



**University of Baghdad**  
**Al Kindy College of  
Medicine**  
**Department of Community  
& Family Medicine**



# **Community & Family Health Module - Part II**

## **Common Diseases & Health Problems in Community: Communicable Diseases**

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### **Note**

- These lectures worth 20% of the degree of the modules
- The topics will be delivered for the students in lectures, tutorials, seminars and group discussion
  
- **Learning Objectives:** Upon completion of this theme, students will be able to:
  - 1) Define the basic concepts and terms related to infectious diseases and epidemiology.
  - 2) Classify infectious diseases according to their etiologies and modes of transmission.
  - 3) Review communicable diseases of public health importance especially in Iraq
  - 4) Discuss the basic principles for communicable disease etiology, mode of transmission, clinical presentations, diagnosis and prevention.
  - 5) Recognize the communicable disease control programme in ordinary and outbreak situations.
  - 6) List the prevention of communicable diseases and prevention ways emphasizing on simple but effective public health ways of preventing outbreaks of in community.
  - 7) Explain the concept of immunization in the control of infectious diseases in community
  - 8) Identify the roles and responsibilities of the physician on infectious diseases.
  - 9) Describe how to manage specific disease outbreaks in emergency settings.
  - 10) review re-emerging and other diseases that may affect displaced populations and other vulnerable groups.
  - 11) Discuss how to monitor and evaluate communicable disease control programmes.

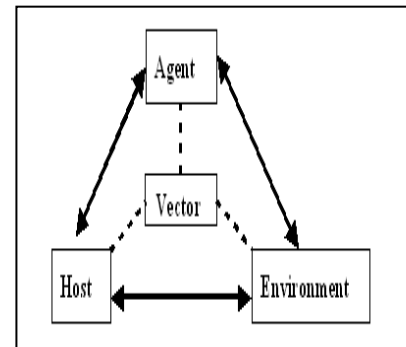
# Communicable Diseases

## ❖ Introduction & Definition

- Infectious diseases are illness caused by pathogenic microorganisms or its toxic products, such as bacteria, viruses, parasites or fungi.
- Communicable diseases are infectious diseases transmitted from an infected person to another person (human is the source of infection), although some diseases transmitted from animals.
- Some diseases are passed on by direct contact with infected person, other by indirect contact (with their excretions).
  - Direct transmission: 1) Sneeze-cough: Influenza, 2) Skin-skin: Herpes type 1, 3) Mucous-mucous: STI, 4) Across placenta: toxoplasmosis, 5) Through breast milk: HIV,
  - Indirect: 1) Food-borne: Salmonella 2) Water-borne: Hepatitis 3) Vector-borne: Malaria 4) Air-borne : Chickenpox
- Infection transmission can take place via many potential routes: (Route of entry and exit of microorganisms)
  - Droplet contact, also known as the respiratory route, and the resultant infection can be termed airborne disease e.g measles virus.
  - Fecal-oral transmission, wherein foodstuffs or water become contaminated (by people not washing their hands before preparing food, or untreated sewage being released into a drinking water supply) and the people who eat and drink them become infected e,f cholera, typhoid fever.
  - Sexual transmission, with the resulting disease being called sexually transmitted disease e.g hepatitis B virus
  - Transmission by direct contact, Some diseases that are transmissible by direct contact include athlete's foot, impetigo and warts
  - Vertical transmission, directly from the mother to an embryo, fetus or baby during pregnancy or childbirth. It can occur when the mother gets an infection as an intercurrent disease in pregnancy e.g HIV.
  - Iatrogenic transmission, due to medical procedures such as injection or transplantation of infected material.
- A short-term infection is an acute infection. A long-term infection is a chronic infection. Infections can be further classified by causative agent (bacterial, viral, fungal, parasitic)
- Control of communicable diseases is the reduction of incidence, prevalence, morbidity, or mortality to a locally acceptable level as a result of deliberate efforts; continued intervention measures are required to maintain the reduction.
- Control is to be contrasted with elimination (reduction to zero of the incidence of a specified disease in a defined geographic area as a result of deliberate efforts; continued intervention measures are required), eradication (permanent reduction to zero of the worldwide incidence of infection caused by a specific agent as a result of deliberate efforts; intervention measures are no longer needed), and extinction (the specific infectious agent no longer exists in nature or the laboratory).

➤ Terms definition:

- ✓ Infectivity (ability to infect) :  $(\text{number infected} / \text{number susceptible}) \times 100$
  - ✓ Pathogenicity (ability to cause disease)  $(\text{number with clinical disease} / \text{Virulence (ability to cause death)}) : (\text{number of deaths} / \text{number with disease}) \times 100$
  - ✓ Virulence: is the degree of pathogenicity; the disease evoking power of a micro-organism in a given host. Numerically expressed as the ratio of the number of cases of overt infection to the total number infected, as determined by immunoassay.
  - ✓ Transmission cycle: The host, agent and environmental factors have to be conducive for the disease to occur. All communicable disease requires that the three factors are present for individuals to be affected.
  - ✓ Vector is a vehicle that some of the agents or disease causing organism require to be move from one point to the other, some require it to complete their developmental cycle e.g. a mosquito in transmission of malaria. Not all communicable diseases require a vector for transmission.
  - ✓ Reservoir: Any person, animal, arthropod, plant, soil, or substance, or a combination of these, in which an infectious agent normally lives and multiplies, on which it depends primarily for survival, and where it reproduces itself in such a manner that it can be transmitted to a susceptible host.
- Contamination: The presence of an infectious agent on a body surface, on or in clothes, beddings, toys, surgical instruments or dressings, or other articles or substances including water and food
- Infestation: It is the lodgment, development and reproduction of arthropods on the surface of the body or in the clothing, e.g. lice, itch mite. This term could be also used to describe the invasion of the gut by parasitic worms, e.g. ascariasis.
- Contagious disease: A contagious disease is the one that is transmitted through contact. Examples include scabies, trachoma, STD and leprosy.
- Exotic diseases: are those which are imported into a country in which they do not otherwise occur, as for example, rabies in the UK.
- Zoonosis: is an infection that is transmissible under natural conditions from vertebrate animals to man, e.g. rabies, plague, bovine tuberculosis.....
- Nosocomial infections (hospital acquired) infection is an infection originating in a patient while in a hospital or another health care facility. It has to be a new disorder unrelated to the patient's primary condition. Examples include infection of surgical wounds, hepatitis B and urinary tract infections.
- Opportunistic infection: This is infection by organisms that take the opportunity provided by a defect in host defense (e.g. immunity) to infect the host and thus cause disease. For example, opportunistic infections are very common in AIDS. Organisms include Herpes simplex, cytomegalovirus, M. tuberculosis....
- Carriers: It is "an infected person or animal that harbors a specific infectious agent in the absence of discernible (visible) clinical disease and serves as a potential source of infection to others. It occurs either due to inadequate treatment or immune response, the disease agent is not completely eliminated, leading to a carrier state.



