

:Animal reservoir

Diseases of animals including birds are usually not transmissible to human ,due to (species immunity),certain infectious agents of some animals ,are pathogenic .to man causing (**zoonosis**)

Zoonosis ,a disease that primarily infects & spreads in animals, by the different means of transmission. But it may be transmitted to man when .exposed to infection

:Forms of zoonosis

- a. Strictly zoonotic disease :animals are the only •
reservoir, no man to man infection e.g.
.Brucellosis
- b. Both animal &man are reservoirs ,&infection •
may be animal to man ,or man to man e.g.
.salmonella &salmonella food poisoning
- c. Some zoonosis in endemic areas ,start first in •
animals and may then spread to man .e.g.
.Influenza, Ebola virus disease

:c. Non-living things as reservoir

Many of the agents are basically saprophytes • living in soil and fully adapted to live freely in nature. Biologically, they are usually equipped to withstand marked environmental changes in temperature and humidity. E.g. Clostridium botulinum etiologic agent of Botulism
Clostridium tetani etiologic agent of Tetanus
Clostridium welchi etiologic agent of gas gangrene

Chain of Disease Transmission

This refers to a logical sequence of factors or •
links of a chain that are essential to the
development of the infectious agent and
.propagation of disease

- The six factors involved in the chain of disease transmission are:
 - a. Infectious agent (etiology or causative agent)
 - b. Reservoir
 - c. Portal of exit
 - d. Mode of transmission
 - e. Portal of entry
 - f. Susceptible host

:Infectious agent

- An organism that is capable of producing infection or infectious disease.
- On the basis of their size, etiological agents are generally classified into:
 - ☐ Metazoa (multicellular organisms). (e.g. Helminths).
 - ☐ Protozoa (Unicellular organisms) (e.g. Ameobae)
 - ☐ Bacteria (e.g. Treponema pallidum, Mycobacterium tuberculosis, etc.)
 - ☐ Fungus (e.g. Candida albicans)
 - ☐ Virus (e.g. Chickenpox, polio, etc.)

Portal of exit (mode of escape from :the reservoir)

- This is the site through which the agent escapes from the reservoir. Examples include:
- ☐ GIT: typhoid fever, bacillary dysentery, amoebic dysentery, cholera, ascariasis, etc.
- ☐ Respiratory: tuberculosis, common cold, etc.
- ☐ Skin and mucus membranes: Syphilis

Modes of transmission (mechanism of :transmission of infection)

- Refers to the mechanisms by which an infectious agent is transferred from one person to another or from a reservoir to a new host.
- Transmission may be direct or indirect.

Direct transmission .1

- : Consists of essentially immediate transfer of infectious agents from an infected host or reservoir to an appropriate portal of entry. This could be:
 - **a. Direct Vertical**
 - Such as: transplacental transmission of syphilis, HIV, etc.
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 - **b. Direct horizontal**
 - Direct touching, biting, kissing, sexual intercourse, droplet spread onto the conjunctiva or onto mucus membrane of eye, nose or mouth during sneezing coughing, spitting or talking; Usually limited to a distance of about one meter or less.

Indirect transmission .2

- **a. Vehicle-borne transmission:** Indirect contact through contaminated inanimate objects (fomites) like:
 - ☐ Bedding, toys, handkerchiefs, soiled clothes, cooking or eating utensils, surgical instruments.
 - ☐ Contaminated food and water
 - ☐ Biological products like blood, serum, plasma or IV-fluids or any substance serving as intermediate means by which an infectious agent is transported and introduced into a susceptible host through a suitable portal of entry. The agent may or may not multiply or develop in the vehicle before it is introduced into man.

:b. Vector-borne transmission

- Occurs when the infectious agent is conveyed by an arthropod (insect) to a susceptible host.
- **1. Mechanical transmission:** The arthropod transports the agent by soiling its feet or proboscis, in which case multiplication of the agent in the vector does not occur. (e.g. common house fly.)

