virus is in its initial stages and replication in the body has just started. It can also indicate later phases of the infection when the person is recovering. Clinical interpretation is necessary here.
- *25–35* : Moderate viral load and transmissibility. Whether the person is having symptoms or is asymptomatic, there is need for isolation and to begin treatment as soon as possible.
- *Less than 25* : High viral load and transmissibility. Immediate isolation and medical consultation.

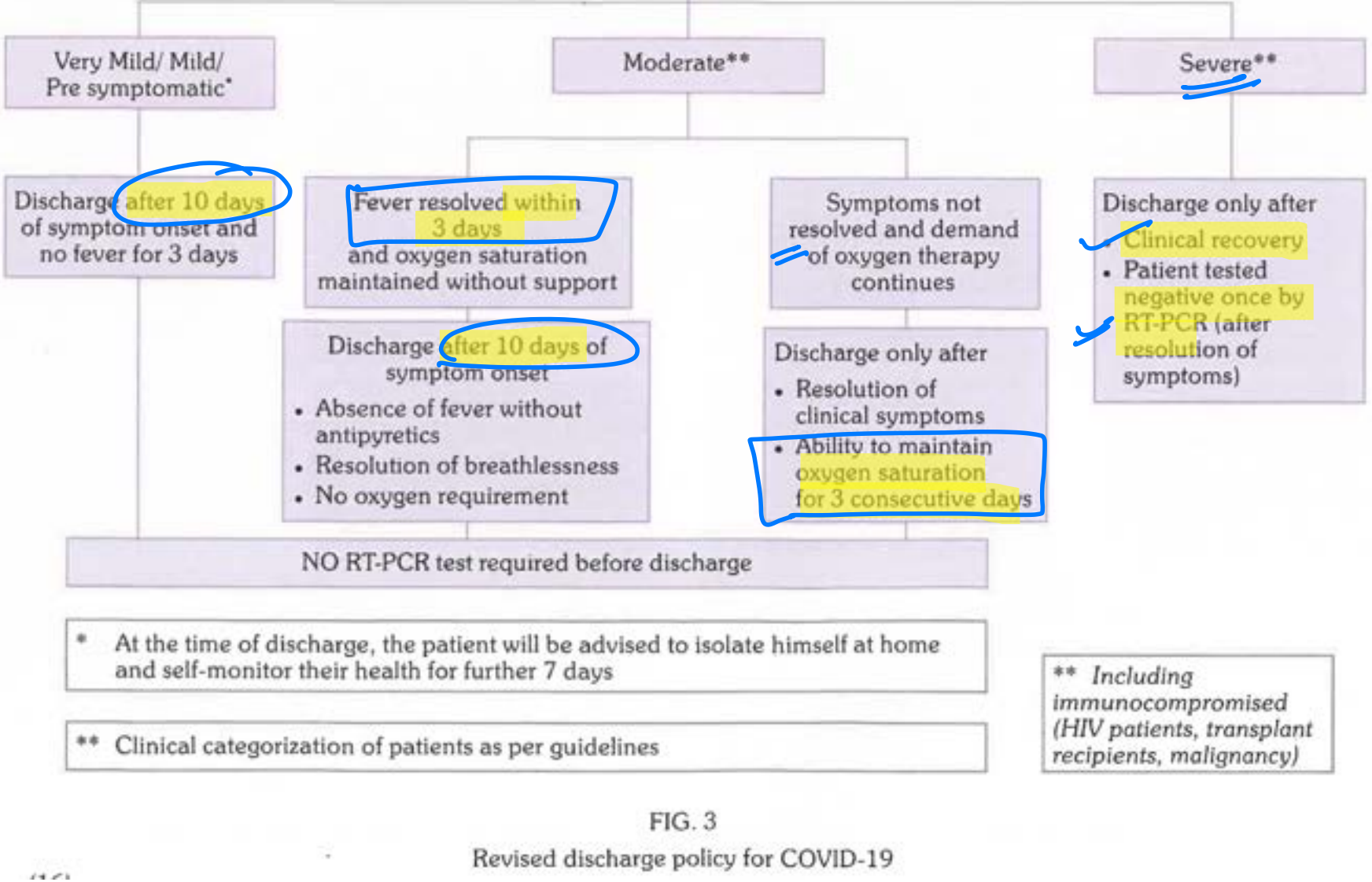
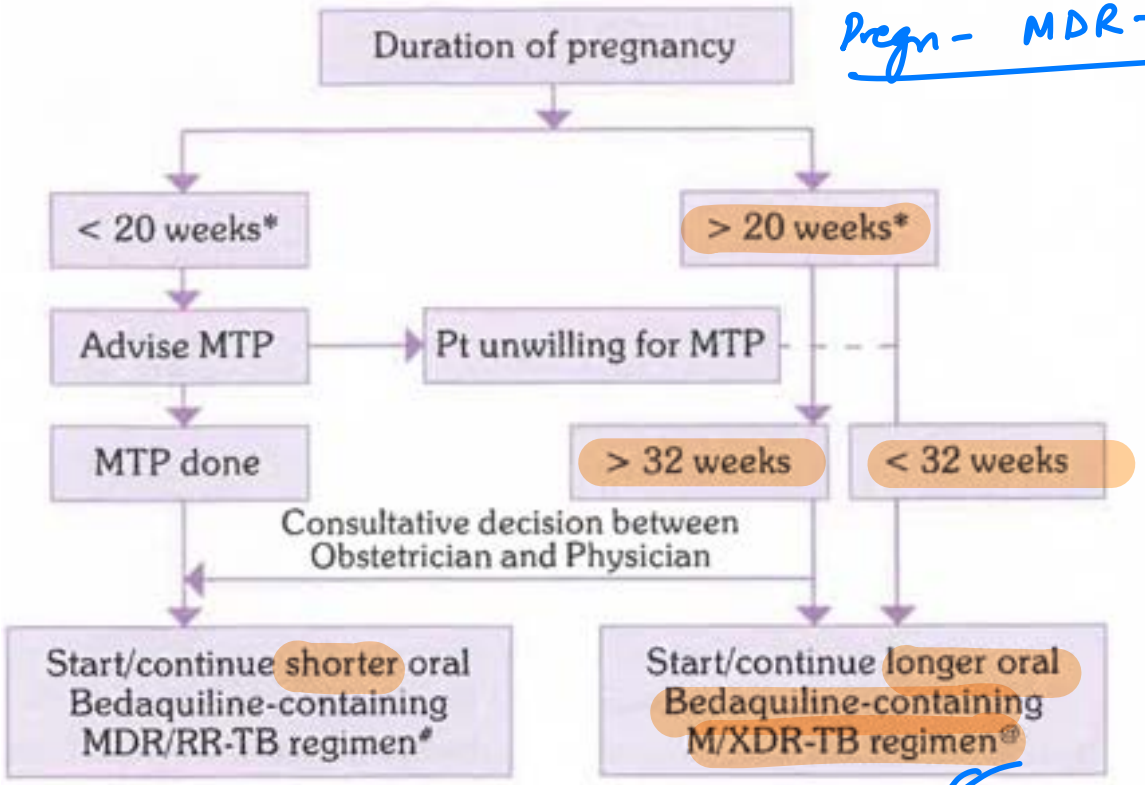


FIG. 3

Revised discharge policy for COVID-19



* 24 weeks will apply wherever the bill is passed.

\# Regimen : 4–6 Bdq (6m) Lfx, Cfz, Eto, Hh, Z, E / 5 Lfx, Cfz, Z, E. No modifications allowed.

@ Regimen :18–20 Lfx, Bdq (6m or longer) Lzd#, Cfz, Cs. Lzd dose to be tapered to half after 6–8 months based on bacteriological response. Modify regimen if one or more drug cannot be used due to reasons of resistance, tolerability, contraindication, availability etc.

- in the order of Z E PAS.
- Eto may be considered after 32 weeks' gestation.
- Am may be considered in post-partum period only. Am will not be started in the final 12 months of treatment.

FIG. 5
Management of MDR-TB patients during pregnancy

1. Shorter oral Bedaquiline-containing MDR/RR-TB regimen *(41, 42)*

Following the recommendations of WHO to implement short oral Bedaquiline-containing MDR/RR-TB regimen, Govt. of India decided on transitioning from the current shorter injectable containing MDR/RR-TB regimen to the shorter oral Bedaquiline-containing MDR/RR-TB regimen in patients >5 years of age weighing 15 kg or more in a phased manner starting with selected states to gain programmatic experience to guide future expansion within 2021.

Eligibility criteria *(41)*

Shorter oral Bedaquiline-containing MDR/RR-TB regimen is recommended for those MDR/RR-TB patients in whom resistance to the component drugs has been excluded or those who have not been previously treated for more than one month with second-line drugs used in shorter oral Bedaquiline-containing MDR/RR-TB regimen and have no other exclusion criteria. The criteria to include or exclude the patients from offering shorter oral Bedaquiline-containing MDR/RR-TB regimen are given below.

Inclusion criteria

1. DST based inclusion criteria
   - Rifampicin resistance detected/inferred;
   - MDR/RR-TB with H resistance detected/inferred based on InhA mutation only or based on KatG mutation only (not both); and
   - MDR/RR-TB with FQ resistance not detected.
2. Other inclusion criteria
   - Children, aged 5 years to less than 18 years of age and weighing at least 15 kg, given their special needs, in consultation with the pediatrician;
   - No history of exposure to previous treatment with second-line medicines in the regimen (Bdq, Lfx, Eto or Cfz) for more than 1 month (unless susceptibility to these medicines is confirmed);
   - No extensive TB disease;
   - No extra-pulmonary TB; and
   - Women who are not pregnant or lactating.

Reaction	Drug responsible
a. Severe rash, agranulocytosis	Thioacetazone
b. Hearing loss or disturbed balance	Streptomycin
c. Visual disturbance (poor vision and colour perception)	Ethambutol
d. Renal failure, shock or thrombocytopenia	Rifampicin
e. Hepatitis	Pyrazinamide

ZHR

TB Interferon gamma release assays (IGRAs)

The Interferon Gamma Release Assays (IGRAs) are a new type of more accurate test for TB. IGRAs are blood tests that measure a person's immune response to the bacteria that cause TB. The immune system produces some special molecules called cytokines. These TB tests work by detecting a cytokine called the interferon gamma cytokine. In practice you carry out one of these TB tests by taking a blood sample and mixing it with special substances to identify if the cytokine is present. Two IGRAs that have been approved and are commercially available, are the QuantiFERON® TB Gold test, and the T-SPOT® TB test. The advantages of an IGRA TB test includes the fact that it only requires a single patient visit to carry out the TB test. Results can be available within 24 hours, and prior BCG vaccination does not cause a false positive result. Disadvantages include the fact that

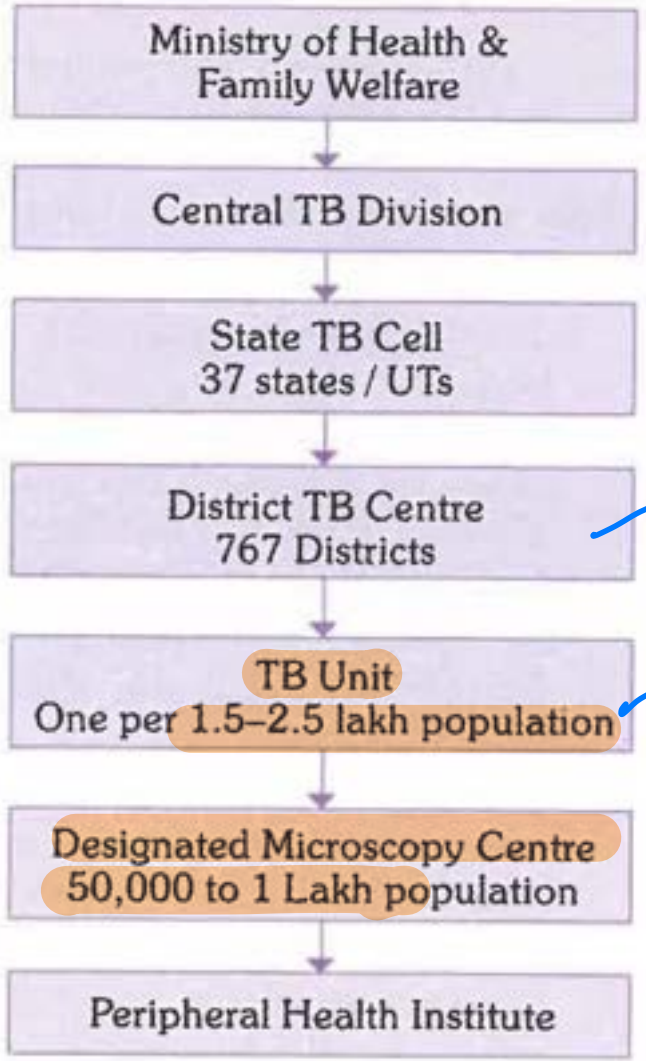
1. *NIKSHAY : TB surveillance using case based, web based IT system (19)*

Central TB Division in collaboration with National Informatics Centre has undertaken the initiative to develop a case based web based application named Nikshay. The word is combination of two Hindi words NI and KSHAY, meaning eradication of TB.

This software was launched in May 2012 and has following functional components.

- Master management
- User details
- TB patient registration and details of diagnosis, DOT provider, HIV status, follow-up, contact tracing, outcomes.
- Details of solid and liquid culture and DST, LPA, CBNAAT details.
- DR-TB patient registration with details.
- Referral and transfer of patients.
- Private health facility registration and TB notification.
- Mobile application for TB notification.
- SMS alerts to patients on registration.
- SMS alerts to programme officers.
- Automated periodic reports:
  a. Case finding
  b. Sputum conversion
  c. Treatment outcome.

The programme has started using IT enabled adherence tools like 99 DOTS for HIV-TB patients. This will be expanded to all TB patients with implementation of daily regimen *(7)*.



CBNAAT sites

In addition to the culture DST laboratories, CBNAAT centres are also established to diagnose Rifampicin resistance among all TB patients (Universal DST). Usually these are established in DTCs, TB units and medical colleges. The country is in the process of expanding CBNAAT site network. They also serve to diagnose TB among presumptive TB cases from key population.

DRTB Centres (18)

DRTB Centres are specialized centres for clinical management of drug resistant TB. At state/regional/division level, there are Nodal DRTB Centres (NDRTBC), to manage seriously ill DRTB cases, DRTB with extensive resistance and DRTB cases to be treated with regimes containing new drugs (Bedaquiline and Delamanid).

At the district level, there are district DRTB centres (DDRTBC), to manage DRTB cases with MDRTB, and H mono/poly-resistance. These centres will function under the guidance of NDRTBCs.

Dengue diagnostics and sample characteristics

	Clinical sample	Diagnostic method	Methodology
Virus detection and its components	Acute serum (1–5 days of fever) and necropsy tissues	Viral isolation	Mosquito or mosquito cell culture inoculation
		Nucleic acid detection	RT-PCR and real time RT-PCR
		Antigen detection	NS1 Ag rapid tests
			NS1 Ag ELISA
			Immuno-histochemistry
Serological response	Paired sera (acute serum from 1–5 days and second serum 15–21 days after)	IgM or IgG seroconversion	ELISA HIA
			Neutralization test
	Serum after day 5 of fever	IgM detection (recent infection)	ELISA
			Rapid tests
		IgG detection	IgG ELISA HIA

1. Prophylactic platelet transfusion may be given at level of < 10,000/cu.mm.
2. Prolonged shock; with coagulopathy and abnormal coagulogram.
3. In case of systemic massive bleeding, platelet transfusion may be needed in addition to red cell transfusion.

Plt transf

Criteria for discharge of patients

1. Absence of fever for atleast 24 hours without the use of anti-pyretic drugs.
2. Return of appetite.
3. Visible clinical improvement.
4. Good urine output.
5. Minimum of 2–3 days after recovery from shock.
6. No respiratory distress from pleural effusion or ascites.
7. Platelet count > 50,000/cu.mm.