- Infectious (communicable) period: length of time a person can transmit disease (sheds the infectious agent).
- Incubation period: time from exposure to development of disease. In other words, the time interval between invasion by an infectious agent and the appearance of the first sign or symptom of the disease in question.
- Immunity: Protection against a disease. There are two types of immunity, passive and active.
- Community Immunity ("Herd Immunity"): is a form of indirect protection from infectious disease that occurs when a large percentage of a population has become immune to an infection, thereby providing a measure of protection for individuals who are not immune.
- Subclinical versus clinical (latent versus apparent): Symptomatic infections are apparent and clinical, whereas an infection that is active but does not produce noticeable symptoms may be called inapparent, silent, subclinical, or occult. An infection that is inactive or dormant is called a latent infection. An example of a latent bacterial infection is latent tuberculosis.

## ❖ Diseases can be prevented by Vaccine (Vaccine Preventable Diseases)

### 1) Diphtheria

- Acute bacterial infection, caused by *Corynebacterium diphtheriae* (gram- positive, non-spore-forming, nonmotile pleomorphic bacillus).
- It mainly affects the mucous membrane of the upper respiratory tract (nose, tonsils, pharynx, and larynx) skin, or may involve any mucous membrane (conjunctiva, vagina, or ear).
- Its transmitted through:
  - a) Most often from person to person spread from respiratory tract (by small droplet when coughing or sneezing )
  - b) From infected cutaneous lesions.
  - c) Through objects contaminated by nasopharyngeal secretion of infected person.
- It's classified according to it site of infection into: anterior nasal, Pharyngeal & tonsillar, laryngeal, Cutaneous, Ocular, and Genital.
- Occurrence: A disease of colder months in temperate zones primarily involving:
  - 1) Non immunized or under immunized children below 15 years of age
  - 2) People living in crowded or unclean conditions.
  - 3) Those who aren't well nourished.
  - 4) Children and adults who don't have up-to-date immunizations.
- Infant born to immune mothers have passive protection which is usually before the 6<sup>th</sup> months.
- Must be notified immediately within five days (group A disease) . School exclusion is relevant for cases and contacts:
- Reservoir: Human carriers usually asymptomatic
- Period of communicability: Transmission may occur as long as virulent bacilli are present in discharges and lesions. The time is variable but is usually two weeks or

less and seldom more than four weeks without antibiotics. Appropriate antibiotic therapy promptly terminates shedding. The rare chronic carrier may shed organisms for six months or more. People who have been infected by the diphtheria bacteria can infect others for up to 4 weeks, even if they don't have any symptoms.

- There are chronic carrier may shed the organisms for 6 months or more.
  - Temporal pattern: winter and spring
  - Signs & Symptoms
    - ✓ The incubation period for diphtheria is 2 to 4 days (range from 1 to 6 days).
    - ✓ Some patients may have mild symptoms similar to those of the common cold.
    - ✓ The most visible and common symptom of diphtheria is a thick, gray coating membrane on the throat and tonsils. Other common symptoms include: fever, chills, swollen glands in the neck, a loud, barking cough, a sore throat, drooling, difficulty breathing or swallowing, changes in vision & slurred speech
  - Lifelong immunity is usually, but not always, acquired after disease or inapparent infection.
  - Method of diagnosis: Diagnosis is usually based on observation of the classical greyish-white membrane overlying the tonsils or pharynx. Specimens for *C. diphtheria* culture should be obtained from the nose and throat and from any other suspicious lesions. Swabs should be obtained from the pharyngeal membrane, or a portion of the membrane itself could be submitted for culture.
  - Treatment:
    - ✓ Antitoxin, which is prepared from horse serum, must be given in all cases when diphtheria is suspected.
    - ✓ Removal of membrane by direct laryngoscopy or bronchoscopy may be necessary to prevent or alleviate airway obstruction.
    - ✓ Penicillin, if sensitive Erythromycin, Azithromycin or clarithromycin These should be continued to complete a total of 14 days of treatment.
  - Prevention:
    - ✓ Active immunization should be given to all children
    - ✓ If diphtheria occur in closed population. Contacts should be given erythromycin
    - ✓ All contacts should be given a booster dose of toxoid. For close contact swabs should be taken for culture from their throat and nose.
    - ✓ A primary course of toxoid vaccination provides long lasting but not lifelong immunity. Vaccinated individuals may become colonized by *C. diphtheria* in
- Diphtheria vaccine (Toxoid): Should be administered with tetanus toxoid as DTaP, DT, Td, or Tdap. 3 or 4 doses plus booster, booster every 10 years
- Efficacy: approximately 95% for approximately 10 years
- ✓ Immunization with diphtheria Toxoid, produce prolonged but not lifelong immunity
  - ✓ Outbreaks of diphtheria require immunizing the largest possible proportion of the population involved, emphasizing the need for protection of infants and preschool children. In outbreaks amongst adults immunize groups that are most affected and at high risk.