Biological transmission: This is when the agent multiplies in the arthropod before it is transmitted, such as the transmission of malaria by mosquito

:C. Air-borne transmission

- Dissemination of microbial agent by air to a suitable portal of entry, usually the respiratory tract. Two types of particles are implicated in this kind of spread:
- dusts and droplet nuclei.
- **Dust:** small infectious particles of widely varying size that may arise from soil, clothes, bedding or contaminated floors and be resuspended by air currents.

Droplet nuclei : Small residues resulting from • evaporation of fluid (droplets emitted by an infected host). They usually remain suspended in the air for long periods of time

:e. Portal of entry

- The site in which the infectious agent enters to the susceptible host. For example:
- Mucus membrane
- Skin
- Respiratory tract
- GIT
- Blood

:f. Susceptible host (host factors)

- A person or animal lacking sufficient resistance to a particular pathogenic agent to prevent disease if or when exposed. Occurrence of infection
- and its outcome are in part determined by host factors. The term “immunity” is used to describe the ability of the host to resist infection. Resistance to infection is determined by non-specific and specific factors:

Time Course of Infectious Diseases

- **Incubation period:** It is the interval of time between infection of the host and the first appearance of symptoms and signs of the disease.
- **Prodromal period:** It is the interval between the onset of symptoms of an infectious disease and the appearance of characteristic manifestations. For example, in a measles patient, fever and coryza occur in the first three days and Koplick spots in the buccal mucosa and characteristic skin lesions appear on the fourth day.
- **Period of communicability:** The period during which that particular communicable disease (infectious agent) is transmitted from the infected person to the susceptible host.

Communicable Disease Control

- **Methods of Communicable Disease Control**
- There are three main methods of controlling communicable diseases:
- **1. Elimination of the Reservoir**
- **a. Man as reservoir:** When man is the reservoir, eradication of an infected host is not a viable option. Instead, the following options are considered:
- **☐ Detection and adequate treatment of cases:** arrests the communicability of the disease (e.g. Treatment of active pulmonary tuberculosis).
- **☐ Isolation:** separation of infected persons for a period of communicability of the disease. Isolation is indicated for infectious disease with the following features:
 - - High morbidity and mortality
 - - High infectivity
- **☐ Quarantine:** limitation of the movement of apparently well person or animal who has been exposed to the infectious disease for a duration of the maximum incubation period of the disease.

- **Protection of susceptible host:** This can be achieved through:
 - ☐ Immunization: Active or Passive
 - ☐ Chemo-prophylaxis- (e.g. Malaria, meningococcal meningitis, etc.)
 - ☐ Better nutrition
 - ☐ Personal protection. (e.g. wearing of shoes, use of mosquito bed net, insect repellents, etc.)

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Carrier and Its Type

A carrier is an infected person or animal who does not have apparent clinical disease but is a potential source of infection to others.

- **1. According to the spectrum of infection:**
- **a. Healthy or asymptomatic carriers:** These are persons whose infection remains unapparent. For example, in poliovirus, meningococcus and hepatitis virus infections,
 - there is a high carrier rate.
- **b. Incubatory or precocious carriers:** These are individuals or persons who excrete the pathogen during the incubation period (i.e. before the onset of symptoms or
 - before the characteristic features of the disease are manifested). **E.g.** Measles, mumps, chickenpox and hepatitis.

- **c. Convalescent Carriers:** Are those who continue to harbor the infective agent after recovering from the illness. **E.g.** Diphtheria, Hepatitis B virus.
- **d. Chronic Carriers:** The carrier state persists for a long period of time. **E.g.** Typhoid fever, Hepatitis B virus infection

:According to the infectivity of the carrier.2

A **.Transient infectivity** :all incubatory carriers • are transient except of Hepatitis ,the virus is found in blood excreted in feces..in the last week of incubation period B&C hepatitis..infectious in the last week of I.P.(6 weeks-6 months),B&C up to 20 or more months. AIDS ,the infected person is infectious during the long I.P. of latent infection (6 months to 7 .years or more)

:b. Temporary infectivity

.for few weeks or some months •

Healthy carriers are infectious for around 2- •
.weeks except HBV

Contact carriers are infectious for around 2- •
.weeks

Convalescent carriers : the majority of enteric- •
carriers ,all poliomyelitis & diphtheria carriers &
.almost all shigellosis carriers