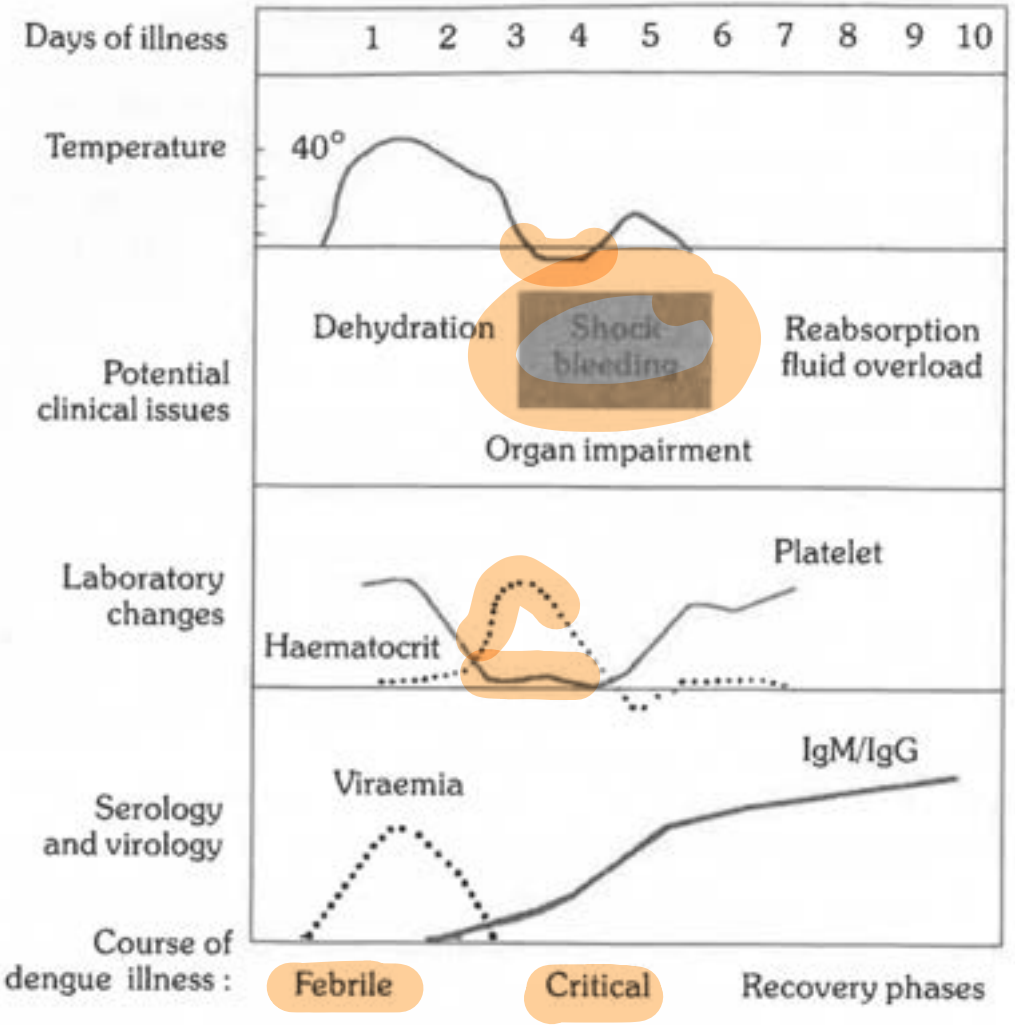


FIG. 2
The course of dengue illness

Dengue

Treatment of *vivax* malaria *(25, 26)*

Diagnosis of vivax malaria may be made by the used of RDT (Bivalent) or microscopic examination of the blood smear. On confirmation, following treatment is to be given :

Drug schedule for treatment of P. vivax malaria:

1. *Chloroquine*: 25 mg/kg body weight divided over three days i.e.
   - 10 mg/kg on day 1,
   - 10 mg/kg on day 2 and
   - 5 mg/kg on day 3.
2. *Primaquine*: 0.25 mg/kg body weight daily for 14 days.

   Primaquine is contraindicated in infants, pregnant women and individuals with G6PD deficiency.

   14 day regimen of Primaquine should be given under supervision.

Dosage chart for treatment of *vivax* malaria

Age	Day 1		Day 2		Day 3		Day 4 to 14
	CQ (150 mg base)	PQ (2.5 mg)	CQ (150 mg base)	PQ (2.5 mg)	CQ (150 mg base)	PQ (2.5 mg)	PQ (2.5 mg)
Less than 1 year	½	0	½	0	¼	0	0
1–4 years	1	1	1	1	½	1	1
5–8 years	2	2	2	2	1	2	2
9–14 years	3	4	3	4	1½	4	4
15 years or more*	4	6	4	6	2	6	6
Pregnancy	4	0	4	0	2	0	0

Note : CQ 250 mg tablet is having 150 mg base

Treatment of *falciparum* malaria *(25, 26)*

Diagnosis of falciparum malaria may be made by the use of RDT (monovalent or bivalent) or microscopic examination of the blood smear. It is imperative to start the treatment for falciparum malaria immediately on diagnosis. The treatment for falciparum malaria is as follows:

In other states (other than North-Eastern states):

1. Artemisinin based combination therapy (ACT-SP)*

   Artesunate (AS), available as 50 mg tablets are given for three days, and Sulfadoxine-Pyrimethamine (S-P) tablets, containing 500 mg Sulfadoxine and 25 mg pyrimethamine are given for one day, as shown in the dosage chart below.

   All tablets for a day should be taken together, swallowed with water.

   In addition, Primaquine (PQ large) tablets should be given on the second day.

Dose schedule for treatment of uncomplicated P. falciparum cases:

1. Artemisinin based combination therapy (ACT-SP) *

   Artesunate 4 mg/kg body weight daily for 3 days, plus Sulfadoxine (25 mg/kg body weight) – Pyrimethamine (1.25 mg/kg body weight) on first day.

   * ACT is not to be given in 1st trimester of pregnancy.

2. Primaquine * : 0.75 mg/kg body weight on day 2.

   With the introduction of different coloured blister packs for different age groups, treatment by the field level staff has been made easy. The colour code for different age groups for packing of tablet ACT+SP has been given as follows :

Dosage chart for treatment of *falciparum* malaria with ACT-SP

Age group (Years)	1st day		2nd day		3rd day
	AS	SP	AS	PQ	AS
0–1* Pink blister	1 (25 mg)	1 (250+ 12.5 mg)	1 (25 mg)	Nil	1 25 (mg)
1–4 Yellow blister	1 (50 mg)	1 (500+25 mg each)	1 (50 mg)	1 (7.5 mg base)	1 (50 mg)
5–8 Green blister	1 (100 mg)	1 (750+37.5 mg each)	1 (100 mg)	2 (7.5 mg base each)	1 (100 mg)
9–14 Red blister	1 (150 mg)	2 (500+25 mg each)	1 (150 mg)	4 (7.5 mg base each)	1 (150 mg)
15 & above White blister	1 (200 mg)	2 (750+37.5 mg each)	1 (200 mg)	6 (7.5 mg base each)	1 (200 mg)

* SP is not to be prescribed for children <5 months of age and should be treated with alternate ACT

* ACT-AL is not to be prescribed for children weighing less than 5 kg.

In North-Eastern states (NE states):

1. ACT-AL co-formulated tablet of Artemether (20 mg) – Lumefantrine (120 mg)

   (Not recommended during the first trimester of pregnancy and for children weighing <5 kg)

Recommended regimen by weight and age group
The packing size for different age groups
based on Kg body weight.

Co-formulated tablet ACT-AL	5–14 kg (>5 months to <3 years)	15–24 kg (>3 to 8 years)	25–34 kg (>9 to 14 years)	>34 kg (>14 years)
Total dose of ACT-AL	20 mg/ 120 mg twice daily for 3 days	40 mg/ 240 mg twice daily for 3 days	60 mg/ 360 mg twice daily for 3 days	80 mg/ 480 mg twice daily for 3 days
	Pack size			
No. of tablets in the packing	6	12	18	24
Give	1 tablet twice daily for 3 days	2 tablets twice daily for 3 days	3 tablets twice daily for 3 days	4 tablets twice daily for 3 days
Colour of the pack	Yellow	Green	Red	White

2. Primaquine * : 0.75 mg/kg body weight on day 2

Treatment of mixed infections (*P. vivax* + *P. falciparum*) cases (25, 26)

All mixed infections should be treated with full course of ACT and Primaquine 0.25 mg per kg body weight daily for 14 days.

In North-Eastern states: Treat with: Age-specific ACT-AL for 3 days + Primaquine 0.25 mg per kg body weight daily for 14 days.

In other states: ACT-SP 3 days + Primaquine 0.25 mg per kg body weight daily for 14 days.

Dosage chart for treatment of mixed (*vivax* and *falciparum*) malaria with ACT-SP

Age	Day 1			Day 2		Day 3		Day 4-14
	AS tablet (50 mg)	SP tablet	PQ (2.5 mg)	AS tablet (50 mg)	PQ (2.5 mg)	AS tablet (50 mg)	PQ (2.5 mg)	PQ (2.5 mg)
Less than 1 year	½	½	0	½	0	½	0	0
1–4 years	1	1	1	1	1	1	1	1
5–8 years	2	1½	2	2	2	2	2	2
9–14 years	3	2	4	3	4	3	4	4
15 years & more	4	3	6	4	6	4	6	6

Treatment of Uncomplicated Malaria

All fever cases diagnosed as malaria by microscopy or RDT should promptly be given effective treatment.

TREATMENT OF P. VIVAX CASES

Positive *P. vivax* cases should be treated with chloroquine in full therapeutic dose of 25 mg/kg divided over three days. Vivax malaria relapses due to the presence of hypnozoites in the liver. The relapse rate in vivax malaria in India is around 30%. For its prevention, primaquine may be given at a dose of 0.25 mg/kg daily for 14 days under supervision. Primaquine is contraindicated in G6PD deficient patients, infants and pregnant women. Caution should be exercised before administering primaquine in areas known to have high prevalence of G6PD deficiency. Primaquine can lead to haemolysis in G6PD deficiency. Patient should be advised to stop primaquine immediately if he develops symptoms like dark coloured urine, yellow conjunctiva, bluish discolouration of lips, abdominal pain, nausea, vomiting etc. and should report to the doctor immediately.

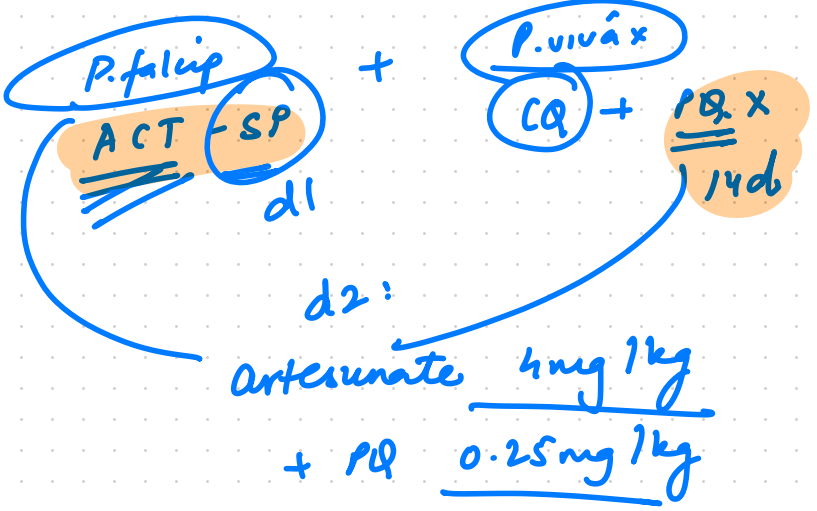
TREATMENT OF P. FALCIPARUM CASES

Artemisinin Combination Therapy (ACT) (Artesunate 3 days + sulphadoxine-pyrimethamine 1 day) should be given to all confirmed *P. falciparum* cases found positive by microscopy or RDT. This is to be accompanied by single dose of primaquine (0.75 mg/kg body weight) on Day 2.

However, considering the reports of resistance to SP drug in North Eastern states, the Technical Advisory Committee has recommended to use the coformulated tablet of Artemether (20 mg) + Lumefantrine (120 mg) as per age-specific dose schedule for the treatment of *Pf* cases in North Eastern states. This drug is not recommended during the first trimester of pregnancy and for children weighing < 5 kg. Production and sale of Artemisinin monotherapy has been banned in India, as it can lead to development of parasite resistance to the drug.

TREATMENT OF MALARIA IN PREGNANCY

ACT should be given for treatment of *P. falciparum* malaria in second and third trimesters of pregnancy, while quinine is recommended in the first trimester. *P. vivax* malaria can be treated with chloroquine. Primaquine is contraindicated in pregnant woman.



Chemotherapy of severe and complicated malaria

Initial parenteral treatment for at least 48 hours: *Choose one of the following four options*	Follow-up treatment, when patient can take oral medication following parenteral treatment
Quinine: 20 mg quinine salt/kg body weight on admission (IV infusion or divided IM injection) followed by maintenance dose of 10 mg/kg 8 hourly; infusion rate should not exceed 5 mg/kg per hour. Loading dose of 20 mg/kg should not be given, if the patient has already received quinine.	*Quinine* 10 mg/kg three times a day with: doxycycline 100 mg once a day OR clindamycin in pregnant women and children under 8 years of age. – to complete 7 days of treatment.
Artesunate: 2.4 mg/kg IV or IM given on admission (time=0), then at 12 h and 24 h, then once a day. OR *Artemether*: 3.2 mg/kg bw IM given on admission then 1.6 mg/kg per day. OR *Arteether*: 150 mg daily IM for 3 days in adults only (not recommended for children).	Full oral course of area-specific ACT: *In North-Eastern states*: Age-specific ACT-AL for 3 days + PQ single dose on second day *In other states*: Treat with: ACT-SP for 3 days + PQ single dose on second day

Note : The parenteral treatment in severe malaria cases should be given for minimum of 24 hours once started (irrespective of the patient's ability to tolerate oral medication earlier than 24 hours).

Note :

- Pregnant women with severe malaria in any trimester can be treated with artemisinin derivatives, which, in contrast to quinine, do not risk aggravating hypoglycaemia.
- The parenteral treatment should be given for minimum of 24 hours.
- Once the patient can take oral therapy; give:
- Quinine 10 mg/kg three times a day with doxycycline 100 mg once a day or clindamycin in pregnant women and children under 8 years of age, to complete 7 days of treatment, in patients started on parenteral quinine.
- Full course of ACT to patients started on artemisinin derivatives.
- Use of mefloquine should be avoided in cerebral malaria due to neuropsychiatric complications associated with it.

Anti-malaria month campaign

Anti-malaria month is observed every year in the month of June throughout the country, prior to the onset of monsoon and transmission season, to enhance the level of awareness and encourage community participation through mass media campaign and inter-personal communication and consolidate inter-sectoral collaborative efforts with other government departments, corporate and voluntary agencies at national, state and district levels.

TABLE 1

Classification of States/UTs for malaria elimination in India (2014)

Category	Definition
Category 0 Prevention of re-establishment phase	States/UTs with zero indigenous cases of malaria (currently, no state/UT)
Category 1 Elimination phase	States/UTs with API less than one, and all their districts reporting API<1 (15 states/UTs)
Category 2 Pre-elimination phase	States/UTs with API < 1, but some of their districts reporting API ≥ 1 (11 states)
Category 3 Intensified control phase	States/UTs with API ≥ 1 (10 states/UTs)

The population living in areas with API ≥ 5 is planned to be covered by LLINs and population living in endemic areas registering API ≥ 2 is covered with conventional net treated with insecticides and IRS. Conventional nets treated with insecticides will continue to be used in areas registering API 2 to 5. IRS is still the preferred method of vector control in areas with very hot summers and where ITNs are not acceptable to population.

A population of about 80 million is at present being covered by IRS in the country *(2)*. DDT is the insecticide of choice; in areas where the vector has shown resistance to DDT, the alternatives are malathion and synthetic pyrethroids. Two rounds of spraying are done for DDT and synthetic pyrethroids to provide protection during the entire transmission season, and in the case of malathion, three rounds of spraying are required. About 60 per cent of the high risk areas targeted under IRS are under coverage with DDT. The real coverage by IRS is, however, limited by the low community acceptance due to the white marks left on plastered surface, acrid smell associated with malathion, re-plastering of walls after completion of IRS etc. *(4)*.

anti-larval - urban
{ most effective : env control
{ Biolog / chemical

(i) Preventive chemotherapy (2)

Elimination of lymphatic filariasis is possible by stopping the spread of the infection. Large-scale treatment involves a single dose of 2 medicines given annually to an entire at-risk population in the following way: albendazole (400 mg) together with either ivermectin (150–200 mcg/kg) or with diethylcarbamazine citrate (DEC) (6 mg/kg). These medicines have a limited effect on adult parasites but effectively reduce the density of microfilariae in the bloodstream and prevent the spread of parasites to mosquitoes. This recommended large-scale treatment strategy is called preventive chemotherapy when conducted annually for 4–6 years, and it can interrupt the transmission cycle.

IDA

Diagnosis of leprosy *(12)*

A case of leprosy is diagnosed by eliciting cardinal signs of leprosy through systematic clinical (and wherever required bacteriological) examination. At least one of the following cardinal (unique and very important) signs must be present to diagnose leprosy.

a. Hypo-pigmented or reddish skin lesion(s) with definite sensory deficit;

b. Involvement of the peripheral nerves, as demonstrated by definite thickening with loss of sensation and weakness /paralysis of the corresponding muscles of the hands, feet or eyes;

c. Demonstration of *M. leprae* in the lesions.

A. Main or core indicators for monitoring progress *(41)*

(1) The number and rate of new cases detected per 100,000 population per year.

(2) Rate of new cases with grade-2 disabilities per 100,000 population per year.

(3) Treatment completion/cure rate.

(4) Prevalence rate

(3) More emphasis is being given on providing disability prevention and medical rehabilitation (DPMR) services to leprosy affected persons. The aid provided is as follows :

(a) Dressing materials, supportive medicines and ulcer kits are provided to leprosy affected persons with ulcers and wounds. These services are also provided to leprosy affected persons residing in self settled colonies.

(b) Micro-cellular rubber footwear is provided for protection of insensitive feet. 41 NGOs in the country and 42 Government Medical Colleges have been strengthened for providing reconstructive surgery services to leprosy affected persons for correction of their disability, thus totalling to 83 centres for conducting reconstructive surgeries in the country.

(c) An amount of Rs. 8,000/- is provided as incentive to each leprosy affected person from BPL family undergoing reconstructive surgery in these identified institutions to compensate for loss of wages.

(d) Support is also provided to government institutions/ PMR centres in the form of Rs 5,000/- per reconstructive surgery conducted.

TABLE 40
Periods of isolation recommended

Disease	Duration of isolation
Chickenpox	Until all lesions crusted; usually about 6 days after onset of rash.
Measles	From the 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 tetracyclines started, 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.
Tuberculosis (sputum +)	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 meningitis Streptococcal pharyngitis	Until the first 6 hours of effective antibiotic therapy are completed.