## 2) **Pertussis (Whooping Cough):**

- Highly contagious bacterial infection of upper respiratory tract caused by bacterium *Bordetella pertussis* (Gram-negative bacteria).
- Pertussis is primarily spread from person to person by direct contact with mucus or droplets from the nose and throat of infected individuals.
- Requires written notification within five days of diagnosis. School exclusion for cases and contacts. Cases should be excluded for five days after commencing antibiotic treatment
- Parapertussis: bacterial illness that is similar to pertussis (whooping cough) but is not as common. causes less severe symptoms. Affects very young infants (<6 months of age) may have a more severe course of parapertussis than older persons. A person can be infected with parapertussis and pertussis at the same time.
- Primarily a toxin-mediated disease. Bacteria attach to cilia of respiratory epithelial cells. Inflammation occurs which interferes with clearance of pulmonary secretions Estimated 195,000 deaths worldwide in 2008
- Clinical Features:
  - ✓ Incubation period 7-10 days (range 4-21 days)
  - ✓ Infection may be asymptomatic, or may present as classic Pertussis. Insidious onset, similar to the common cold with nonspecific cough
  - ✓ Fever usually minimal throughout course of illness
  - ✓ The clinical course of the illness is divided into three stages: Catarrhal stage (1-2 weeks, characterized by symptoms resemble those of a common cold, including sneezing, runny nose, low- grade fever and a mild cough.), Paroxysmal cough stage (1-6 weeks, characterized by bursts of rapid, consecutive coughs followed by a deep, high-pitched inspiration (whoop) ), Convalescence (weeks to months characterized by decrease in the frequency and severity of paroxysms of cough.)
  - ✓ Disease in adults often milder than in infants and young children and the diagnosis often is not considered in adults, who may not have a typical presentation.
- Complications in Children
  - Secondary bacterial pneumonia – most common
  - Neurologic complications – seizures, encephalopathy more common among infants
  - Otitis media, Anorexia, Dehydration, Pneumothorax, Epistaxis
  - Subdural hematomas ,Hernias , Rectal prolapse
- Pertussis Complications in Adolescents
  - Difficulty sleeping ,
  - Urinary incontinence ,
  - Pneumonia ,Rib fracture
- Diagnosis:
  - ✓ Usually on clinical presentation, but since the early symptoms are so non-specific, pertussis is usually not diagnosed until appearance of characteristic cough.
  - ✓ The diagnosis is established by isolating the organism from nasopharyngeal culture and or microscopy demonstration of bacilli in respiratory secretion .
  - ✓ Florescent antibody .
  - ✓ Polymerase Chain Reaction (PCR)



- Treatment: Administering antibiotics (Erythromycin, Azithromycin, Clarithromycin )  
If treatment is begun early enough with antibiotics, the duration of whooping cough symptoms can be decreased.  
Supportive Care: Admission to the hospital, Intravenous (IV) fluids, Oxygen, Breathing support from a ventilator, Prevention of secondary infections & Good nursing care.  
Treatment is also recommended for anyone who comes in close physical contact with an infected person.
- Prevention
  - ✓ Pertussis vaccine is recommended for all infants, combined with diphtheria and tetanus toxoids (DTP). Initiating immunization at two months of age and adhering to the immunization schedule (DTPa at two, four and six months and four and fifteen years of age).
  - ✓ Delay immunization only for significant intercurrent infection or an evolving neurological disorder.
  - ✓ Adolescents aged 11–18 years who have completed the DTP vaccination series should receive a single dose of either Tdap product instead of Td (tetanus and diphtheria toxoids vaccine) for booster immunization against tetanus, diphtheria, and pertussis.
  - ✓ Administer Tdap in each pregnancy, through 36 weeks gestation
  - ✓ People with whooping cough (pertussis) should avoid close contact with others particularly infants and children.
  - ✓ Treatment with appropriate antibiotics, such as Zithromax, will shorten the time a person can spread pertussis to 5 days after the beginning of treatment.
  - ✓ Treatment of people who are close contacts of pertussis cases is also an important part of prevention.
  - ✓ Neither vaccination nor natural infection with pertussis guarantees lifelong protective immunity against pertussis. Since immunity decreases after 5-10 years from the last pertussis vaccine dose

### 3) **Tetanus (Lockjaw):**

- Tetanus is an acute disease caused by an exotoxins produced by the bacterium Clostridium tetani. (Anaerobic gram-positive, spore-forming bacteria )
- The infection can cause severe muscle spasms, serious breathing difficulties, and can ultimately be fatal.
- C. tetani produces exotoxin (tetanospasmin). This neurotoxin causes the clinical manifestations of tetanus.
- Transmission is primarily by contaminated wounds.
- Age: It is the disease of active age (5-40 years), New born baby, female during delivery or abortion. Sex : Higher incidence in males than females
- Occupation: Agricultural workers are at higher risk.
- Immunity : Herd immunity does not protect the individual
- Environmental & social factors: Unhygienic custom habits, Unhygienic delivery practices

- Tetanus may also develop as a result of: Animal bites. Skin burns, Abrasions and lacerations, Injecting drugs with dirty needle, Tattoos and body piercing performed with unsterilized equipment, and Circumcision
- The typical clinical manifestations of tetanus are caused when tetanus toxin interferes with release of neurotransmitters, blocking inhibitor impulses. This leads to unopposed muscle contraction and spasm and noticing the following features.
  - ✓ Tetanus often begins with mild spasms in the jaw muscles, also known as lockjaw or trismus.
  - ✓ The spasms can also affect the facial muscles resulting in an appearance called risus sardonicus.
  - ✓ Chest, neck, back, abdominal muscles, and buttocks may be affected. Back muscle spasms often cause arching, called opisthotonos.
  - ✓ Sometimes the spasms affect muscles that help with breathing, which can lead to breathing problems.
  - ✓ These spasms usually last a few minutes each time and occur frequently for three to four weeks. Spasms may be so severe that bone fractures may occur.
- Other complications: Laryngospasm, Hypertension and/or abnormal heart rhythm Nosocomial infections ,Pulmonary embolism ,Aspiration pneumonia, and Death
- Diagnosis: Diagnosis of tetanus is made on the basis of the clinical features.
- Treatment: Three Objectives of Management of Tetanus
  - ✓ To provide supportive care until the tetanospasmin that is fixed in tissue has been metabolized
  - ✓ To neutralize circulating toxin
  - ✓ To remove the source of tetanospasmin.
- Management of wound:
  - ✓ All wounds should be cleaned. Necrotic tissue and foreign material should be removed.
  - ✓ Tetanus toxoid can be given in case of a suspected exposure to tetanus. In such cases, it can be given with or without tetanus immunoglobulin (also called tetanus antibodies). It can be given as intravenous therapy or by intramuscular injection.