: c. chronic infectivity

- for years , lifelong
- Incubatory carriers of AIDS-
- Healthy carriers of HB-
- convalescent carriers of :minor percentage of enteric-
convalescent carriers, Hepatitis B infectious for years
or long life 5-10%. ,Eltor cholera
- **Note:** the person who harbor & excrete the
microorganism for his whole life e.g. rare cases of
typhoid fever (more than 40 years) called **permanent
infectivity**

According to the site or the habitat of the.3 :microorganism inside the body

.Nasal carrier :e.g. strept. & staph. Infections- •

.Urinary carrier : schist. heamatobium- •

.Fecal carrier :cholera(intestinal)- •

.Skin carrier :scabies ,staph. aurous- •

Note: typhoid carrier is a good example of •

.both intestinal (fecal)&urinary carrier

Control of Communicable Diseases in Emergencies

?What is needed during an emergency •

Provision of shelter, water, sanitation, food and •
basic health care are the most effective means
of protecting health of those affected by
.emergencies

A systematic approach to control of •
communicable diseases is a key component of
humanitarian response and crucial for the
.protection of the health of the population

Fundamental principles of Control of Communicable Diseases

- Rapid Assessment •
- Prevention •
- Surveillance •
- Outbreak Control •
- Disease Management •

Rapid Health Assessment

: The objectives should be

To assess the extent of the emergency and the.1
threat of communicable diseases in the population

To define the type and size of interventions and.2
priority activities

To plan the implementation of these activities.3

To provide information to international.4
community, donors and the media to mobilize
.resources both human and financial

Prevention

Communicable diseases can be prevented by •
:appropriate preventive measures which include

Good site planning.1 □

Provision of basic clinical services.2 □

Provision of appropriate shelter.3 □

Clean water supply.4 □

Sanitation.5 □

Mass vaccination against specific diseases.6 □

Regular and sufficient food supply.7 □

Control of vectors.8 □

Surveillance

Surveillance is the ongoing systematic •
collection, analysis and interpretation of data
in order to plan, implement and evaluate
.public health intervention

Surveillance system should be simple, □
flexible, acceptable and situation specific

Objectives of a surveillance system in an emergency

Identify public health priorities.1

Monitor the severity of an emergency by collecting.2
and analyzing mortality and morbidity data

Detect outbreaks and monitor response.3

Monitor trends in incidence and case fatality from.4
major diseases

Provide information to ministry of health,donors to.5
assist in health programme planning, implementation
.and resource mobilization

Outbreak Control

An outbreak is occurrence of a number of cases •
of a disease that is unusually large or unexpected
.for a given place and time

Outbreaks and epidemics refer to the one and ☐
.same thing

Outbreaks in emergency situations can spread ☐
rapidly giving rise to high morbidity and mortality
.rates

Aim should be to detect and control the outbreak ☐
.as early as possible

Major diseases with epidemic potential in emergency situation

Cholera •

Meningococcal disease •

Measles •

Shigellosis •

In certain areas the following diseases have to be included: malaria, louse borne typhus, yellow fever, trypanosomiasis, leishmaniasis, viral hemorrhagic fever, relapsing fever, typhoid and hepatitis A and E

Preparation for the outbreak

- Health coordination meetings •
- Strong surveillance system •
- Outbreak response plan for each disease •
- Stocks of iv fluids, antibiotics and vaccines •
- Plans for isolation wards •
- Laboratory support •

Detection of outbreak

- Surveillance system with early warning system •
 - .for epidemic prone diseases
- Inform ministry of health and WHO in case of •
 - .outbreaks of specific diseases
- Take appropriate specimens (stool, CSF or •
 - .serum) for laboratory confirmation
- .Include case in the weekly report •

Response to the outbreak

Confirm the outbreak •

Activate the outbreak control team •

Investigate the outbreak •

Control the outbreak •

Evaluation

Assess appropriateness and effectiveness of •
.containment measures

Assess timeliness of outbreak detection and •
.response

.Change public health policy if indicated •

.Write and disseminate outbreak report •