TABLE 45
Indications for chemoprophylaxis

Disease	Chemoprophylaxis
Cholera	Tetracycline or furazolidone for house-hold contacts
Conjunctivitis, bacterial	Erythromycin ophthalmic ointment (no effect on viral conjunctivitis)
Diphtheria	Erythromycin (and first dose of vaccine)
Influenza	Oseltamivir (effective only for type A) for contacts suffering from chronic diseases
Malaria	See Chapter 5
Meningitis, meningococcal	Ciprofloxacin and minocycline, for household and close community contacts; immunization should be initiated in all cases (against serogroups A and C).
Plague	Tetracycline for contacts of pneumonic plague.

HIV sentinel surveillance round 2016–2017

	High risk groups: IDU/MSM/FSW/TG	Bridge population: SMM/LDT	General population: Pregnant women attending ANC clinics
Sentinel site	Targeted interventions (TI) projects	STD clinic, TI projects	Antenatal clinic
Sample size	250	250	400
Duration	3 months	3 months	3 months
Frequency	Once in 2 years	Once in 2 years	Once in 2 years
Sampling method	Consecutive/random	Consecutive	Consecutive
Age group	15–49 years	15–49 years	15–49 years
Testing strategy	Unlinked anonymous with informed consent	Unlinked anonymous at STD, with informed consent at TI sites	Unlinked anonymous
Blood specimen	Dried blood spot	Serum at STD, DBS at TI sites	Serum
Testing protocol	Two test protocol	Two test protocol	Two test protocol

SMM – Single male migrants, LDT – Long distance truckers

Category of Districts	
More than 1% ANC/PTCT prevalence in district at any time in any of the sites in the last 3 years.	A
Less than 1% ANC/PTCT prevalence in all the sites during last 3 years associated with more than 5% prevalence in any HRG group (STD/CSW/MSM/IDU).	B
Less than 1% in ANC prevalence in all sites during last 3 years with less than 5% in all STD clinic attendees or any HRG with known hot spots (Migrants, truckers, large aggregation of factory workers, tourist etc.).	C
Less than 1% in ANC prevalence in all sites during last 3 years with less than 5% in all STD clinic attendees or any HRG OR, poor HIV data with no known hot spots.	D

ANC – Antenatal clinic
PTCT – Parent to child transmission

TABLE 6

Number of HIV sentinel surveillance sites (2016–2017)

Site type	2016–2017
ANC	829
IDU	87
MSM	89
FSW	245
Migrant	27
TG	18
Truckers	28
Total	1,323

Adults (including pregnant women)

PCP

Co-trimoxazole prophylaxis is recommended for severe or advanced HIV clinical disease (WHO stage 3 or 4) and/or for a CD4 count ≤ 350 cells/mm^3.

- In settings where malaria and/or severe bacterial infections are highly prevalent, co-trimoxazole prophylaxis should be initiated regardless of CD4 cell count or WHO stage.

Co-trimoxazole prophylaxis may be discontinued in adults (including pregnant women) with HIV infection who are clinically stable on antiretroviral therapy, with evidence of immune recovery and viral suppression.

- In settings where malaria and/or severe bacterial infections are highly prevalent, co-trimoxazole prophylaxis should be continued regardless of CD4 cell count or WHO clinical stage.

STI clinics

Management in pregnant women:

Per speculum examination should be done to rule out pregnancy complications like abortion, premature rupture of membranes.

Treatment for vaginitis (TV+BV+Candida):

In first trimester of pregnancy

- Local treatment with Clotrimazole vaginal pessary/cream only for candidiasis. Oral Fluconazole is contraindicated in pregnancy.
- Metronidazole pessaries or cream intravaginally if trichomoniasis or BV is suspected.

In second and third trimester oral metronidazole can be given

- Tab. Secnidazole 2 gm orally, single dose or
  Tab. Tinidazole 500 mg orally, twice daily for 5 days.
- Tab. Metoclopropramide taken 30 minutes before
  Tab. Metronidazole, to prevent gastric intolerance.

genital ulcer

Management of pregnant women:

- Quinolones (like ofloxacin, ciprofloxacin), doxycycline, sulfonamides are contraindicated in pregnant women.
- Pregnant women who test positive for RPR should be considered infected unless adequate treatment is documented in the medical records and sequential serologic antibody titers have declined.
- Inj Benzathine penicillin 2.4 million IU IM after test dose (with emergency tray ready).
- A second dose of benzathine penicillin 2.4 million units IM should be administered 1 week after the initial dose for women who have primary, secondary, or early latent syphilis.
- Pregnant women who are allergic to penicillin should be treated with erythromycin and the neonate should be treated for syphilis after delivery.
- Tab Erythromycin 500 mg orally four times a day for 15 days.
- (Note : Erthromycin estolate is contraindicated in pregnancy because of drug related hepatotoxicity. Only Erythromycin base or Erythromycin ethyl succinate should be used in pregnancy).
- All pregnant women should be asked history of genital herpes and examined carefully for herpetic lesions.
- Women without symptoms or signs of genital herpes or its prodrome can deliver vaginally.
- Women with genital herpetic lesions at the onset of labour should be delivered by caesarean section to prevent neonatal herpes.
- Acyclovir may be administered orally to pregnant women with first episode genital herpes or severe recurrent herpes.

pregn – desensitise – penicillin

3. Immunization

Since their development more than four decades ago, concentrated and purified cell-culture vaccine (CCV) and embryonated egg-based vaccine (EEV) have proved to be safe and effective in preventing rabies. These vaccines are intended for pre-exposure as well as post-exposure prophylaxis.

The internationally available cell-culture and embryonated egg-based vaccines (CCEEVs) consist of rabies virus that has been propagated in cell substrates such as human diploid cells (embryonic fibroblast cells), fetal rhesus diploid cells, Vero cells (kidney cells from the African green monkey), primary Syrian hamster kidney cells, primary chick embryo cells or in embryonated duck eggs. The more recently developed vaccines based on chick embryo cells and Vero cells have safety and efficacy records comparable to those of the human diploid cell vaccines and are less expensive *(4)*.

Rabies vaccines prequalified by WHO do not contain preservatives such as thimerosal. The shelf-life of these vaccines is ≥ 3 years, provided they are stored at +2°C to +8°C and protected from sunlight. Following reconstitution with the accompanying sterile diluent, the vaccines should be used immediately, or within 6–8 hours if kept at the correct temperature.

All CCEEVs should comply with the WHO recommended potency of ≥ 2.5 IU per single intramuscular dose (0.5 ml or 1.0 ml volume after reconstitution, depending on the type of vaccine).

Rabies vaccine

not indicated because an active antibody response to the CCEEV is presumed to have occurred. The dose of human rabies immunoglobulin is 20 IU/kg body weight; for equine immunoglobulin and F (ab')2 products, it is 40 IU/kg body weight. All of the rabies immunoglobulin, or as much as anatomically possible (but avoiding possible compartment syndrome), should be administered into or around the wound site or sites. The remaining immunoglobulin, if any, should be injected intramuscularly at a site distant from the site of vaccine administration. Rabies immunoglobulin may be diluted to a volume sufficient for all wounds to be effectively and safely infiltrated.

Most of the new equine immunoglobulin preparations are potent, highly purified, safe and considerably less expensive than human rabies immunoglobulin. However they are of heterologous origin and carry a small risk of anaphylactic reaction (1/45,000 cases). There are no scientific grounds for performing a skin test prior to administering equine immunoglobulin because testing does not predict reactions, and it should be given whatever the result of the test. The treating physician should be prepared to manage anaphylaxis which, although rare, could occur during any stage of administration *(14)*.

Causes of blindness in India
(2015–19 National survey on blindness)

Refractive error	0.1 per cent
Aphakia uncorrected	1.7 per cent
Cataract untreated	66.2 per cent
Cataract surgical complications	7.2 per cent
Trachomatous corneal opacity	0.8 per cent
Non-trachomatous corneal opacity	7.4 per cent
Phthisis	2.8 per cent
Glaucoma	5.5 per cent
Diabetic retinopathy	1.2 per cent
ARMD	0.7 per cent
Other posterior segment disease	5.9 per cent
All other globe/CNS abnormalities	0.5 per cent

NCD

(1) *Body mass index* (Quetelet's index)

$$= \frac{\text{Weight (kg)}}{\text{Height}^2\text{(m)}}$$

(2) *Ponderal index*

$$= \frac{\text{Height (cm)}}{\text{Cube root of body weight (kg)}}$$

(3) *Brocca index*

= Height (cm) *minus* 100

For example, if a person's height is 160 cm, his ideal weight is (160−100) = 60 kg

(4) *Lorentz's formula*

$$= \text{Ht (cm)} - 100 - \frac{\text{Ht (cm)} - 150}{\text{2 (women) or 4 (men)}}$$

(5) *Corpulence index*

$$= \frac{\text{Actual weight}}{\text{Desirable weight}}$$

This should not exceed 1.2

3. WAIST CIRCUMFERENCE AND WAIST : HIP RATIO (WHR)

Waist circumference is measured at the mid point between the lower border of the rib cage and the iliac crest. It is a convenient and simple measurement that is unrelated to height, correlates closely with BMI and WHR and is an approximate index of intra-abdominal fat mass and total body fat. Changes in waist circumference reflect changes in risk factors for cardiovascular disease and other forms of chronic diseases. There is an increased risk of metabolic complications for men with a waist circumference ≥ 102 cm, and women with a waist circumference ≥ 88 cm *(11)*.

According to WHO guidelines, it has become accepted that a high WHR (> 0.9 in men and > 0.85 in women) indicates abdominal fat accumulation *(4)*.

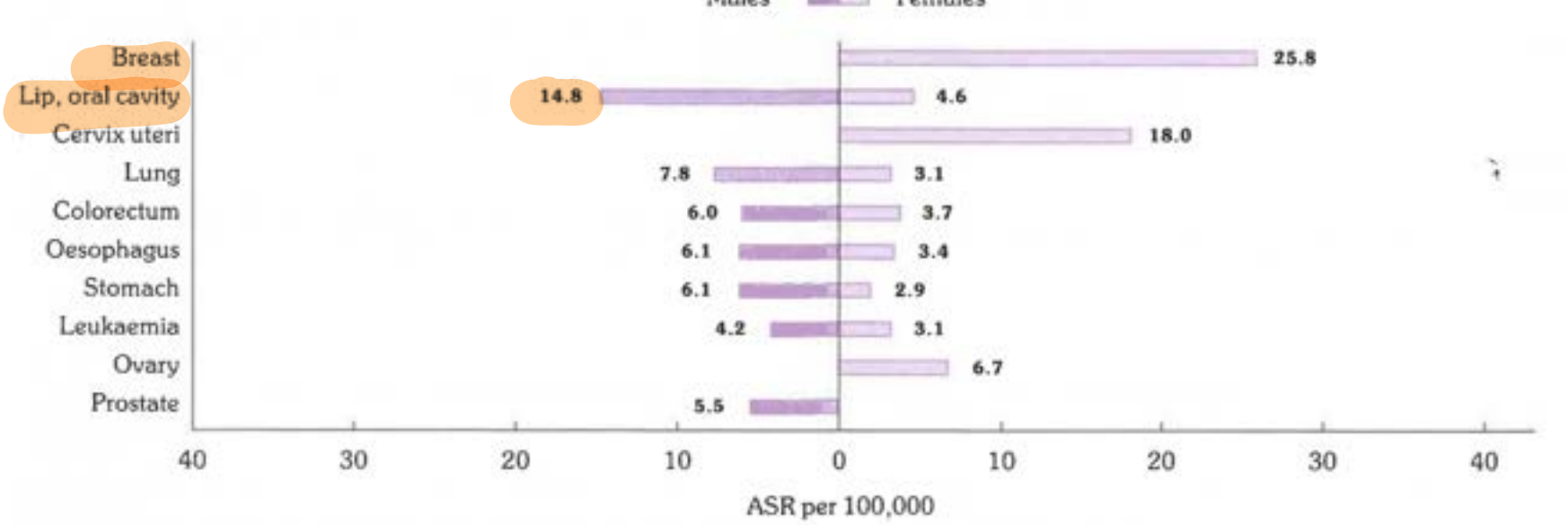


FIG. 3
Age standardized incidence rates by sex, top 10 cancers in India (2020)

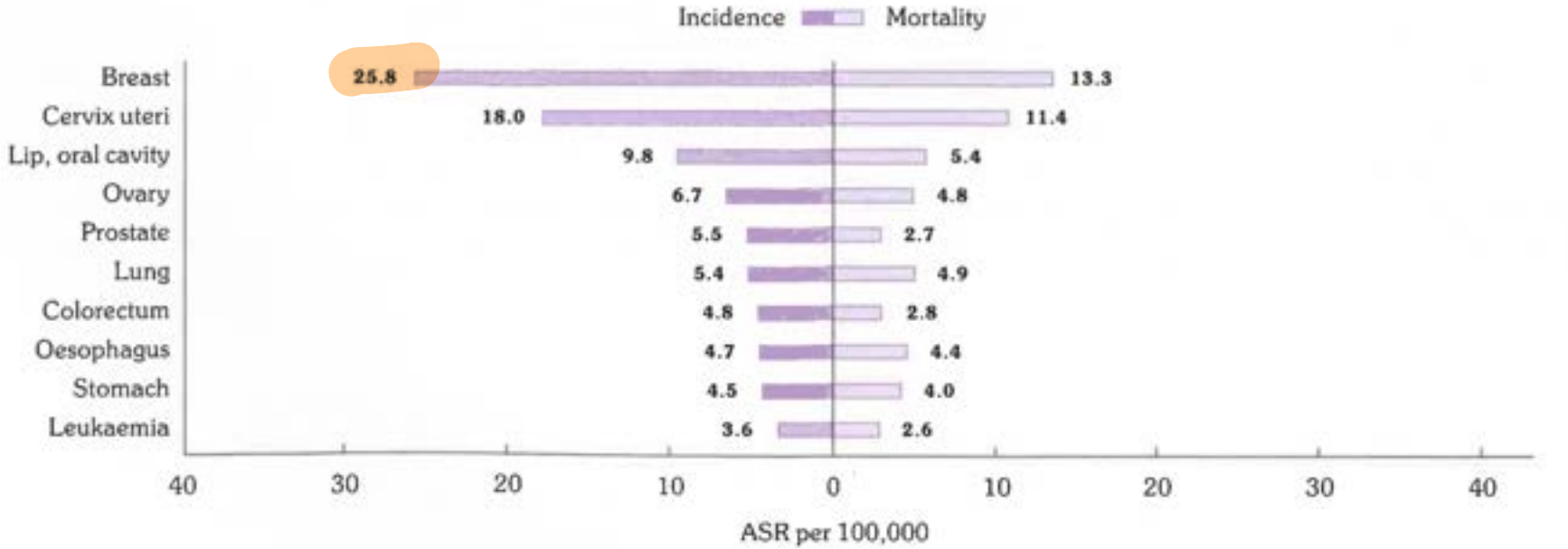


FIG. 4
Age standardized incidence and mortality rates, top 10 cancers in India (2020)

Rule of halves

FIG. 1
Hypertension in the community

The areas of the circles shown in Fig. 1 correspond to the actual proportions observed in several population based studies and number-wise represent the following : *(6)*.

1. The whole community
2. Normotensive subjects
3. Hypertensive subjects
4. Undiagnosed hypertension
5. Diagnosed hypertension
6. Diagnosed but untreated
7. Diagnosed and treated
8. Inadequately treated
9. Adequately treated

TABLE 2

Lifestyle modifications to manage hypertension

DASH

Modification	Recommendation Reduction, Range	Approximate systolic BP
Weight reduction	Maintain normal body weight (BMI, 18.5–24.9)	5–20 mm Hg/10 kg weight loss
Adopt DASH eating plan	Consume a diet rich in fruits, vegetables and low-fat dairy products with a reduced content of saturated fat and total fat	8–14 mm Hg
Dietary sodium reduction	Reduce dietary sodium intake to no more than 100 mEq/d (2.4 g sodium or 6 g sodium chloride)	2–8 mm Hg
Physical activity	Engage in regular aerobic physical activity such as brisk walking (at least 30 minutes per day, most days of the week)	4–9 mm Hg
Moderation of alcohol consumption	Limit consumption to no more than two drinks per day (1 oz or 30 ml ethanol eg, 24 oz beer, 10 oz wine, or 3 oz 80- proof whisky) in most men, and no more than one drink per day in women and lighter-weight persons	2–4 mm Hg

QQ

1. Dietary changes : Dietary modification is the principal preventive strategy in the prevention of CHD. The WHO Expert Committee *(1)* considered the following dietary changes to be appropriate for high incidence populations :

- reduction of fat intake to 20–30 per cent of total energy intake
- consumption of saturated fats must be limited to less than 10 per cent of total energy intake; some of the reduction in saturated fat may be made up by mono and poly-unsaturated fats
- a reduction of dietary cholesterol to below 100 mg per 1000 kcal per day
- an increase in complex carbohydrate consumption (i.e., vegetables, fruits, whole grains and legumes)
- avoidance of alcohol consumption; reduction of salt intake to 5 g daily or less.

All countries should develop a national nutrition and food policy setting out "dietary goals" for achievement *(72)*. The dietary goals (**"prudent diet"**) recommended by the various Expert Committees of WHO *(16, 79)* are as below :

(a) dietary fat should be limited to approximately 15–30 per cent of total daily intake;

(b) saturated fats should contribute no more than 10 per cent of the total energy intake; unsaturated vegetable oils should be substituted for the remaining fat requirement;

(c) excessive consumption of refined carbohydrate should be avoided; some amount of carbohydrate rich in natural fibre should be taken;

(d) sources rich in energy such as fats and alcohol should be restricted;

(e) salt intake should be reduced to an average of not more than 5 g. per day; (salt intake is more in tropical countries. In India it averages 15 g. per day);

(f) protein should account for approximately 10–15 per cent of the daily intake; and

(g) junk foods such as colas, ketchups and other foods that supply empty calories should be reduced.