Vaccination status	Clean, minor wounds	All other wounds
Unknown or less than 3 doses of tetanus toxoid containing vaccine	<u>Tdap</u> and recommend catch-up vaccination	<u>Tdap</u> and recommend catch-up vaccination Tetanus <u>immunoglobulin</u>
3 or more doses of tetanus toxoid containing vaccine AND less than 5 years since last dose	No indication	No indication
3 or more doses of tetanus toxoid containing vaccine AND 5–10 years since last dose	No indication	Tdap preferred (if not yet received) or Td
3 or more doses of tetanus toxoid containing vaccine AND more than 10 years since last dose	Tdap preferred (if not yet received) or Td	Tdap preferred (if not yet received) or Td

- Prevention:
  - ✓ Active immunization with adsorbed tetanus toxoid which gives durable protection for at least 10 years (booster every 10 years). Efficacy approximately 100%
  - ✓ Should be administered with diphtheria toxoid as DTaP, DT, Td, or Tdap
  - ✓ Careful assessment of wound: if the wound is clean or contaminated, and the immunization status of the patient.
- Prevention of neonatal tetanus
  - ✓ 2 doses of T.T to all pregnant women between 16 to 36 weeks of pregnancy with an interval of 1 to 2 months between the two doses.
  - ✓ The first dose as early as possible & the second dose a month later preferably 3 weeks before delivery.
  - ✓ If the pregnant woman is previously immunized, a booster dose is sufficient.
  - ✓ If the pregnant woman is not immunized, then the new born should be protected against tetanus by giving tetanus human immunoglobulin 750 IU with in 6 hours of birth.

#### 4) Measles

- Highly contagious infection caused by the measles virus. Must be notified immediately, followed by a written notification within five days (Group A disease).
- Measles virus is a member of the genus Morbillivirus, It is an airborne disease which spreads easily through the coughs and sneezes of those infected. It may also be spread through contact with saliva or nasal secretions.
- Cases should be excluded for at least four days after rash onset
- Clinical features: Symptoms usually develop 10–12 days after exposure to an infected person and last 7–10 days
  - ✓ Initial signs and symptoms typically include fever, often greater than 40 °C, cough, runny nose, and inflamed eyes.
  - ✓ Two or three days after the start of symptoms, small white spots may form inside the mouth, known as Koplik's spots. A red, flat rash which usually starts on the face and then spreads to the rest of the body typically begins three to five days after the start of symptoms.
  - ✓ Persons who have been previously immunized may present with non classical features.
- Period of communicability: Cases are infectious from slightly before the beginning of the prodromal period, usually five days prior to rash onset. They continue to be infectious until four days after the onset of the rash.
- Complications (in 30%) can include: Diarrhea, otitis media, pneumonia and encephalitis, Sub-acute sclerosing panencephalitis (SSPE) Develops very rarely as late sequelae.
- Diagnosis: usually onclinical diagnosis, but should be confirmed by:
  - ✓ Demonstration of anti-measles IgM antibody,
  - ✓ Detection of measles RNA by polymerase chain reaction (PCR) techniques (if available) or by viral culture.

- Large measles outbreaks continue to occur. These occur especially in areas of developing countries with low vaccine coverage and among children living in countries where there are unstable social conditions. These outbreaks frequently have high case-fatality rates.
- Natural infection provides lifelong immunity.
- Prevention: The measles vaccine (Live attenuated) virus is effective at preventing the disease. Vaccination has resulted in a 75% decrease in deaths from measles between 2000 and 2013 with about 85% of children globally being currently vaccinated.
- Vaccination at 9 months of age produces a protective antibody in approximately 95% of recipients. The second dose of vaccine, recommended at 4 years, increases protection to approximately 99% of recipients
- No specific treatment is available. Supportive care may improve outcomes.
- Protection of susceptible contacts of a measles patient with:
  - ✓ MMR if within 72 hours of first contact with the patient
  - ✓ Immunoglobulin if longer than 72 hours
- Schools monitoring: Although outbreaks mainly affect unvaccinated children, highly vaccinated school populations have also been affected. Cases are excluded from school and child care for at least four days after rash onset. Immunized contacts are not excluded. Immunoglobulin prophylaxis
- In Iraq measles is one of the most contagious and endemic diseases. It causes high rate of mortality especially in children below five years. The immunization technique started in Iraq since 1985 by using measles vaccine and mixed vaccines in 1988, then a noticeable decrease in the number of cases observed.
- The Iraqi Ministry of Health implemented a measles catch – up campaign based on WHO recommendations for supplementary immunization activities to eliminate measles. The age group target was 19 – 24 years old. This campaign was unique in Iraq as it was the first national vaccination campaign which included this age group. Previous campaign targeting the age group 6 months -12 years. The first case after the war discovered in Al Anbar province in 2008 then the disease spread to Salah Aldin , Baghdad and other provinces .8134 cases recorded with 33 deaths In 2009,the cases increased to 29,778 with 160 deaths.\_After the use of vaccinations regularly by instructions recommended by Ministry of Health in Iraq, the cases started to decrease to 385 in 2010 and 54 cases in the first 30 weeks of 2011. In 2012 in Iraq there was only one reported case so we are in elimination phase, but there were new eight cases of measles in Syrian campaign in Nenava governorate

## 5) **Mumps (Epidemic Parotitis)**

- Acute viral febrile disease characterized by swelling and tenderness of one or more of the salivary glands, usually the parotid and occasionally the sublingual or sub maxillary glands. Mumps is highly contagious and spreads rapidly among people living in close quarters.
- Mumps virus is a member of the family *Paramyxoviridae*.
- Mumps (Group B disease) must be notified in writing within five days of diagnosis.
- School exclusion for nine days, or until swelling goes down, whichever is sooner.

- The virus is transmitted by respiratory droplets or direct contact with an infected person. Symptoms occur 16 to 18 days after exposure and resolve after seven to ten days. Mumps is communicable from six to seven days before to nine days after the onset of parotitis.
- About a third of people have mild or no symptoms. Initial signs and symptoms often include fever, muscle pain, headache, and feeling tired. This is then usually followed by painful swelling of one or both parotid salivary glands
- Symptoms in adults are often more severe than in children.  
Complications: Meningitis, encephalitis, pancreatitis, very rarely causes sensorineural deafness & permanent deafness. Epididymo-orchitis occurs in up to a third of postpuberal males and is most commonly unilateral: sterility is an uncommon complication. Oophoritis occurs in up to 31% of females aged over 15 years and may cause lower abdominal or back pain. Mumps during the first trimester may increase the risk of spontaneous abortion but there is no evidence that mumps during pregnancy results in congenital anomaly.
- Diagnosis usually clinical confirmed serologically by the detection of mumps specific IgM antibody.
- High childhood immunization rates have resulted in a dramatic reduction in rates of mumps infection. Unimmunized children and adults, especially males, are the groups at highest risk of infection.
- Immunity is generally life long and develops after either in apparent or clinical infections.
- There is no specific treatment. We rely on prevention
- Preventive measures
  - ✓ Mumps is preventable by two doses of the mumps vaccine. Live attenuated mumps vaccine is available combined with rubella and measles vaccine (MMR). Vaccination with this vaccine results in seroconversion to all three viruses in over 95% of recipients. Since the MMR vaccine viruses are not transmissible, there is no risk of infection originating from vaccines.
  - ✓ MMR vaccination is recommended for all children at 12 months of age, unless specific contra-indications to the vaccine exist. A second dose is recommended at four years of age, prior to school entry.
  - ✓ **Outbreak measures:** Susceptible persons should be immunized, especially those at risk of exposure. Those who are not certain of their immunity can be vaccinated if no specific contra-indications to live vaccines exist.

## 6) **Rubella (German measles)**

- Viral infection caused by the rubella virus Rubella virus (Togaviridae family). (Group B disease) must be notified in writing within five days of diagnosis.
- School exclusion: excluded until fully recovered or at least four days after the onset of the rash.
- Rubella is usually spread through the air via coughs of people who are infected. People are infectious during the week before and after the appearance of the rash.

This disease is often mild with half of people not realizing that they are sick. A rash may start around two weeks after exposure and last for three days. It usually starts on the face and spreads to the rest of the body. Swollen lymph nodes are common and may last a few weeks. Postauricular, occipital and posterior cervical lymphadenopathy is common and precedes the rash by five to ten days.

- A fever, sore throat, and fatigue may also occur.
- Complications: arthralgia and less commonly arthritis, Testicular swelling, and inflammation of nerves. Encephalitis is a rare complication
- Infection during early pregnancy may result in a child born with congenital rubella syndrome (CRS) or miscarriage. It occurs in less than 25% of infants born to women who acquire rubella during the first trimester of pregnancy. The risk of a single congenital defect falls to approximately 10–20% by the 16th week of pregnancy. Problems are rare after the 20th week of pregnancy. Symptoms of CRS include problems with the eyes such as cataracts, ears such as deafness, heart, and brain. Although CRS is now rare, the risk of infection remains for unimmunized pregnant women. Such women have been infected primarily by persons who have not been included in rubella vaccine programs.
- Diagnosis: Clinical diagnosis should be confirmed by one or more of the following:
  - ✓ Rubella-specific IgM antibody, except following rubella immunization
  - ✓ fourfold or greater rise in rubella antibody titre between acute and convalescent-phase sera obtained at least two weeks apart
  - ✓ Isolation of rubella virus from a clinical specimen.
- There is no specific treatment. The case should be excluded from school and childcare for at least four days after onset of the rash.
- Preventive measures:
  - ✓ Rubella is preventable with the rubella vaccine with a single dose being more than 95% effective. MMR vaccine is recommended for all infants at the age of 12 months and at again at four years of age.
  - ✓ Women of childbearing age should be tested for immunity to rubella prior to pregnancy if possible. All non-pregnant seronegative women should be offered rubella vaccine. Women receiving rubella vaccine should be instructed to avoid pregnancy for 28 days after vaccination.
  - ✓ All suspected outbreaks should be reported. Mass immunization may be recommended during an outbreak of rubella in a school regardless of immune status.
- MMR Vaccine Contraindications and Precautions:
  - 1- Severe allergic reaction to vaccine component or following a prior dose
  - 2- Pregnancy
  - 3- Immunosuppression.
  - 4- Moderate or severe acute illness.

## 7) **Poliomyelitis (Infantile Paralysis)**

- Viral infectious disease caused by the poliovirus (Enterovirus).
- Infection with poliovirus results in a spectrum of clinical manifestations from inapparent infection to non-specific febrile illness, aseptic meningitis, paralytic disease, and death.
- Incubation period: 7-14 days for paralytic cases
- In 70% of infections there are no symptoms. 25% of people have minor symptoms such as fever and a sore throat and up to 4% have headache, neck stiffness and pains in the arms and legs. The virus enters the central nervous system in about 1% of infections causing nonparalytic aseptic meningitis, with symptoms of headache, neck, back, abdominal and extremity pain, fever, vomiting, lethargy, and irritability. About one to five in 1000 cases progress to paralytic disease, in which the muscles become weak, floppy and poorly controlled, and, finally, completely paralyzed; this condition is known as acute flaccid paralysis.
- Poliovirus has 3 serotypes type 1, 2 & 3. All types can cause paralysis; type 1 most frequently causes epidemics. Most vaccine-associated cases are due to type 2 or 3
- Entry of the virus through the mouth→ replicate in pharynx, GI tract, local lymphatics→Hematologic spread to lymphatics and central nervous system→ Viral spread along nerve fibers→Destruction of motor neurons
- Acute onset of a flaccid paralysis of one or more limbs with decreased or absent tendon reflexes in the affected limbs, without other apparent cause, and without sensory or cognitive loss.
- Clinical case definition of WHO (Poliomyelitis is a Disease under surveillance by WHO and is targeted for eradication: AFP surveillance program for polio eradication): Any child under 15 years of age with acute flaccid paralysis (AFP) or any person of any age with paralytic illness if polio is suspected.
- The paralysis of polio is usually asymmetric & the maximum extent is reached in a short period (3-4 days)
- Diagnosis: Definitive laboratory diagnosis required isolation of the wild poliovirus from stool samples, CSF or oropharyngeal secretions in cell culture system of human or monkey origin (primate cells).
- Prevention
  - ✓ General prevention: Health promotion through environmental sanitation. Health education (modes of spread, protective value of vaccination).
  - ✓ Active immunization: The disease is preventable with the polio vaccine; however, a number of doses are required for it to be effective.
    - Salk vaccine (intramuscular polio trivalent killed vaccine).
    - Sabin vaccine (oral polio trivalent live attenuated vaccine).
      - >90% immune after 2 doses, >99% immune after 3 doses
  - ✓ Polio Vaccination Schedule: 2 months, 4 months, 6-18 months, 4-6 years
  - ✓ Polio Vaccine Adverse Reactions
    - Rare local reactions (IPV)
    - No serious reactions to IPV have been documented
    - Paralytic poliomyelitis (OPV)