Protein	–	4 kcal/g
Fat	–	9 kcal/g
Carbohydrate	–	4 kcal/g
Dietary fibre	–	2 kcal/g

alcohol 7

Summary of RDA for Indians – 2020

Age Group	Category of work	Body Wt (kg)	Protein (g/d)	Dietary Fibre* (g/d)	Cal-cium (mg/d)	Magn-esium (mg/d)	Iron (mg/d)	Zinc (mg/d)	Iodine (µg/day)	Thia-mine (mg/d)	Ribo-flavin (mg/d)	Niacin (mg/d)	Vit B6 (mg/d)	Folate (µg/d)	Vit B12 (µg/d)	Vit C (mg/d)	Vit A (µg/d)	Vit D (IU/d)
Men	Sedentary	65	54.0	32	1000	440	19	17	150	1.4	2.0	14	1.9	300	2.2	80	1000	600
	Moderate			41						1.8	2.5	18	2.4					
	Heavy			52						2.3	3.2	23	3.1					
Women	Sedentary	55	46.0	25	1000	370	29	13	150	1.4	1.9	11	1.9	220	2.2	65	840	600
	Moderate			32						1.7	2.4	14	1.9					
	Heavy			41						2.2	3.1	18	2.4					
	Pregnant woman	55 + 10	+9.5 (2nd trimester) +22.0 (3rd trimester)	–	1000	440	27	14.5	250	2.0	2.7	+2.5	2.3	570	+0.25	+15	900	600
	Lactation 0–6m		+17.0	–	1200	400	23	14	280	2.1	3.0	+5	+0.26	330	+1.0	+50	950	600
	7–12m		+13.0							2.1	2 9	+5	+0.17	330				
Infants	0–6 m*	5.8	8 0	–	300	30	–	–	100	0.2	0 4	2	0.1	25	1.2	20	350	400
	6–12m	8.5	10.5	–	300	75	3	2.5	130	0.4	0 6	5	0 6	85	1.2	30	350	400
Children	1–3 y	12.9	12.5	15	500	90	8	3.3	90	0.7	1.1	7	0 9	120	1.2	30	390	
	4–6 y	18.3	16.0	20	550	125	11	4.5	120	0.9	1.3	9	1.2	135	1.2	35	510	600
	7–9 y	25.3	23.0	26	650	175	15	5.9	120	1.1	1.6	11	1 5	170	2.2	45	630	
Boys	10–12 y	34.9	32.0	33	850	240	16	8.5	150	1.5	2.1	15	2.0	220	2.2	55	770	600
Girls	10–12 y	36.4	33.0	31	850	250	28	8.5	150	1.4	1.9	14	1 9	225	2.2	50	790	600
Boys	13–15 y	50.5	45 0	43	1000	345	22	14.3	150	1.9	2.7	19	2.6	285	2.2	70	930	600
Girls	13–15 y	49.6	43.0	36	1000	340	30	12.8	150	1.6	2.2	16	2 2	245	2.2	65	890	600
Boys	16–18 y	64.4	55.0	50	1050	440	26	17.6	150	2.2	3 1	22	3.0	340	2.2	85	1000	600
Girls	16–18 y	55.7	46.0	38	1050	380	32	14.2	150	1.7	2.3	17	2.3	270	2.2	70	860	600

* Adequate Intake (AI)

The six interventions under Anaemia Mukt Bharat strategy are prophylactic iron folic acid supplementation, periodic deworming, intensified year-round behaviour change communication campaign including delayed cord clamping, testing and treatment of anaemia using digital methods and point of care treatment, mandatory provision of iron folic acid fortified foods in public health programmes and addressing non-nutritional causes of anaemia in endemic pockets, with special focus on malaria, haemoglobinopathies and fluorosis. The six institutional mechanisms are inter-ministerial coordination, national Anemia Mukt Bharat unit, national centre of excellence and advanced research on anaemia control, convergence with other ministries, strengthening supply chain and logistics, Anaemia Mukt Bharat dashboard and digital portal-one-stop shop for anaemia.

To address anaemia in children, bi-weekly IFA supplements are provided to children aged 6-59 months through ASHAs and Weekly IFA supplements to children of 5–10 years and adolescents 10–19 years of age. 180 doses of IFA supplements are also being provided to pregnant and lactating women during ANC and PNC period, respectively. Bi-annual Vitamin-A supplementation is being done for all children below five years of age. During FY 2021–22 (till

6 × 6 × 6 — Intervention
beneficary
Institutional mech
IFA
Albendazole
10 Feb - 10 mg
400 mg

Vandemataram scheme

This is a voluntary scheme wherein any obstetric and gynaec specialist, maternity home, nursing home, lady doctor/MBBS doctor can volunteer themselves for providing safe motherhood services. The enrolled doctors will display 'Vandemataram logo' at their clinic. Iron and Folic Acid tablets, oral pills, TT injections etc. will be provided by the respective District Medical Officers to the 'Vandemataram doctors/ clinics' for free distribution to beneficiaries. The cases needing special care and treatment can be referred to the government hospitals, who have been advised to take due care of the patients coming with Vandemataram cards.

18. Kilkari: Kilkari is an Interactive Voice Response (IVR) based mobile service that delivers time- sensitive audio messages (voice call) about pregnancy and child health directly to the mobile phones of pregnant women, mothers of young children and their families. The service covers the critical time period– where the most maternal/

From mid 1980s, CARE–India focused its food support in the ICDS programme and in development of programmes in the areas of health and income supplementation. It is helping in the following projects : Integrated Nutrition and Health Project; Better Health and Nutrition Project; Anaemia Control Project; Improving Women's Health Project; Improved Health Care for Adolescent Girl's Project; Child Survival Project; Improving Women's Reproductive Health and Family Spacing Project; Konkan Integrated Development Project etc.

UNICEF

GOBI-FFF

G-Growth monitoring
O-Oral rehydration
B-Breast feeding
I-Immunization
F-Family planning
F-Food supliments
F-Female education

Abhiyan Indradhanush is an initiative by the Employees' State Insurance Corporation (ESIC) to make hospitals clean and hygienic. The initiative involves changing bed sheets in a specific color pattern every day.

How does Abhiyan Indradhanush work?

- The VIBGYOR pattern is used to change bed sheets in ESIC hospitals.
- The colors of the bed sheets are as follows:
  - **Sunday**: Violet
  - **Monday**: Indigo
  - **Tuesday**: Blue
  - **Wednesday**: Green
  - **Thursday**: Yellow
  - **Friday**: Orange
  - **Saturday**: Red

What is Project Panchdeep?

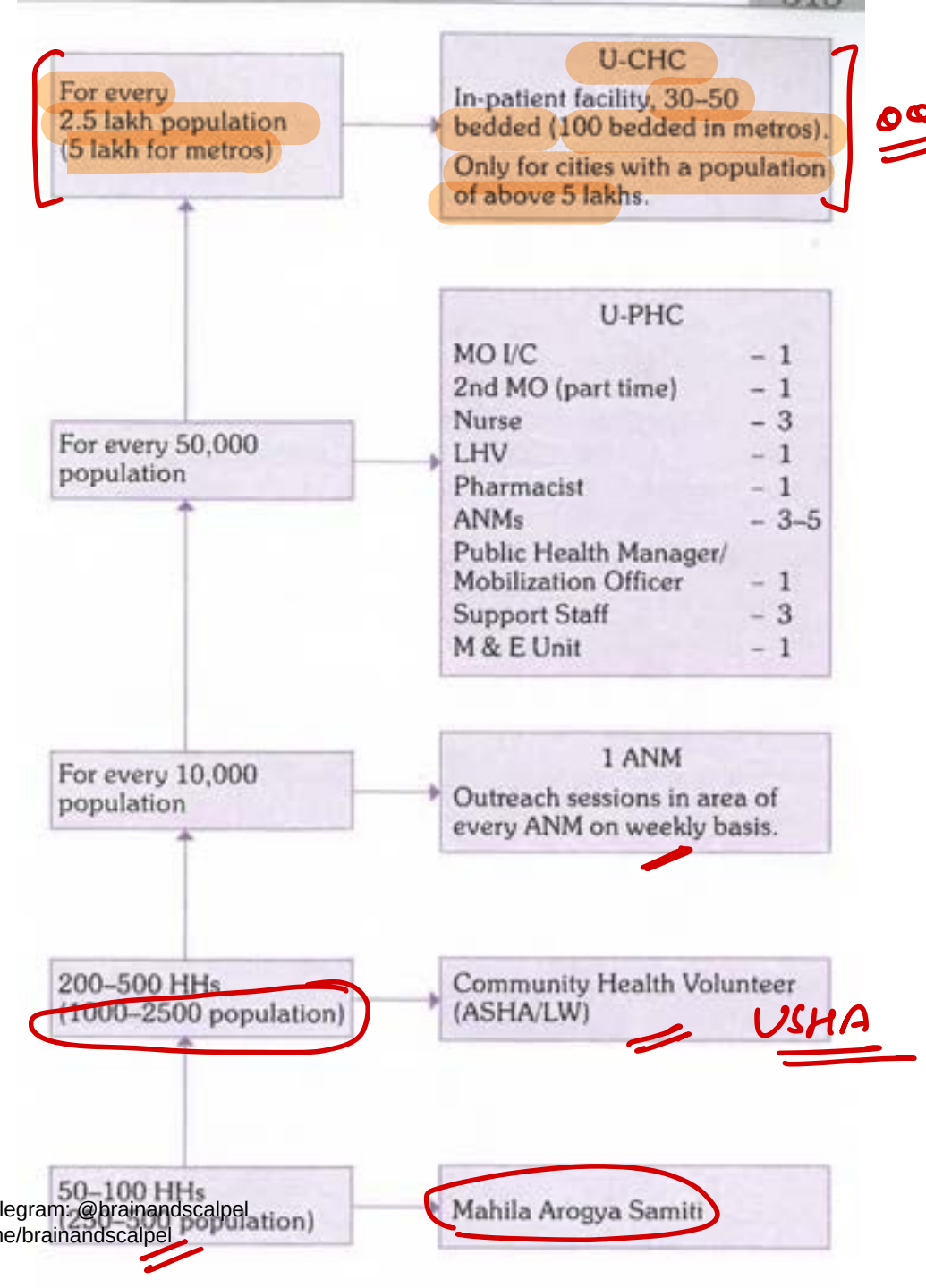
Project Panchdeep allows insured people to avail of medical services at any ESIC facility across India. With each Insured Person being given two biometric cards (one for himself and one for his family), family members can avail medical services even when the Insured Person is away at another location.

RAJIV GANDHI SHRAMIK KALYAN YOJNA (40, 41)

The ESI Corporation has launched a new Yojna for the employees covered under the ESI scheme. This scheme provides an unemployment allowance for the employees covered under ESI scheme who are rendered unemployed involuntarily due to retrenchment/closure of factory etc.

As per this scheme, an insured person going out of insurable employment involuntarily, on account of closure of a factory or establishment, retrenchment, or permanent invalidity arising out of non-employment injury, after rendering insurable employment and having contributed under the scheme for two or more years, is entitled to claim unemployment allowance equal to 50% of wage for a maximum period of upto two years during the life time.

The allowance can be availed in one spell or in different spells of not less than one month.



4. *Mission Parivar Vikas (MPV)*

A programme launched in 146 high total fertility rate districts to accelerate the use and awareness of family planning methods. States and districts fact sheet highlight the current indicators and trends in these districts and will act as baseline and roadmap for future work in these districts, A five pronged strategy has been developed under the mission parivar vikas, which comprise of *(9)*:

a. Delivering assured services;
b. Building additional capacity/human resources development for enhanced service delivery;
c. Ensuring commodity security;
d. Implementing new promotional schemes; and
e. Creating an enabling environment.

5. *New contraceptive launch (9)*

The new contraceptive injectable MPA under "Antara programme" and oral contraceptive pill centchroman "chhaya" have been added to the existing contraceptive basket of choice thus providing the users with new options.

The public sector provides a wide range of contraceptive services for limiting and spacing of births at various levels of health system as described in Table 24.

Government of India is promoting "Fixed Day Static Services (FDS) approach in sterilization services within the

Identification of "at-risk" infants

The number of infants (and children 1–5 years of age) in a community, or attending a child health clinic, may be so large that it may not be possible to give sufficient time and attention to all of them. It is therefore necessary to identify particularly those "at-risk" and give them special intensive care, because it is these "at-risk" babies that contribute so largely to perinatal, neonatal and infant mortality. The basic criteria for identifying these babies include :

1. birth weight less than 2.5 kg;
2. twins;
3. birth order 5 and more;
4. artificial feeding;
5. weight below 70 per cent of the expected weight (i.e., II and III degrees of malnutrition);
6. failure to gain weight during three successive months;
7. children with PEM, diarrhoea; and
8. working mother/one parent.

Family planning method	Service provider	Service location	Service strategy and promotional schemes
Spacing Methods			
IUCD 380 A/IUCD 375	Trained & certified ANMs, LHVs, SNs and Doctors	Sub-centre & higher levels	• On demand • Camp approach • Revised Compensation Scheme
Oral contraceptive pills (OCPs)	Trained ASHAs, ANMs, LHVs, SNs and Doctors	At door step (in pilot districts), Village level Sub-centre & higher levels	• On demand • Village Health Nutrition Days
Condoms	Trained ASHAs, ANMs, LHVs, SNs and Doctors	At door step (in pilot districts), Village level Sub-centre & higher levels	• On demand • Village Health Nutrition Days
Injectable contraceptive MPA	Trained doctors, SNs and ANMs	Medical colleges and district hospitals (in MPV districts at all levels upto sub-centres)	
Limiting Methods			
Minilap	Trained & certified MBBS Doctors & Specialist Doctors	PHC & higher levels	• Fixed Day Static Approach • Camp approach • Revised Compensation Scheme • National Family Planning Insurance Scheme
Laparoscopic sterilization	Trained & certified Specialist Doctors (OBG & General Surgeons)	Usually CHC & higher levels	
NSV (No Scalpel Vasectomy)	Trained & certified MBBS Doctors & Specialist Doctors	PHC & higher levels	
Emergency Contraception			
Emergency contraceptive pills (ECPs)	Trained ASHAs, ANMs, LHVs, SNs and Doctors	At door step (in pilot districts) Village level, Sub-centre & higher levels	• On demand • Village Health Nutrition Days

b. NET-EN

Norethisterone enantate (NET-EN) has been in use as a contraceptive since 1966. However, it has been less extensively used than DMPA. It is given intramuscularly in a dose of 200 mg every 60 days. Contraceptive action appears to include inhibition of ovulation, and progestogenic effects on cervical mucus. A slightly higher (0.4) pregnancy rate (failure rate) has been reported as compared to DMPA.

a. ASHA

ASHA must be resident of the village – a woman (married/widow/divorced) preferably in the age group of 25 to 45 years with formal education upto eight class, having communication skill and leadership qualities. Adequate representation from the disadvantaged population group will ensure to serve such groups better. The general norm of selection is one ASHA for 1000 population. In tribal, hilly and desert areas the norm could be relaxed to one ASHA per habitation.

Role and responsibilities of ASHA

ASHA will be a health activist in the community who will create awareness on health. Her responsibilities will be as follows *(29)* :

1. ASHA will take steps to create awareness and provide information to the community on determinants of health such as nutrition, basic sanitation and hygienic practices, healthy living and working conditions, information on existing health services, and the need for timely utilization of health and family welfare services.
2. She will counsel women on birth preparedness, importance of safe delivery, breast-feeding and complementary feeding, immunization, contraception and prevention of common infections including reproductive tract infection/sexually transmitted infection and care of the young child.
3. ASHA will mobilize the community and facilitate them in accessing health and health related services available at the anganwadi/subcentre/primary health centres, such as immunization, antenatal check-up, postnatal check-up, supplementary nutrition, sanitation and other services being provided by the government.
4. She will work with the village health and sanitation committee of the gram panchayat to develop a comprehensive village health plan.
5. She will arrange escort/accompany pregnant women and children requiring treatment/admission to the nearest pre-identified health facility i.e. primary health centre/community health centre/First Referral Unit.
6. ASHA will provide primary medical care for minor ailments such as diarrhoea, fevers, and first-aid for minor injuries. She will be a provider of directly observed treatment short-course (DOTS) under revised national tuberculosis control programme.
7. She will also act as a depot holder for essential provisions being made available to every habitation like oral rehydration therapy, iron folic acid tablet, chloroquine, disposable delivery kits, oral pills and condoms etc. A drug kit will be provided to each ASHA. Contents of the kit will be based on the recommendations of the expert/technical advisory group set up by the government of India, and include both AYUSH and allopathic formulations.

Her role as a provider can be enhanced subsequently. States can explore the possibility of graded training to her for providing newborn care and management of a range of common ailments, particularly childhood illnesses.

She will inform about the births and deaths in her village and any unusual health problems/disease outbreaks in the community to the sub-centre/primary health centre.

She will promote construction of household toilets under total sanitation campaign.

Newborn Care Corner (NBCC)

NBCC is a space within the delivery room in any health facility where immediate care is provided to all newborns at birth. This area is MANDATORY for all health facilities where deliveries are conducted. About 20,337 NBCCs are operational in the country *(6)*.

Newborn Stabilization Unit (NBSU)

NBSU is a facility within or in close proximity of the maternity ward where sick and low birth weight newborns can be cared for during short periods. All FRUs/CHCs need to have a neonatal stabilization unit, in addition to the newborn care corner. It requires space for 4 bedded unit and two beds in post-natal ward for rooming-in. About 2,579 NBSUs are functional in the country.

Special Newborn Care Unit (SNCU)

SNCU is a neonatal unit in the vicinity of the labor room which is to provide special care (all care except assisted ventilation and major surgery) for sick newborns. Any facility with more than 3,000 deliveries per year should have an SNCU (most district hospitals and some sub-district hospitals would fulfil this criteria).

The minimum recommended number of beds for an SNCU at a district hospital is 12. However, if the district hospital conducts more than 3,000 deliveries per year, 4 beds should be added for each 1,000 additional deliveries. A 12 bedded unit will require 4 additional adult beds for the step down. 894 SNCUs are functional in the country.

Navjat Shishu Suraksha Karyakram (NSSK)

NSSK is a programme aimed to train health personnel in basic newborn care and resuscitation. It has been launched to address care at birth issue i.e. prevention of hypothermia, prevention of infection, early initiation of breast-feeding and basic newborn resuscitation. The objective of the new initiative is to have a trained health person in basic newborn care and resuscitation unit at every delivery point *(46)*.

Delivery of services

AWW

1. Supplementary nutrition

Supplementary nutrition is given to children below 6 years, and nursing and expectant mothers from low income group. The type of food depends upon local availability, type of beneficiary, location of the project etc. The aim is to supplement nutritional intake as follows *(141)* :

a. each child 6–72 months of age to get 500 calories and 12–15 grams of protein (financial norm of Rs 8.00 per child per day);

b. Severely malnourished child 6–72 months to get 800 calories and 20–25 grams protein (financial norm of Rs 12.00 per child per day); and

c. Each pregnant and nursing woman to get 600 calories and 18–20 grams of protein (financial norm of Rs 9.50 per beneficiary per day.

Under the revised nutritional and feeding norms for supplementary nutrition, state governments/UTs have been mandated to provide more than one meal to the children who come to AWCs, which include providing a morning snack in the form of milk/banana/egg/seasonal fruit/micro-nutrient fortified food followed by a hot cooked meal. For children below 3 years of age, and pregnant and lactating mothers, "take home ration" is to be provided. All are eligible for availing of the services of ICDS, below poverty line is not a criteria for registration of beneficiaries. The scheme is universal.

Supplementary nutrition is given 300 days in a year *(140)*. Adequate funds for supplementary nutrition is provided in the State Plan under Minimum Needs Programme. Children are weighed every month. Nutrition education and health education is given to mothers of children suffering from 1st

Phases of family life cycle		Events characterizing	
No.	Description	Beginning of phase	End of phase
I.	Formation	Marriage	Birth of 1st child
II.	Extension	Birth of 1st child	Birth of last child
III.	Complete extension	Birth of last child	1st child leaves home
IV.	Contraction	1st child leaves home	Last child leaves home of parents
V.	Completed contraction	Last child has left home of parents	1st spouse dies
VI.	Dissolution	1st spouse dies	Death of survivor (extinction)

1. NUCLEAR FAMILY

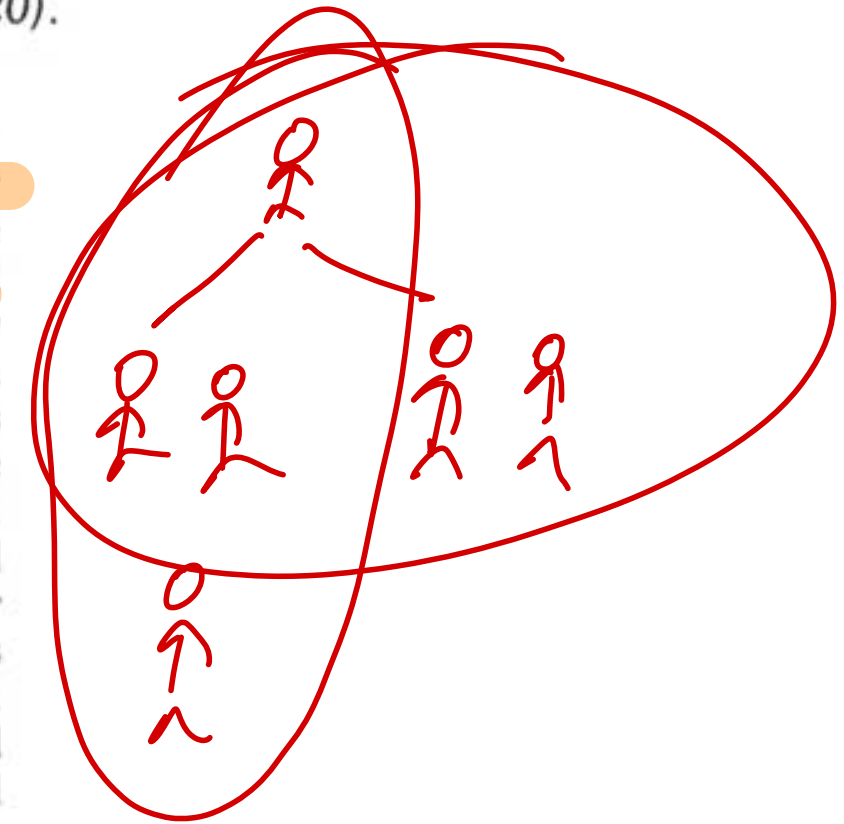
The *nuclear* or *elementary* family is universal in all human societies. It consists of the married couple and their children while they are still regarded as dependents. They tend to occupy the same dwelling space. In the nuclear family, the

than in the joint family. The term "new families" has come recently into vogue; it is applied to those under 10 years duration and consists of parents and children. The concept is important in view of studies relating to family planning *(20)*.

The main characteristics of a typical joint family are *(21)* : (1) It consists of a number of married couples and their children who live together in the same household. All the men are related by blood and the women of the household are their wives, unmarried girls and widows of the family kinsmen. (2) All the property is held in common. There is a common family purse to which all the family income goes and from which all the expenditures are met. (3) All the authority is vested in the senior male member of the family. He is the most dominant member and controls the internal and external affairs of the family. The senior female member by virtue of her being the wife of the male head shares his power so far as the women of the family are concerned. (4) The familial relations enjoy primacy over marital relations. Early and arranged marriage is advocated to ward off any threat from marital relationship.

3 THREE GENERATION FAMILY

The three generation family is confused with the joint family. It is fairly common in the west. This tends to be a household where there are representatives of three generations. It occurs usually when young couples are unable to find separate housing accommodation and continue to live with their parents and have their own children. Thus, representatives of three generations related to each other by direct descent live together.



7. *BROKEN FAMILY*

A broken family is one where the parents have separated, or where death has occurred of one or both the parents. Dr. John Bowlby brought out clearly the concept of "mental deprivation" as one of the most dangerous pathogenic factors in child development *(23)*. Separation of the child from its father (paternal separation) and separation of the child from both of its parents (dual-parental separation) are

8. *PROBLEM FAMILIES*

Problem families are those which lag behind the rest of the community. In these families, the standards of life are generally far below the accepted minimum and parents are unable to meet the physical and emotional needs of their children. The home life is utterly unsatisfactory. The underlying factors in most problem families are usually those of personality and of relationship, backwardness, poverty, illness, mental and emotional instability, character defects and marital disharmony. These families are recognized as problems in social pathology *(24)*. Children who are reared in such an environment are victims of prostitution, crime and vagrancy. Problem families may be found in all social classes but are more common in the lower social classes. The health visitor, the health inspector, the midwife, the social worker, the medical officer of health, all can render useful service in rehabilitating such families in a community.

SOCIAL PATHOLOGY

The term "social pathology" is given a restricted interpretation linking it to poverty, crime, delinquency and vagrancy. In the modern context, the term is also used to describe the relation between disease and social conditions. The social pathology of accidents, diabetes, cardiovascular disease, cancer, chronic bronchitis have all been subject of recent investigations in medical literature. Social pathology is uncovered by "social surveys".

The term "social medicine" was first introduced by Jules Guerin, a French physician in 1848. In 1911, the concept of social medicine was revived by Alfred Grotjahn of Berlin who stressed the importance of social factors as determinants of health and disease. These ideas of social medicine spread throughout Europe and England after the First World War (see page 8).

Social medicine should not be confused with state medicine or socialized medicine. State medicine implies provision of free medical service to the people at government expense. Socialized medicine envisages provision of medical service and professional education by the State as in state medicine, but the programme is operated and regulated by professional groups rather than by the government.

CULTURE

The word "culture" is widely used in sociology. It is the central concept around which cultural anthropology has grown. Culture is defined as "learned behaviour which has been socially acquired". Culture is the product of human societies, and man is largely a product of his cultural environment. Culture is transmitted from one generation to another through learning processes, formal and informal. Culture plays an important role in human societies. It lays down norms of behaviour and provides mechanisms which secure for an individual his personal and social survival *(4)*. In general, it is widely held, that culture stands for the customs, beliefs, laws, religion and moral precepts, arts and other capabilities and skills acquired by man as a member of the society.

Cultural factors in health and disease have engaged the attention of medical scientists and sociologists. Every culture has its own customs, some of which have a profound influence on the incidence of disease. In developed countries, for example, cancer of the lung from smoking and cirrhosis of liver from drinking are the result of the abuse of widely proclaimed social habits. In India, chewing pan is associated with oral cancer. It is now fairly established that cultural factors are deeply involved in matters of personal hygiene, nutrition, immunization, seeking early medical care, family planning, child rearing, disposal of refuse and excreta, outlook on health and disease – in short, the whole way of life.

ACCULTURATION

Acculturation means "culture contact." When there is contact between two people with different types of culture, there is diffusion of culture both ways. There are various ways by which culture contact takes place *(10)* : (1) trade and commerce; (2) industrialization; (3) propagation of religion; (4) education; and (5) conquest. The British brought their culture into India through conquest. An Indian is said to be the next best Englishman. It is because of culture contact, which has both good and bad aspects. The introduction of scientific medicine is through culture contact. The changes in food habits of people is brought about through culture contact; many orthodox brahmins in India today eat meat. The widespread use of tobacco all over the world is because of culture contact. The radio, the television, the cinema have been important factors in shaping the cultural-behaviour patterns of people.

3. TEMPORARY SOCIAL GROUPS

(1) *The Crowd* : When a group of people come together temporarily, for a short period, motivated by a common interest or curiosity (e.g., to witness a football match), it is known as a crowd. The crowd lacks internal organization and leadership. When the interest is over, the crowd disperses. (2) *The Mob* : The mob is essentially a crowd, but has a leader who forces the members into action. There may be a symbol in the shape of a flag or slogan. The mob is more emotional than a crowd. Like the crowd, it is unstable and without internal organization. When the purpose of the mob is achieved, the group disperses. (3) *The Herd* : This is also a crowd with a leader. Here the members of the group have to follow the orders of the leader without question, e.g., the tourist group under a guide.

Some specific emotions

(1) FEAR : Fear is the most common emotion of man. It may produce excitement or depression; flight or fight. Some of the common fears of man are – fear of the dark, fear of dogs, fear of snakes, fear of ghosts, fear of sickness, fear of death, etc. When the fear becomes exaggerated or unnecessary, it is called **phobia**. Such fears are common in patients with mental disorders; (2) ANGER : Anger or rage is another basic emotion of man. It is a reaction of the offensive type. Anger is a destructive force. If it is not controlled, it may impel a person even to commit murder; (3) ANXIETY : Anxiety may manifest in such symptoms as rapid pulse and breathing, flushing, tremors, sweating, dry mouth, nausea, diarrhoea, raised blood pressure, etc. Patients admitted to hospitals are anxious. Anxiety leads to tension, and tension to pain. The doctor must understand the patient's anxiety and give him reassurance. A kind word from the doctor or nurse works like a magic and gives the patient considerable relief from mental anxiety; and (4) LOVE : Love is a feeling of attachment to some person. It is a basic emotion of man.

Technique of interview

QQQ

Conducting an interview is both an art and science. Sociologists have described the following steps for conducting an interview *(40)*.

1. ESTABLISHING CONTACT

The first requisite before conducting an interview is to establish contact with the interviewee. Prior appointment regarding the time and place of interview is always desirable. It gives the interviewee a sense of satisfaction and a feeling of importance that his time has been valued.

2. STARTING AN INTERVIEW

The beginning should always be made from a general discussion of the problem. The researcher should create an atmosphere in which the interviewee freely tells his story in his own way. The researcher should let the interviewee do most of the talking, while he should himself listen to it attentively guiding and directing the interviewee about the subject matter wherever necessary. All controversial matters must be carefully avoided.

3. SECURING RAPPORT

A state of rapport must be established between the interviewee and the researcher. In the beginning every interviewee proceeds very cautiously giving only formal information. He may not like to discuss personal matters with a stranger. It therefore requires tact on the part of the researcher to create a friendly atmosphere and gain the confidence of the interviewee. Once rapport is gained and hesitation and shyness are overcome, the interviewee may feel overzealous to tell everything that he knows, and all that he feels without any attempt at secrecy or formality. The research worker must utilize this situation to the fullest advantage, and use it as best as he can. The state of rapport, sometimes may not last long; once the interviewee has relapsed into his former state, it may be very difficult to bring him back to rapport.

4. RECALL

At times, during the course of an interview, the interviewee may be so full of emotion that he drifts away from the main subject, and may even go into silence at the end of the narration. At such times, the researcher should give enough time to the interviewee to recollect and start again. It may be necessary to refresh his memory by pointing out what he had been saying last.

5. PROBE QUESTIONS

When the interviewee, during an interview knowingly or unknowingly side-tracks some important aspect of the problem, the researcher has to be very cautious in catching these slips. Great care should be taken in putting probe questions. They should appear to the interviewee to be born of mere curiosity. If the interviewee has deliberately side-tracked a particular point, a very shrewd effort is needed to make him discuss a point at length, the same should not be doggedly pursued, lest rapport should be lost.

6. ENCOURAGEMENT

During the course of an interview, it is necessary to encourage the interviewee from time to time, by interpolating such complimentary expressions as "what you have said is really very illuminating; I never had such an enlightening discussion; you really have a very unique approach to the problem; I myself had never thought of it from that angle, etc." Great care should be taken that complimentary remarks should sound true appreciations, and not flattery otherwise they will lose all their effect.

7. GUIDING THE INTERVIEW

Sometimes, the interviewee digresses in his narration to less important topics, which he is most eager to relate, and if stopped from continuing the conversation he may get offended. It is the duty of the researcher to guide the subject in the right path without offending him.

8. RECORDING

Recording the statements should be reduced to a minimum during the course of an interview. If recording is continued, the flow of the conversation will slow down and the interview may take the form of questions and answers. Further, the interviewee will be conscious that his statements are being recorded. The researcher should jot down only important points.

9. CLOSING THE INTERVIEW

An interview should not be ended abruptly. The interviewee should not feel, at the close of the interview, that he has divulged many of his secrets to a stranger. The researcher should bring the interview to a natural close, followed by the usual forms of greetings.

10. REPORT

Soon after the interview, the report should be compiled when the mind is still fresh about the narration.

(a) *Changing the water source :* One solution to the problem is to find a new source of drinking water with a lower fluoride content (0.5 to 0.8 mg/L) if that is possible. Running surface water contains lower quantities of fluorides than ground water sources such as wells. (b) *Chemical treatment :* If the above is not possible, the water can be chemically defluoridated in a water treatment plant, even though such treatment is moderately expensive *(99)*. The National Environmental Engineering Research Institute, Nagpur developed a technique for removing fluoride by chemical treatment. It is called **Nalgonda technique** for defluoridation of water *(103)*. It involves the addition of two chemicals (viz. lime and alum) in sequence followed by flocculation, sedimentation and filtration. (c) *Other measures :* Fluoride supplements should not be prescribed for children who drink fluoridated water. The use of fluoride toothpaste in areas of endemic fluorosis is not recommended for children upto 6 years of age *(99)*.