- ✓ Contraindications and Precautions
  - Serious allergic reaction to component or following prior dose
  - Moderate or severe acute illness
- ✓ Report to local health authority, Enteric precautions in the hospital for wild virus .
- Polio Eradication
  - In 2015 polio affected less than 100 people, down from 350,000 cases in 1988.
  - In Iraq The last laboratory-confirmed indigenous polio case was reported on 28 January, 2000. In 2014 two wild polio cases were reported from Baghdad-Resafa province. Dates of onset of the cases were February and April 2014. Both cases were linked to Syria outbreak of 2013.

## ❖ Diseases can be transmitted through Respiratory Route:

### 1) Chickenpox or Shingles (varicella/herpes zoster)

- Highly contagious disease caused by the initial infection with varicella zoster virus (VZV, a DNA virus and is a member of the herpesvirus group). The disease results in a characteristic skin rash that forms small, itchy blisters, which eventually scab over. It usually starts on the chest, back, and face then spreads to the rest of the body. Symptoms usually last five to ten days. The disease is often more severe in adults than children
- Average incubation period: 14-16 days after exposure to rash (range: 10-21 days)
- It is usually communicable for one to two days (up to five days) before the onset of the rash, continuing until all the lesions are crusted.
- Notification is not required. Cases should be excluded until full recovery or for at least five days after the first eruption appears.
- Airborne disease which spreads easily through the coughs and sneezes of an infected person. It may be spread from one to two days before the rash appears until all lesions have crusted over.
- Children infected with (HIV) also may have severe, prolonged illness.
- Recovery from primary varicella infection usually results in lifetime immunity.
- Complications may occasionally include pneumonia, inflammation of the brain, or bacterial infections of the skin among others. Aseptic meningitis , encephalitis, Reye, transverse myelitis, Guillain-Barré syndrome, thrombocytopenia, hemorrhagic varicella, purpura fulminans, glomerulonephritis, myocarditis, arthritis, orchitis, uveitis, iritis, and hepatitis. Hospitalization: 2-3 per 1,000 cases (children) Death: 1 per 60,000 cases
- People usually only get the disease once. Although reinfections by the virus occur, these reinfections usually do not cause any symptoms.
- VZV has the capacity to persist in the body after the primary (first) infection as a latent infection. VZV persists in sensory nerve ganglia.
- Children with lymphoma and leukaemia may develop a severe progressive form of Varicella characterized by high fever, extensive vesicular eruption, and high complication rates.



- Reactivation of latent infection results in Herpes Zoster (shingles): Associated with:
  - ✓ Aging (Varicella at younger than 18 months of age)
  - ✓ Immunosuppression
  - ✓ Intrauterine exposure to VZV
- Infection during pregnancy: Period of risk may extend through first 20 weeks of pregnancy. Low birth weight, hypoplasia of extremity, skin scarring, eye and neurologic abnormalities. Risk appears to be very low (less than 2%). Varicella infection during the first trimester of pregnancy confers a small risk of miscarriage.
- Prevention: Two live attenuated varicella virus vaccines licensed for use : Varivax and Proquad Varicella Vaccine Recommendations. Susceptible persons at high risk of exposure or severe illness
  - ✓ Teachers of young children
  - ✓ Institutional settings
  - ✓ Military
  - ✓ Women of childbearing age
  - ✓ International travelers
  - ✓ Susceptible persons likely to expose persons at high risk for severe illness
  - ✓ Health care workers
  - ✓ Family members of immuno- compromised persons
- Aspirin should never be given to children with Varicella due to a strong association with the development of Reye's syndrome.

## 2) Meningitis

- Meningitis is an acute inflammation of the meninges (protective membranes covering the brain and spinal cord).
- The most common symptoms are fever, headache and neck stiffness. Other symptoms include confusion or altered consciousness, vomiting, and an inability to tolerate light or loud noises. Young children often exhibit only nonspecific symptoms, such as irritability, drowsiness, or poor feeding.
- Meningitis can be life-threatening because of the inflammation's proximity to the brain and spinal cord; therefore, the condition is classified as a medical emergency.
- Classification
  - A. Acute aseptic (viral) meningitis
  - B. Acute pyogenic (bacterial) meningitis
  - C. Chronic bacterial infection (tuberculosis)
- The differentiation in diagnosis by CSF exam
  - A. Acute aseptic (viral) meningitis
    - Usually caused by viral infection (enterovirus, cytomegalovirus, chickenpox, HIV, herpes simplex, mumps, measles, rabies)
    - Aseptic meningitis is more common than bacterial meningitis, but its symptoms are usually less severe.
    - Serious complications are rare and most people completely recover within two weeks after the onset of symptoms.