SANITARY WELL

A sanitary well is one which is properly located, well-constructed and protected against contamination with a view to yield a supply of safe water (Fig. 3). The following points should be taken into consideration while constructing sanitary wells: (1) *LOCATION* : The first step in well construction is the choosing of a proper site. If bacterial contamination is to be avoided, the well should be located not less than 15 m (50 feet) from likely sources of contamination. The well should be located at a higher elevation with respect to a possible source of contamination. The distance between the well and the houses of the users should also be considered. If the well is situated far away, people may not use it. It is therefore recommended that the well should be so located that no user will have to carry water for more than 100 m (100 yards) *(7)*. (2) *LINING* : The lining of the well should be built of bricks or stones set in cement up to a depth of at least 6 m (20 feet) so that water enters from the bottom and not from the sides of the well. The lining should be carried 60–90 cm (2–3 feet) above the ground level. (3) *PARAPET WALL* : There should be a parapet wall up to a height of at least 70–75 cms (28 inches) above the ground. (4) *PLATFORM* : There should be a cement-concrete platform round the well extending at least 1 m (3 feet) in all directions. The platform should have gentle slope outwards towards a drain built along its edges. (5) *DRAIN* : There should be a pucca drain to carry off spilled water to a public drain or a soakage pit constructed beyond the "cone of filtration" (area of drainage) of the well. (6) COVERING : The top of the well should be closed by a cement concrete cover because the bulk of the pollution is introduced into the well directly through the open top. Studies have shown that merely covering a well alone caused a marked improvement in the bacteriological quality of the water *(5)*. *Open* wells, therefore, cannot be considered sanitary, however well they might be constructed otherwise. (7) *HAND-PUMP* : The well should be equipped with a hand-pump for lifting the water in a sanitary manner. Studies have shown that when a pump is fitted there is marked improvement in the bacteriological quality of the water. The handpump should be of robust construction to withstand rough handling by the people. There should be an efficient maintenance service and arrangements for immediate repair if the pumps go out of order. (8) *CONSUMER RESPONSIBILITY* : The provision

TABLE 2

Differences between a shallow well and deep well

	Shallow well	Deep well
1. *Definition*	Taps the water from above the first impervious layer	Taps the water from below the first impervious layer
2. *Chemical quality*	Moderately hard	Much hard
3. *Bacteriological quality*	Often grossly contaminated	Taps purer water
4. *Yield*	Usually goes dry in summer	Provides a source of constant supply

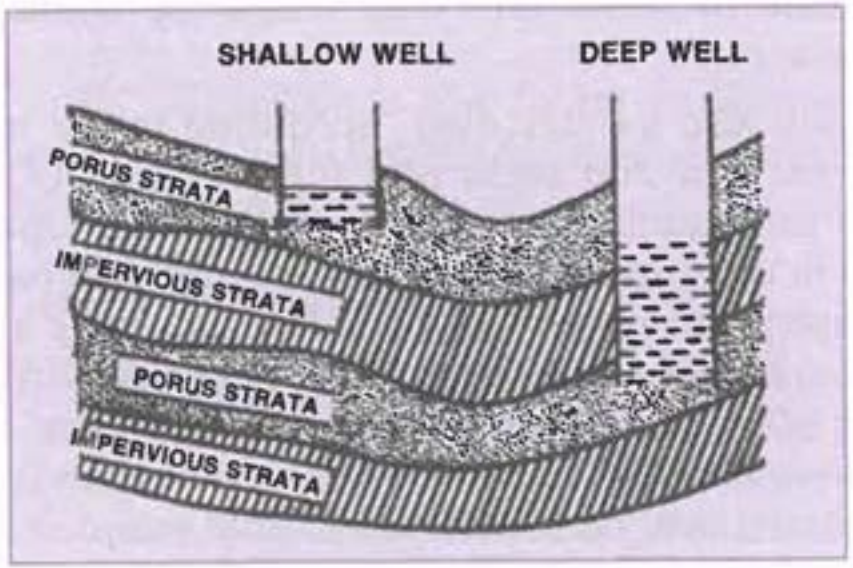


FIG.2
Shallow and deep wells

		Rapid sand filter	Slow sand filter
1.	Space	Occupies very little space	Occupies large area
2.	Rate of filtration	200 m.g.a.d	2–3 m.g.a.d.
3.	Effective size of sand	0.4–0.7 mm	0.2–0.3 mm
4.	Preliminary treatment	Chemical coagulation and sedimentation	Plain sedimentation
5.	Washing	By back-washing	By scraping the sand bed
6.	Operation	Highly skilled	Less skilled
7.	Loss of head allowed	6–8 feet (2–2.5 m)	4 feet (1.5 m)
8.	Removal of turbidity	Good	Good
9.	Removal of colour	Good	Fair
10.	Removal of bacteria	98–99 per cent	99.9–99.99 per cent

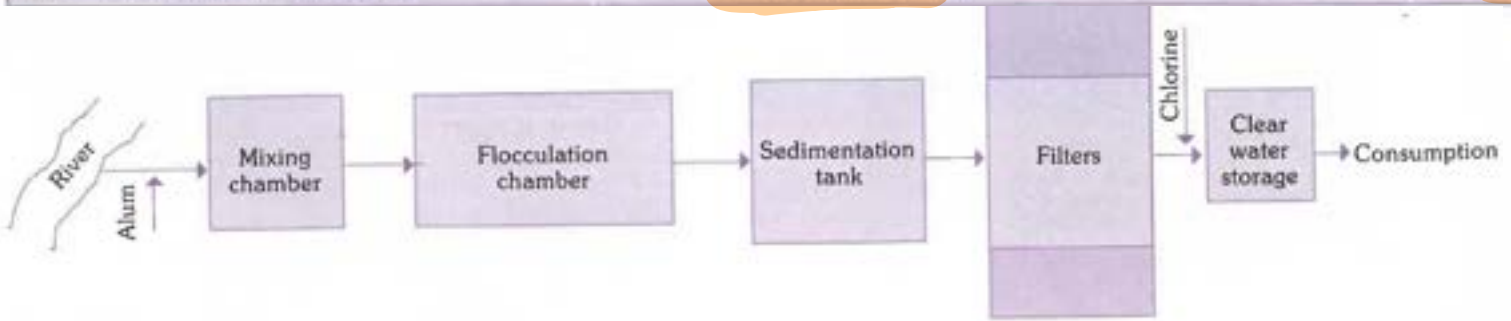


FIG. 6
Flow diagram of a rapid sand filtration plant

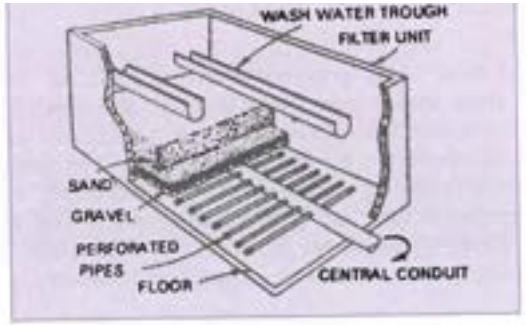
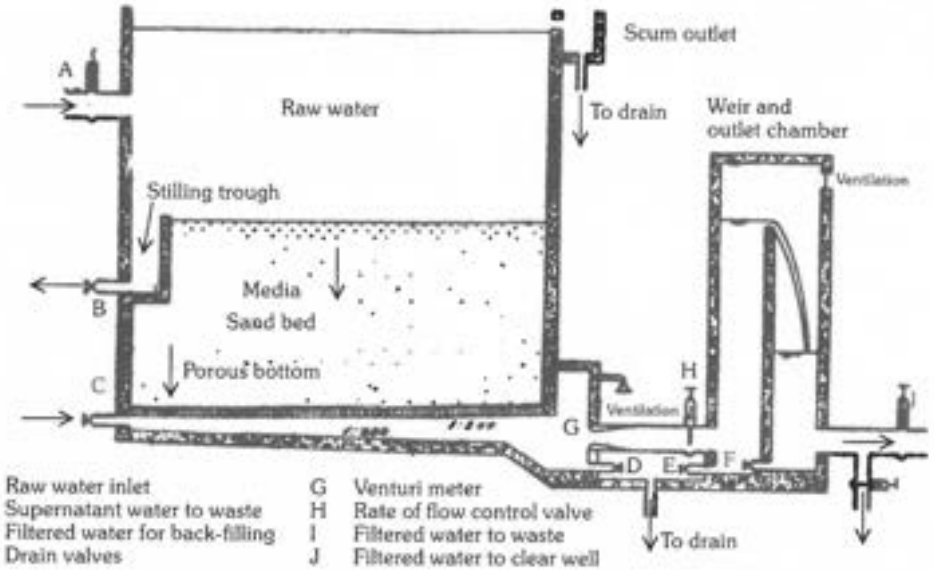


FIG. 7
Details of a rapid sand filter

slow
vital
zoological / Schmuldet's
Sand 0 0 0 0



A	Raw water inlet	G	Venturi meter
B	Supernatant water to waste	H	Rate of flow control valve
C	Filtered water for back-filling	I	Filtered water to waste
D, E, F	Drain valves	J	Filtered water to clear well

FIG. 4
Slow sand filter

disinfecting agent.

STEPS IN WELL DISINFECTION

(1) Find the volume of water in a well

(a) Measure the depth of water column ... (h) metre

(b) Measure the diameter of well ... (d) metre

Take the average of several readings of the above measurements.

(c) Substitute h and d in :

$$\text{Volume (litres)} = \frac{3.14 \times d^2 \times h}{4} \times 1000$$

(d) One cubic metre = 1,000 litres of water

Classification of hardness in water

Classification	Level of hardness (mEq./litre)
(a) Soft water	Less than 1 (<50 mg/L)
(b) Moderately hard	1–3 (50–150 mg/L)
(c) Hard water	3–6 (150–300 mg/L)
(d) Very hard water	over 6 (> 300 mg/L)

Drinking water should be moderately hard. Softening of water is recommended when the hardness exceeds 3 meq/l (150 mg per litre).

Water can be purified on a small scale by filtering through ceramic filters such as Pasteur Chamberland filter, Berkefeld filter and "Katadyn" filter. The essential part of a filter is the "candle" which is made of porcelain in the Chamberland type, and of kieselgurh or infusorial earth in the Berkefeld filter (Fig. 8). In the Katadyn filter, the surface of the filter is coated with a silver catalyst so that bacteria coming in contact with the surface are killed by the "oligodynamic" action of the silver ions, which are liberated into the water. Filter candles of the fine type usually remove bacteriae found in drinking water, but not the filter-passing viruses. Filter candles are liable to be logged with impurities and bacteriae. They should be cleaned by scrubbing with a hard brush under running water and boiled at least once a week. Only clean water should be used with ceramic filters. Although ceramic filters are effective in purifying water, they are not quite suitable for widespread use under Indian conditions.

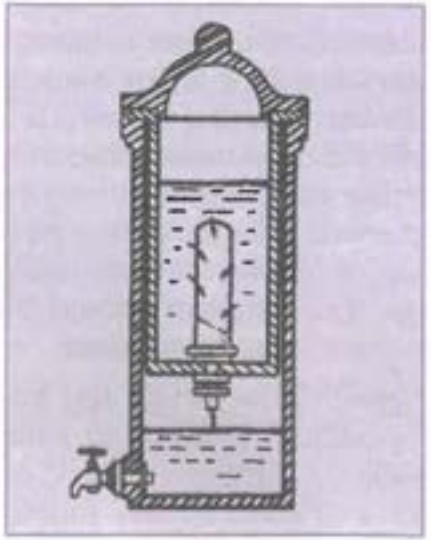


FIG. 8
Berkefeld filter

However, minimum standards are still maintained by building regulations, the aim being improvement of housing and environmental conditions for the majority of families within the limits set by available resources and objectives. The standards in India are those recommended by the EHC (1947). These are as below :

HOUSE

SITE : (a) The site should be elevated from its surroundings so that it is not subject to flooding during rains (b) the site should have an independent access to a street of adequate width (c) it should be away from the breeding places of mosquitoes and flies (d) it should be away from nuisances such as dust, smoke, smell, excessive noise and traffic (e) it should be in pleasing surroundings (f) the soil should be dry and safe for founding the structure and should be well drained. "Made-soil", i.e., ground that is levelled by dumping refuse is very unsatisfactory for building purposes for at least 20 to 25 years. The subsoil water should be below 10 feet (3 metres).

SET BACK : For proper lighting and ventilation, there should be an open space all round the house – this is called "set back". In rural areas it is recommended that the built-up area should not exceed one-third of the total area; in urban areas where land is costly, the built-up area may be upto two-thirds. The set back should be such that there is no obstruction to lighting and ventilation.

FLOOR : The floor should be pucca and satisfy the following criteria : (a) it should be impermeable so that it can be easily washed and kept clean and dry. Mud floors tend to break up and cause dust; they are not recommended, (b) the floor must be smooth and free from cracks and crevices to prevent the breeding of insects and harbourage of dust, (c) the floors should be damp proof, (d) the height of the plinth should be 2 to 3 feet (0.6 to 1 metre).

WALLS : The walls should be (a) reasonably strong (b) should have a low heat capacity i.e., should not absorb heat and conduct the same (c) weather resistant (d) unsuitable for harbourage of rats and vermin (e) not easily damaged and (f) smooth. These standards can be attained by 9-inch brick-wall plastered smooth and coloured cream or white.

ROOF : The height of the roof should not be less than 10 feet (3 m) in the absence of air-conditioning for comfort. The roof should have a low heat transmittance coefficient.

ROOMS : The number of living rooms should not be less than two, at least one of which can be closed for security. The other may be open on one side if that side is a private courtyard. The number and area of rooms should be increased according to size of family, so that the recommended floor space per person may be made available.

FLOOR AREA : The floor area of a living room should be at least 120 sq.ft. (12 sq. m.) for occupancy by more than one person and at least 100 sq.ft. (10 sq. m.) for occupancy by a single person. The floor area available in living rooms per person should not be less than 50 sq.ft; the optimum is 100 sq.ft.

CUBIC SPACE : Unless means are provided for mechanical replacement of air the height of rooms should be such as to give an air space of at least 500 c.ft. *per capita*, *preferably 1,000 c.ft.*

WINDOWS : (a) Unless mechanical ventilation and artificial lighting are provided, every living room should be provided with at least 2 windows, and at least one of them should open directly on to an open space, (b) the windows should be placed at a height of not more than 3 feet (1 m) above the ground in living rooms (c) window area should be 1/5th of the floor area. Doors and windows combined should have 2/5th the floor area.

LIGHTING : The daylight factor should exceed 1 per cent over half the floor area.

KITCHEN : Every dwelling house must have a separate kitchen. The kitchen must be protected against dust and smoke; adequately lighted; provided with arrangements for storing food, fuel and provisions; provided with water supply; provided with a sink for washing utensils and fitted with arrangements for proper drainage. The floor of the kitchen must be impervious.

PRIVY : A sanitary privy is a MUST in every house, belonging exclusively to it and readily accessible. In the more developed areas of the world, the majority of dwelling units are equipped with water carriage systems.

GARBAGE AND REFUSE : These should be removed from the dwelling at least daily and disposed off in a sanitary manner.

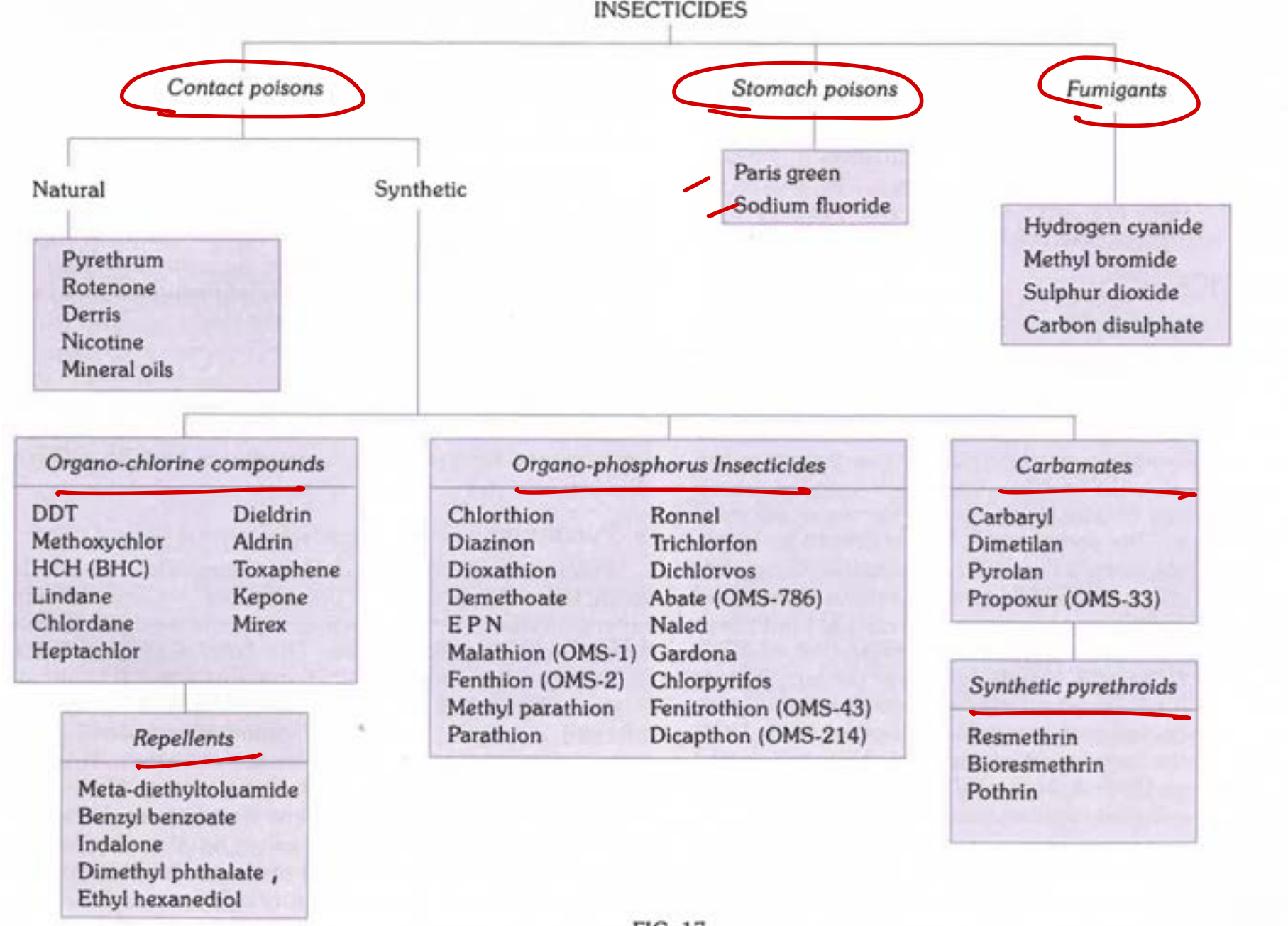


FIG. 17
Chemical control of arthropods of public health importance

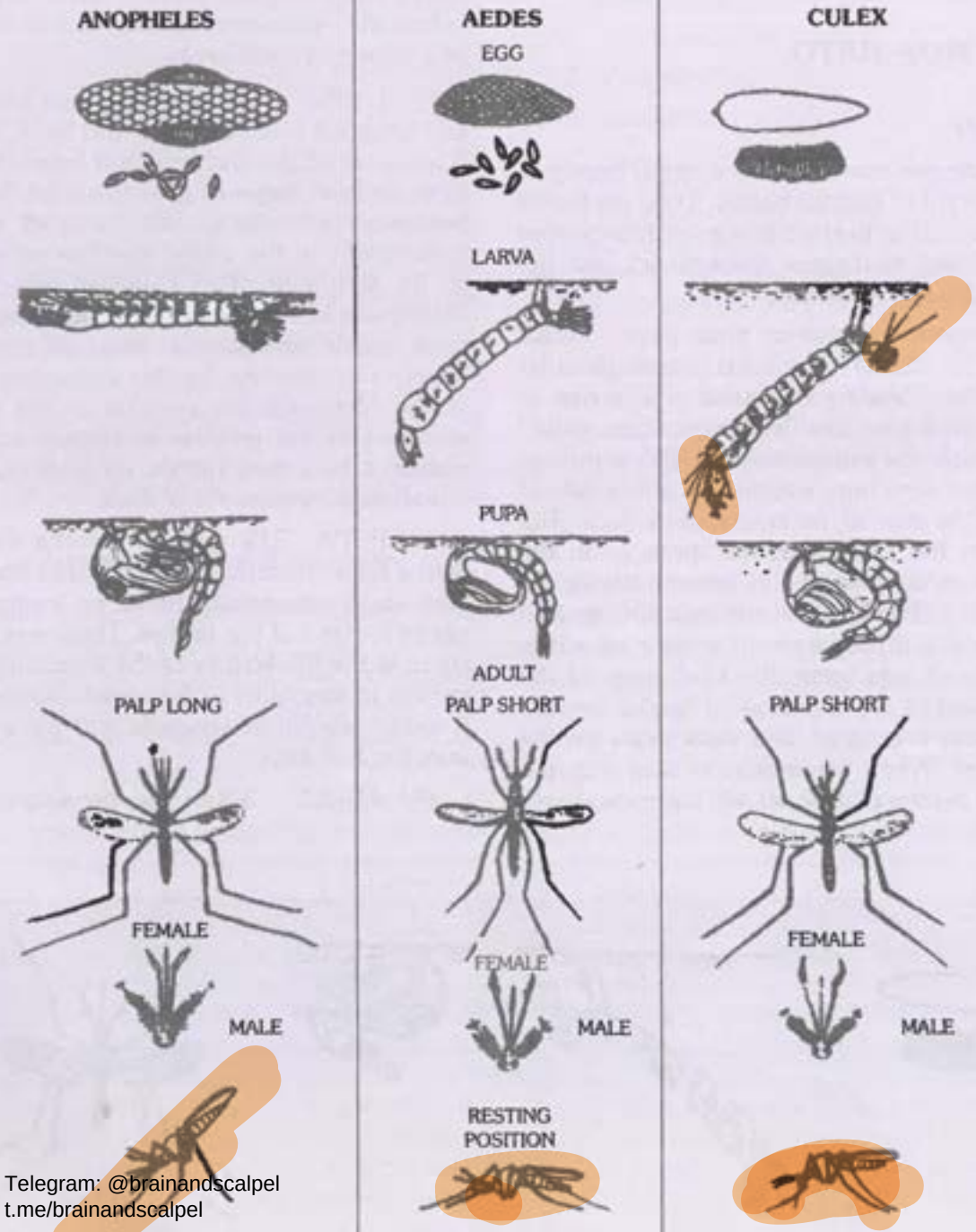
(f) Burial

This method is suitable for small camps. A trench 1.5 m wide and 2 m deep is excavated, and at the end of each day the refuse is covered with 20 to 30 cm of earth. When the level in the trench is 40 cm from ground level, the trench is filled with earth and compacted, and a new trench is dug out. The contents may be taken out after 4 to 6 months and used on the fields. If the trench is 1 m in length for every 200 persons, it will be filled in about one week *(8)*.

environment". Dumping should be outlawed and replaced by sound procedures *(6)*.

(b) Controlled tipping

Controlled tipping or sanitary landfill is the most satisfactory method of refuse disposal where suitable land is available. It differs from ordinary dumping in that the material is placed in a trench or other prepared area, adequately compacted, and covered with earth at the end of the working day. The term "modified sanitary landfill" has been applied to those operations where compaction and covering are accomplished once or twice a week *(7)*.



Differentiation between anophelini and culicini

Tribe Genus	Anophelini anopheles	Culicini Culex, Aedes, Mansonia
EGGS	(1) Laid singly.	(1) Laid in clusters or rafts, each raft containing 100–250 eggs (except-Aedes).
	(2) Eggs are boat-shaped, and provided with lateral floats.	(2) Eggs are oval-shaped, and not provided with lateral floats.
LARVAE	(1) Rest parallel to water surface.	(1) Suspended with head downwards at an angle to water surface.
	(2) No siphon tube.	(2) Siphon tube present.
	(3) Palmate hairs present on abdominal segments.	(3) No palmate hairs.
PUPAE	Siphon tube is broad and short.	Siphon tube is long and narrow.
ADULTS	(1) When at rest, inclined at an angle to surface.	(1) When at rest, the body exhibits a hunch back.
	(2) Wings spotted.	(2) Wings unspotted.
	(3) Palpi long in both sexes.	(3) Palpi short in female.

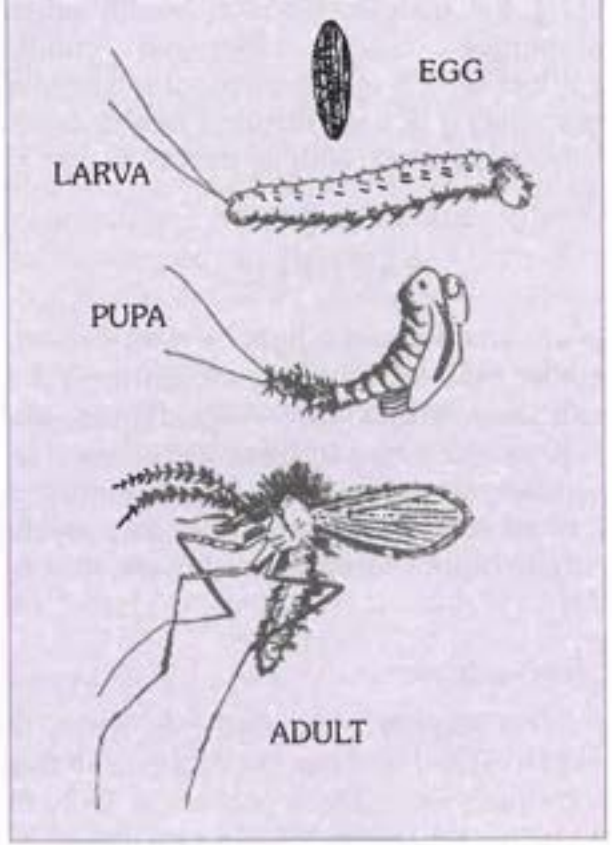


FIG. 4
Life cycle of a sandfly

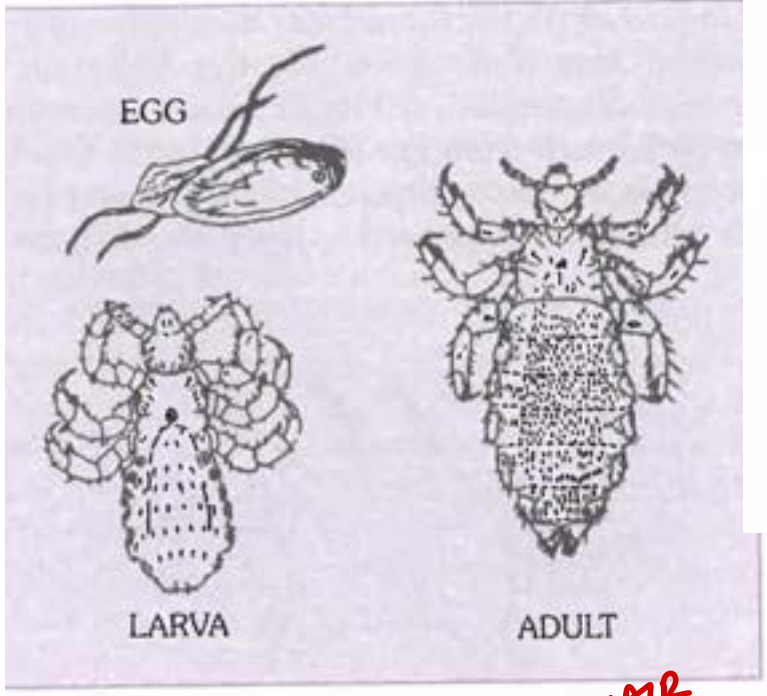


FIG. 7
Life cycle of a louse

HAIR

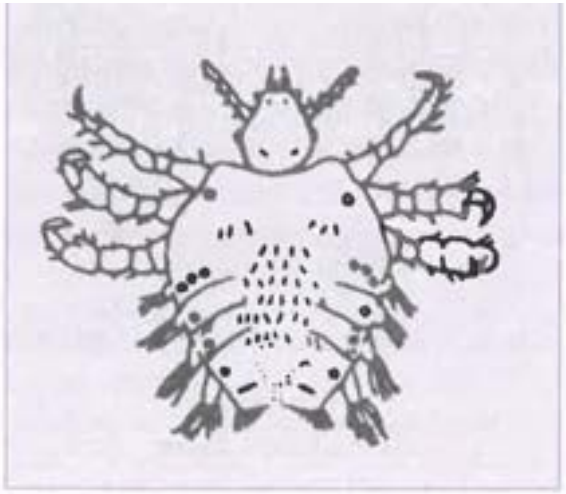


FIG. 8
Phthirus pubis

FIG. 6
Simulum

Black fly
Onchocerciasis

FIG. 5
Tsetse fly

Sleeping

Deerfly - Loa Loa — calabar swelling

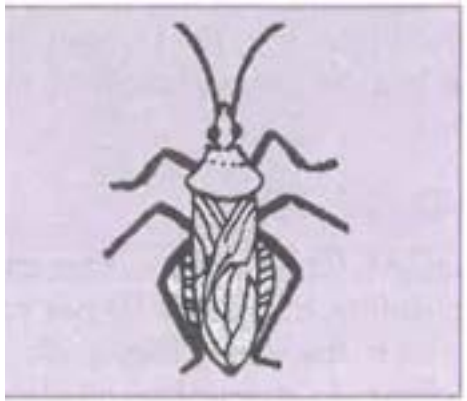


FIG. 11
Reduviid bug

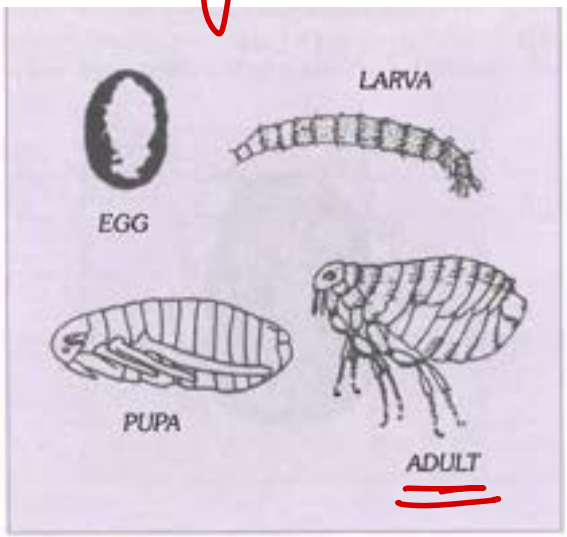


FIG. 9
Life cycle of rat flea

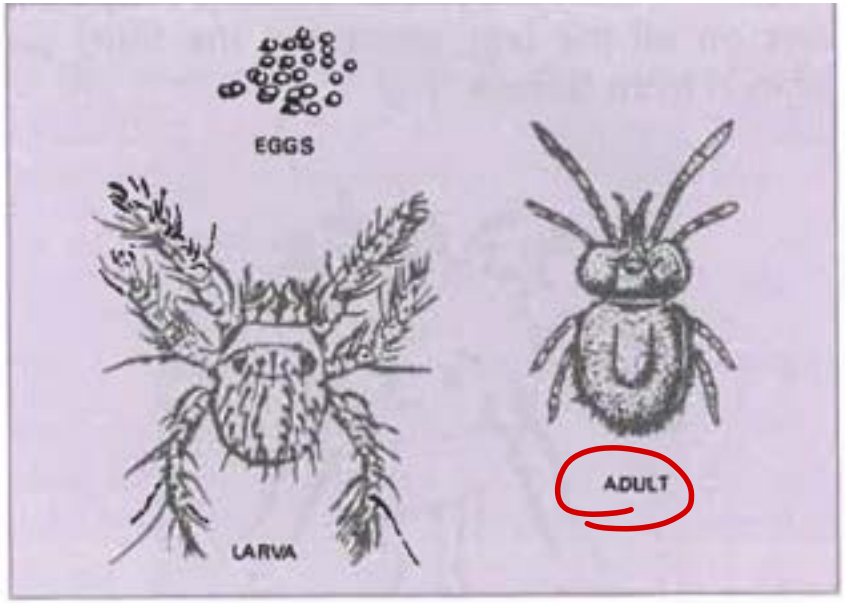


Fig. 14
Life cycle of a mite

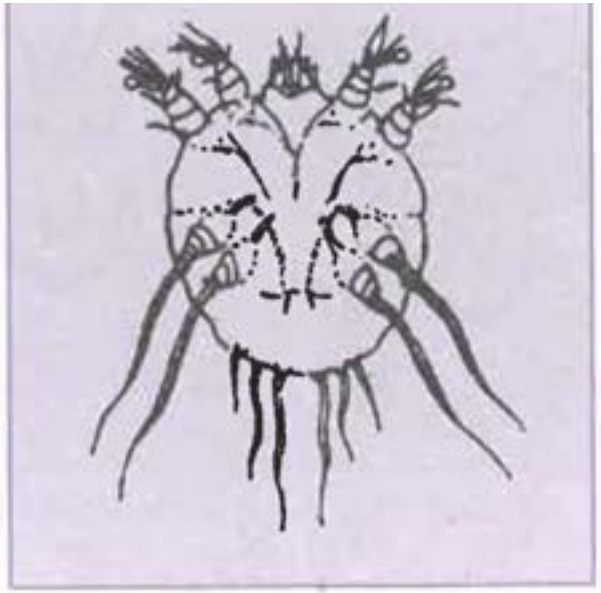


Fig. 15
Itch mite

Scabies

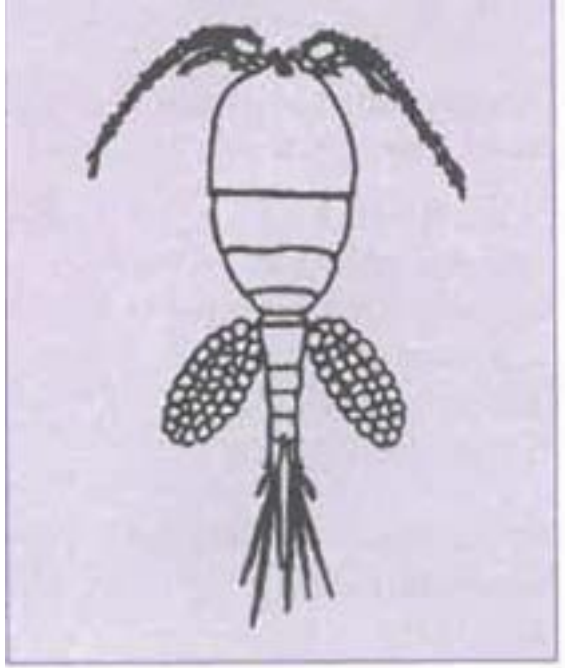


FIG. 16
Cyclops

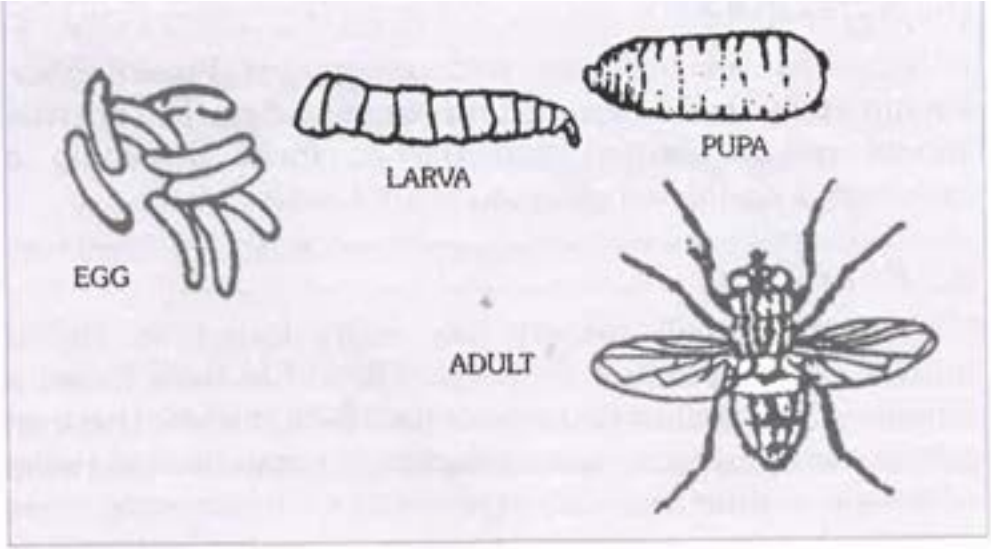


FIG. 3
Life cycle of housefly

(1) Cyclops is the intermediate host of Dracunculiasis or guinea-worm disease. Man acquires infestation by drinking water containing infected cyclops.

(2) Cyclops mediates also as one of the intermediate hosts of fish tape worm, *Diphyllobothrium latum* infestation. The disease is rare in India.