## B. Acute pyogenic (bacterial) meningitis

- The types of bacteria that cause bacterial meningitis vary according to the infected individual's age group.
- In premature babies and newborns up to three months old, common causes are group B streptococci
- Older children are more commonly affected by *Neisseria meningitidis* (meningococcus) and *Streptococcus pneumoniae* and those under five by *Haemophilus influenzae* type B (in countries that do not offer vaccination).
- In adults, *Neisseria meningitidis* and *Streptococcus pneumoniae* together cause 80% of bacterial meningitis cases.
- Bacterial meningitis is very serious and can be deadly. Death can occur in as little as a few hours. While most people with meningitis recover, permanent disabilities such as brain damage, hearing loss and learning disabilities can result from the infection.
- Risk factors: Recent skull trauma, devices in the brain and meninges, such as cerebral shunts, extraventricular drains, head and neck area, such as otitis media or mastoiditis. Crowding, low socioeconomic status, immunocompromized patient.
- Meningococcal meningitis
  - ✓ Caused by the bacterium *Neisseria meningitidis* (also termed meningococcus) is the most common type. It carries a high mortality rate if untreated but is a vaccine-preventable disease.
  - ✓ The incidence of endemic meningococcal disease during the last 13 years ranges from 1 to 5 per 100,000 in developed countries, and from 10 to 25 per 100,000 in developing countries. During epidemics the incidence of meningococcal disease approaches 100 per 100,000.
  - ✓ Up to 5%–10% of people may be asymptomatic carriers with nasopharyngeal colonization by *N. meningitidis*.

## C. Chronic bacterial infection (tuberculosis)

- Tuberculous meningitis, which is meningitis caused by *Mycobacterium tuberculosis*, is more common in people from countries in which tuberculosis is endemic, but is also encountered in persons with immune problems, such as AIDS.
- The infection usually begins elsewhere in the body, usually in the lungs, and then travels through the bloodstream to the meninges where small abscesses (called microtubercles) are formed.

### ➤ Prevention

- The most effective way to of prevention in bacterial meningitis is to complete the recommended vaccine schedule. There are vaccines for three types of bacteria that can cause meningitis:
  - ✓ *Neisseria meningitidis* (Vaccines containing groups A, C, Y and W-135 meningococcal polysaccharides are been available)
  - ✓ *Streptococcus pneumoniae*

- ✓ Haemophilus influenzae type b (Hib)
- ✓ TB meningitis
- Like with any vaccine, the vaccines that protect against these bacteria are not 100% effective. This means that even if you have been vaccinated, there is still a chance you can develop bacterial meningitis.
- Meningococcal vaccine are effective for:
  - ✓ Outbreak control
  - ✓ Prevention among high-risk groups, such as travelers to countries where disease is epidemic, Hajj pilgrims, military groups, and individuals with underlying immune dysfunctions.
  - ✓ Because these vaccines are often poorly immunogenic in young children and have limited duration of efficacy, they are not generally used in routine childhood immunization programs.
- Maintaining healthy habits, like not smoking and avoiding cigarette smoke, getting plenty of rest, and not coming into close contact with people who are sick, can also help. This is especially important for young babies, older adults, and people with weak immune systems, since they are at increased risk for serious disease.
- To help decrease the chance of spreading the bacteria that cause meningitis, antibiotics may be recommended for:
  - ✓ Close contacts of a person with meningococcal meningitis
  - ✓ Family members of a person who develop a serious Hib infection, especially if there is a person at increased risk living in the house
- Reduce overcrowding in living quarters and workplaces, schools and ships.
- Isolation: Respiratory isolation for 24 hours after start of treatment.
- Epidemic measures: When an outbreak occurs, major emphasis must be placed on:
  - ✓ Careful surveillance, early diagnosis and immediate treatment of suspected cases.
  - ✓ Thresholds (alert and epidemic)
  - ✓ When thresholds are passed, immunization campaigns must be implemented.
  - ✓ Setting up an epidemic management committee,
  - ✓ Reduce overcrowding and ventilate living and sleeping quarters
  - ✓ Intimate contacts should all be considered for prophylaxis

### 3) **Influenza**

- Commonly known as "the flu", is an infectious (contagious) respiratory disease caused by an influenza virus (types A, B and C).
- The incubation period is one to four days. Symptoms can be mild to severe. The most common symptoms include: a high fever, runny nose, sore throat, muscle pains, headache, coughing, and feeling tired. These symptoms typically begin two days after exposure to the virus and most last less than a week. The cough, however, may last for more than two weeks.
- **Mode of transmission:** Influenza viruses are predominately transmitted by airborne spread in aerosols but can also be transferred by direct contact with droplets. Nasal inoculation after hand contamination with the virus is also an important mode of transmission

- (Group B disease) must be notified in writing within five days of laboratory confirmation. School exclusion: exclude until well.
- Period of communicability: It is probably communicable for three to five days from clinical onset in adults and up to seven days and occasionally longer in young children.
- Seasonal influenza epidemics are annually responsible for between 3 million and 5 million cases of severe illness and between 250,000 and 500,000 deaths worldwide
- Older people, young children, and people with certain health conditions, are at high risk for serious flu complications.
- **Influenza type A:** This type includes influenza A viruses of human and also widespread in animals, particularly aquatic birds, chickens, ducks, pigs, horses, and seals. Influenza virus type A can undergo antigenic shift (total Ag change) or drift (partial Ag change) leads to a new highly virulent influenza subtype for which there is little or no immunity in the population and it is responsible for pandemic and for most cases of epidemic influenza (antigenically highly variable).
- **Influenza type B:** This type includes influenza B viruses which are mainly found in humans. Influenza type B may exhibit some antigenic changes (only drift) and sometimes causes epidemics.
- **Influenza type C:** This type includes influenza C viruses of human and swine. Influenza type C is antigenically stable (No shift or drift).
- Complications of flu can include: bacterial pneumonia, ear infections, sinus infections, worsening of chronic medical conditions, such as congestive heart failure, asthma, or diabetes.
- Public health significance and occurrence: Influenza occurs as pandemics, epidemics, outbreaks and as sporadic cases.
- Diagnosis: A clinical diagnosis can be confirmed by culture or antigen testing of appropriate respiratory specimens such as nasopharyngeal aspirate or nose and throat swabs, taken within five days of Onset. Or it can be confirmed by serology performed on blood specimens taken during the acute and convalescent Stages.
- **Reservoir:** Humans are the primary reservoir. Animal reservoirs are suspected as sources of new human subtypes and may occur particularly when people and livestock (for example pigs and poultry) live closely together. In 2004 an outbreak of avian influenza (influenza A H5N1) caused a number of human infections in South East Asia.
- **Preventive measures:** Types of Vaccine:
  - ✓ Inactivated, consisting of (1) whole-virus, (2) subvirion, (3) purified surface antigen. Only subvirion or purified antigen should be used in children. Any of the three can be used for adults.
  - ✓ Live attenuated: Influenza Vaccine, who should receive it.
    - Persons 65 years or older, persons with heart, pulmonary, renal and metabolic diseases.
    - Persons in nursing homes and other long-term care facilities
    - Persons 6 mos-18 years old receiving aspirin therapy
    - Women in 2nd or 3rd trimester of pregnancy during flu season.