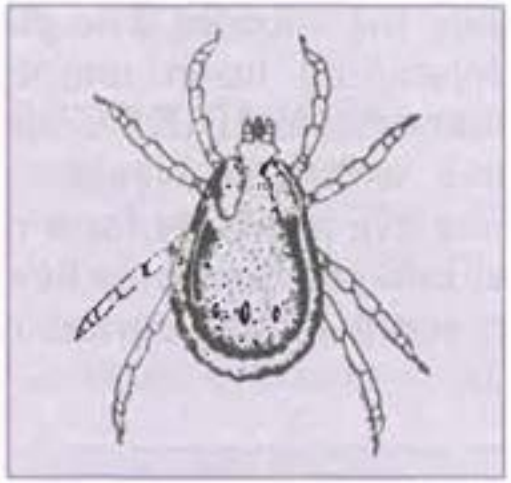


FIG. 12
Hard tick

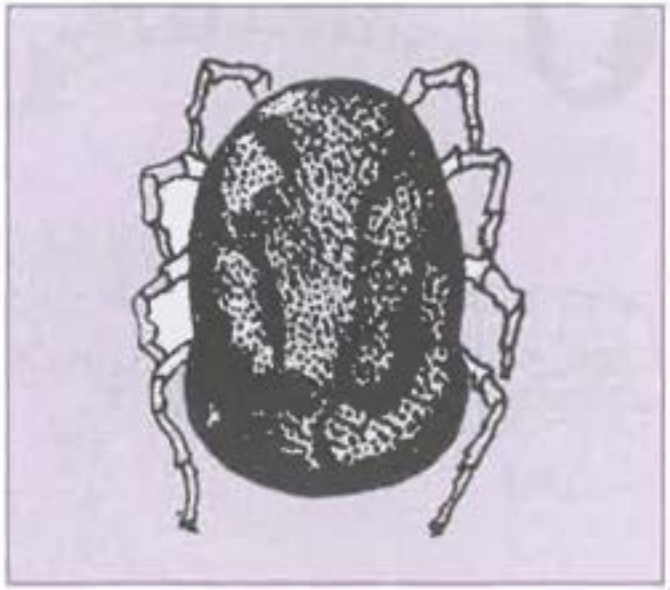


FIG. 13
Soft tick

Hard ticks transmit the following diseases :

(a) Tick typhus (Rocky mountain spotted fever)

(b) Viral encephalitis (e.g., Russian spring-summer encephalitis)

(c) Viral fevers (e.g., Colorado tick fever)

(d) Viral haemorrhagic fevers (e.g. KFD in India)

(e) Tularaemia

(f) Tick paralysis, and

(g) Human babesiosis

Soft ticks transmit :

(a) Q fever

(b) Relapsing fever, and

(c) KFD

Category	Type of waste	Type of bag or container to be used	Treatment and disposal options
Yellow	**(a) Human anatomical waste:** Human tissues, organs, body parts and foetus below the viability period.	Yellow coloured non-chlorinated plastic bags.	Incineration or plasma pyrolysis or deep burial*
	(b) Animal anatomical waste: Experimental animal carcasses, body parts, organs, tissues, including the waste generated from animals used in experiments or testing in veterinary hospitals or colleges or animal houses.		
	(c) Soiled waste: Items contaminated with blood, body fluids like dressings, plaster casts, cotton swabs and bags containing residual or discarded blood and blood components.		Incineration or plasma pyrolysis or deep burial*. In absence of above facilities, autoclaving or micro-waving/ hydroclaving followed by shredding or mutilation or combination of sterilization and shredding. Treated waste to be sent for energy recovery.
	(d) Expired or discarded medicines: Pharmaceutical waste like antibiotics, cytotoxic drugs including all items contaminated with cytotoxic drugs along with glass or plastic ampoules, vials etc.	Yellow coloured non-chlorinated plastic bags or containers.	Expired cytotoxic drugs and items contaminated with cytotoxic drugs to be returned back to the manufacturer or supplier for incineration at temperature > 1200° C or to a common bio-medical waste treatment facility or hazardous waste treatment, storage and disposal facility for incineration at > 1200° C or Encapsulation or Plasma Pyrolysis at > 1200° C. All other discarded medicines shall be either sent back to manufacturer or disposed by incineration.
	(e) Chemical waste: Chemicals used in production of biological and used or discarded disinfectants.	Yellow coloured containers or non-chlorinated plastic bags.	Disposed of by incineration or Plasma Pyrolysis or Encapsulation in hazardous waste treatment, storage and disposal facility.
	(f) Chemical liquid waste: Liquid waste generated due to use of chemicals in production of biological and used or discarded disinfectants, Silver X-ray film developing liquid, discarded formalin, infected secretions, aspirated body fluids, liquid from laboratories and floor washings, cleaning, house-keeping and disinfecting activities etc.	Separate collection system leading to effluent treatment system.	After resource recovery, the chemical liquid waste shall be pre-treated before mixing with other wastewater. The combined discharge shall conform to the discharge norms given in Schedule-III.
	(g) Discarded linen, mattresses, beddings contaminated with blood or body fluid.	Non-chlorinated yellow plastic bags or suitable packing material.	Non-chlorinated chemical disinfection followed by incineration or Plasma Pyrolysis or for energy recovery. In absence of above facilities, shredding or mutilation or combination of sterilization and shredding. Treated waste to be sent for energy recovery or incineration or Plasma Pyrolysis.

	(h) Microbiology, biotechnology and other clinical laboratory waste: Blood bags, laboratory cultures, stocks or specimens of micro-organisms, live or attenuated vaccines, human and animal cell cultures used in research, industrial laboratories, production of biological, residual toxins, dishes and devices used for cultures.	Autoclave safe plastic bags or containers.	Pre-treat to sterilize with non-chlorinated chemicals on-site as per National AIDS Control Organisation or World Health Organisation guidelines thereafter for Incineration.
Red	**Contaminated waste (Recyclable) :** Wastes generated from disposable items such as tubing, bottles, intravenous tubes and sets, catheters, urine bags, syringes (without needles and fixed needle syringes) and vacutainers with their needles cut) and gloves.	Red coloured non-chlorinated plastic bags or containers.	Autoclaving or micro-waving/hydroclaving followed by shredding or mutilation or combination of sterilization and shredding. Treated waste to be sent to registered or authorized recyclers or for energy recovery or plastics to diesel or fuel oil, or for road making, whichever is possible. Plastic waste should not be sent to landfill sites.
White (Trans-lucent)	**Waste sharps including metals:** Needles, syringes with fixed needles, needles from needle tip cutter or burner, scalpels, blades or any other contaminated sharp object that may cause puncture and cuts. This includes both used, discarded and contaminated metal sharps.	Puncture proof, Leak proof, tamper proof containers.	Autoclaving or Dry Heat Sterilization followed by shredding or mutilation or encapsulation in metal container or cement concrete; combinations of shredding cum autoclaving; and sent for final disposal to iron foundries (having consent to operate from the State Pollution Control Boards or Pollution Control Committees) or sanitary landfill or designated concrete waste sharp pit.
Blue	**(a) Glassware:** Broken or discarded and contaminated glass including medicine vials and ampoules except those contaminated with cytotoxic wastes.	Cardboard boxes with blue coloured marking.	Disinfection (by soaking the washed glass waste after cleaning with detergent and Sodium Hypochlorite treatment) or through autoclaving or microwaving or hydroclaving and then sent for recycling.
	(b) Metallic body implants	Cardboard boxes with blue coloured marking.	

* Disposal by deep burial is permitted only in rural or remote areas where there is no access to common bio-medical waste treatment facility. This will be carried out with prior approval from the prescribed authority and as per the standards specified in Schedule-III. The deep burial facility shall be located as per the provisions and guidelines issued by Central Pollution Control Board from time to time.

Source: *(4)*

Health authorities are often under considerable public and political pressure to begin mass vaccination programmes, usually against typhoid, cholera and tetanus. The pressure may be increased by the press media and offer of vaccines from abroad.

Diagnosis of lead poisoning is based on : (1) HISTORY : a history of lead exposure (2) CLINICAL FEATURES : such as loss of appetite, intestinal colic, persistent headache, weakness, abdominal cramps and constipation, joint and muscular pains, blue line on gums, anaemia, etc. (3) LABORATORY TESTS : (a) *Coproporphyrin in urine (CPU)* : Measurement of CPU is a useful screening test. In non-exposed persons, it is less than 150 microgram/litre. (b) *Amino levulinic acid in urine (ALAU)* : If it exceeds 5 mg/litre, it indicates clearly lead absorption. (c) *Lead in blood and urine* : Measurement of lead in blood or urine requires refined laboratory techniques. They provide quantitative indicators of exposure. Lead in urine of over 0.8 mg/litre (normal is 0.2 to 0.8 mg) indicates lead exposure and lead absorption. A blood level of 70µg/100 ml is associated with clinical symptoms. (d) *Basophilic stipling of RBC* : Is a sensitive parameter of the haematological response.

Bio-hazard Symbol

Cytotoxic Hazard Symbol

	Education	Propaganda or publicity
1.	Knowledge and skills actively acquired.	Knowledge instilled in the minds of people.
2.	Makes people think for themselves	Prevents or discourages thinking by ready-made slogans.
3.	Disciplines primitive desires.	Arouses and stimulates primitive desires.
4.	Develops reflective behaviour. Trains people to use judgement before acting.	Develops reflexive behaviour, aims at impulsive actions.
5.	Appeals to reason.	Appeals to emotion.
6.	Develops individuality, personality and self-expression.	Develops a standard pattern of attitudes and behaviours according to the mould used.
7.	Knowledge acquired through self-reliant activity.	Knowledge is spoon-fed and passively received.
8.	The process is behaviour centred – aims at developing favourable attitudes, habits and skills.	The process is information centred – no change of attitude or behaviour designed.

QQ

1. Awareness	Interest
2. Motivation	Evaluation Decision-making
3. Action	Adoption or acceptance

FIG. 2
Adoption model

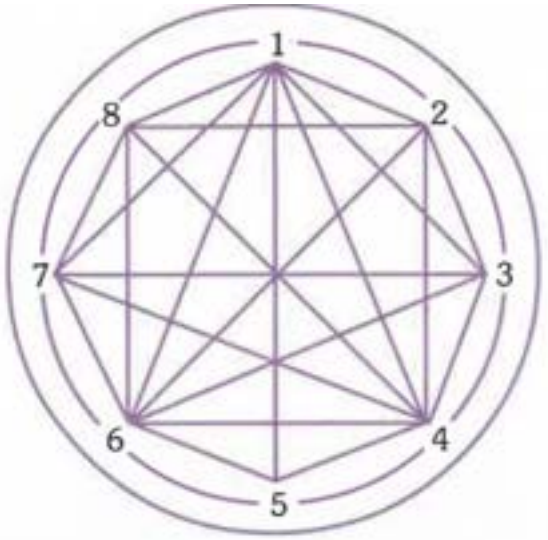


FIG. 4
A good group discussion

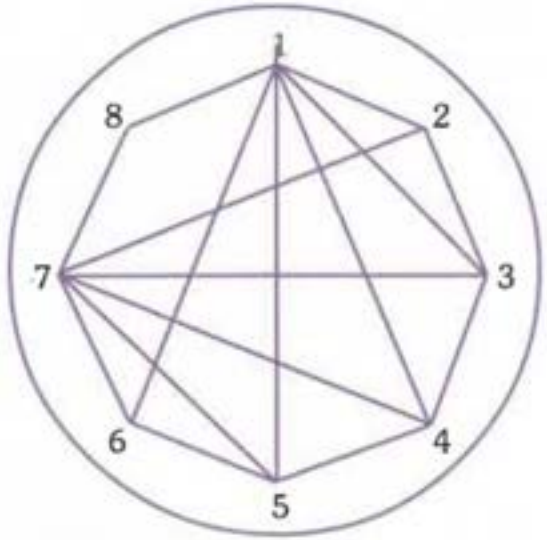


FIG. 5
A dominated group. No.1 and No.7 dominate the discussion

(8) Conferences and seminars

This category contains a large component of commercialized continuing education. The programmes are usually held on a regional, state or national level. They range from once half-day to one week in length and may cover a single topic in depth or be broadly comprehensive. They usually use a variety of formats to aid the learning process from self instruction to multimedia.

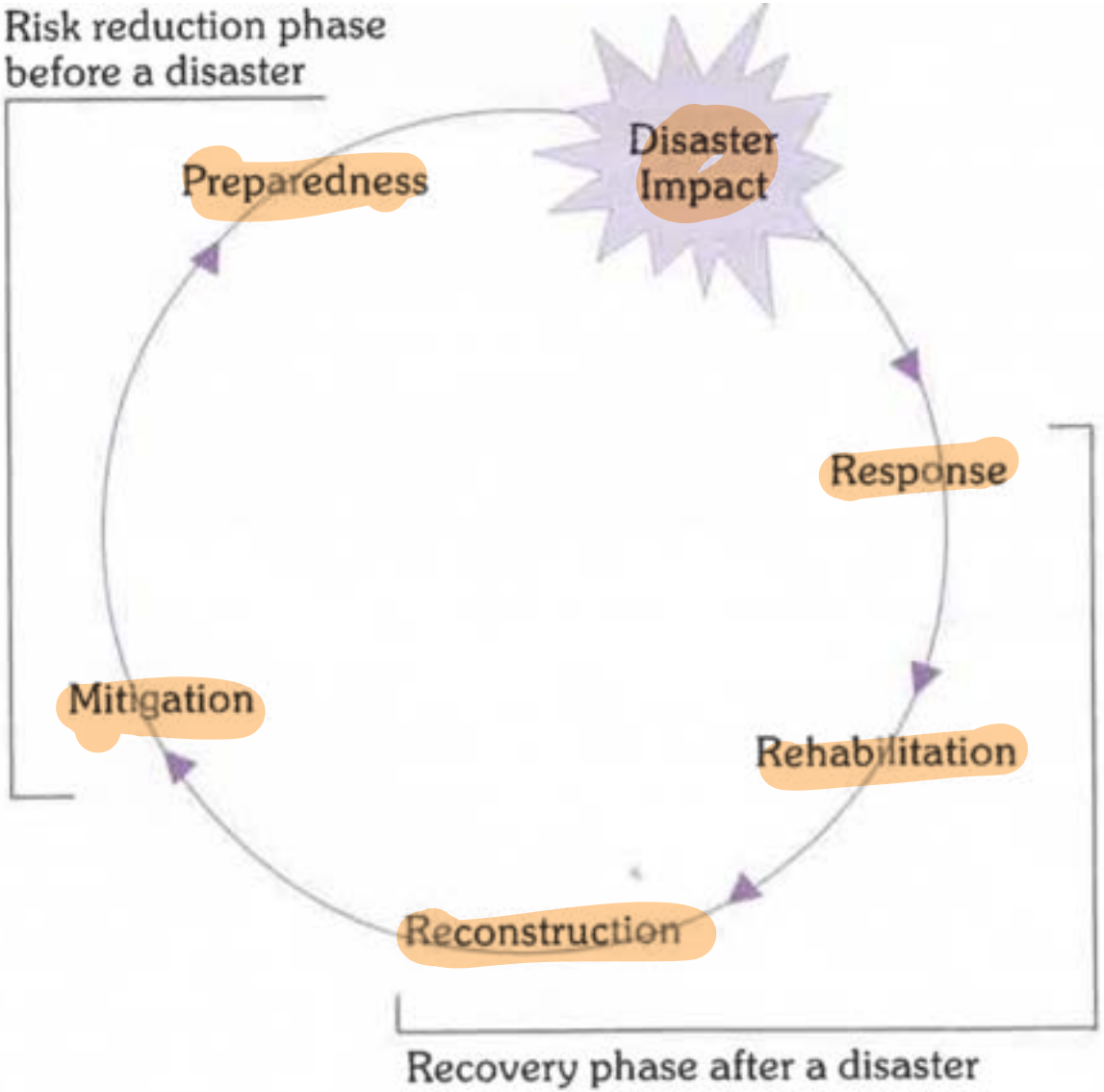


FIG. 1

Management sequence of a sudden-onset disaster

Suggested norms for health personnel

Category of personnel	Norms suggested
1. Nurses	1 per 5,000 population
2. Health workers female and male	1 per 5,000 population in plain area and 3,000 population in tribal and hilly areas.
3. Trained dai	One for each village
4. Health assistants (male and female)	1 per 30,000 population in plain area and 20,000 population in tribal and hilly areas. Provides supportive supervision to 6 health workers (male / female).
5. Pharmacists	1 per 10,000 population
6. Lab. technicians	1 per 10,000 population
7. ASHA	1 per 1,000 population

TABLE 2

Child (Under 5 years) and infant mortality indicators, India 2020

Indicators	Total	Rural	Urban
Child mortality rate	3.2	36	21
Infant mortality rate	28	31	19
Neo-natal mortality rate	20	23	12
Early neo-natal mortality rate	15	17	9
Late neo-natal mortality rate	5	6	3
Post neo-natal mortality rate	8	8	7
Peri-natal mortality rate	18	21	12
Still birth rate	3	1	3

Source : *(22)*

TABLE 1

India: Demographic profile

Total population (2022)	1,412 million
Crude birth rate (2022)	18.7
Crude death rate (2022)	7.2
Annual growth rate % (2022)	1.3
Population doubling time (at current growth rate)	30 years
Population rural % (2020)	65.0
Adult literacy rate % (2011)	74.04
Density of population per sq.km (2020)	464
Sex ratio female per 1000 male (2018–20)	907
Population below 15 years % (2020)	26.2
Population above 65 years % (2020)	6.6
Average family size (2020)	1.8
Age at marriage, female (2020)	22.7 years
Annual per capita GNP (at current prices 2018–19)	Rs. 126,521