- Household members of persons in high-risk groups
- Health care workers and others providing essential community services.

➤ Outbreak measures

➤ The most important control measure to prevent serious morbidity and mortality from influenza epidemics is appropriate immunization.

➤ Avian Influenza

- ✓ An infection in birds caused by avian strains of influenza A
- ✓ Representatives of each of the known subtypes of influenza A have been isolated from aquatic birds worldwide, in both wild and domesticated species.
- ✓ The natural reservoir of the virus is wild water birds in which the infection is generally avirulent, such “low pathogenic avian influenza virus” (LPAIV) strains causing little, or no, evident symptoms.
- ✓ H1N1: new virus The 2009 H1N1 virus is a hybrid of swine, avian and human strains Influenza A (H1N1)

➤ Swine influenza (swine flu)

- ✓ A respiratory disease of pigs caused by type A influenza viruses that regularly cause outbreaks of influenza in pigs.
- ✓ The main swine influenza viruses circulating in U.S. pigs in recent years are:
- ✓ swine triple reassortant (tr) H1N1 influenza virus, trH3N2 virus, trH1N2 virus
- ✓ Swine flu viruses do not normally infect humans. However, sporadic human infections with swine influenza viruses have occurred. When this happens, these viruses are called “variant viruses.”
- ✓ There is no vaccine right now to protect against this new H1N1 virus.
- ✓ H1N1 influenza (swine flu) tends to cause high morbidity but low mortality rates (1%-4%).

#### 4) **Tuberculosis**

➤ An infectious disease caused by the bacterium *Mycobacterium tuberculosis* generally affects the lungs, but can also affect other parts of the body. Humans are the primary reservoir.

➤ One-third of the world's population is thought to be infected with TB. New infections occur in about 1% of the population each year. In 2014, there were 9.6 million cases of active TB which resulted in 1.5 million deaths. More than 95% of deaths occurred in developing countries.

➤ TB is transmitted mainly by:

- ✓ Inhalation of infectious droplets produced by persons with pulmonary or laryngeal tuberculosis during coughing, laughing, shouting or sneezing.
- ✓ Invasion may occur through mucous membranes or damaged skin.
- ✓ Extrapulmonary tuberculosis, other than laryngeal infection, is generally not communicable. Urine is infectious in cases of renal tuberculosis.

- ✓ Bovine tuberculosis results mainly from ingestion of unpasteurized milk and dairy products.
- ✓ Aerosol transmission has been reported among abattoir workers.
- Most infections do not have symptoms; in which case it is known as latent tuberculosis. About 10% of latent infections progress to active disease which, if left untreated, kills about half of those infected.
- The initial pulmonary infection usually goes unnoticed with lesions healing, sometimes leaving traces of calcified scar tissue.
- The classic symptoms of active TB are a chronic cough with blood-containing sputum, fever, night sweats, and weight loss.
- The infection may however progress to pulmonary tuberculosis, or through blood or lymphatic spread produce miliary, meningeal or other extrapulmonary involvement.
- Tuberculosis must be notified in writing within five days of diagnosis including clinical suspicion.
- School exclusion: Exclude until receipt of a medical certificate from the treating physician stating that the child is not considered to be infectious.
- Method of diagnosis: TB is diagnosed by a consideration of the following:
  - ✓ Clinical presentation
  - ✓ Tuberculin skin test using the Mantoux procedure
  - ✓ Radiographic examination, sometimes including CT scans
  - ✓ Bacteriology, direct staining and culture of sputum or other specimens.
  - ✓ Molecular amplification (PCR) and gene probes assist in rapid diagnosis.
  - ✓ Definitive diagnosis of TB rests on isolation of *M. tuberculosis* (or *M. bovis*) from sputum, urine, biopsy material, CSF or other clinical specimens.
- A negative sputum test does not rule out a diagnosis of TB.
- Public health significance and occurrence: Tuberculosis occurs worldwide and had been decreasing steadily over past decades in developed countries. This pattern was reversed with the arrival of HIV and increased mobility of the world's population.
- Susceptibility and resistance: Everyone is susceptible to infection; however some groups are more susceptible to infection and progression to active disease than others.
- Special groups at risk are:
  - ✓ Recent immigrants and refugees from countries with a high incidence of TB including those in close contact with a case of active TB,
  - ✓ Immunosuppressed patients, those with HIV infection and AIDS
  - ✓ The elderly
  - ✓ Diabetics
  - ✓ Drug and alcohol-dependent people
  - ✓ People living in substandard, overcrowded conditions.
  - ✓ Institutionalized people including prisoners
- Treatment: Combination chemotherapy is the treatment of choice; effective regimens for the treatment of TB must contain multiple drugs to which the organisms are sensitive. PULMONARY TB is treated primarily with antituberculosis agents for 6 to 12 months. The successful treatment outcome of sputum smear-positive cases is

achieved by the Directed Observed Therapy – Short Course (DOTS) which has been adopted in Iraq since 1998

- First line antitubercular medications
  - ✓ Streptomycin 15mg/kg
  - ✓ Isoniazid or INH(Nydrazid) 5 mg/kg(300 mg max perday)
  - ✓ Rifampin 10 mg/kg
  - ✓ Pyrazinamide 15 – 30 mg/kg
  - ✓ Ethambutol(Myambutol) 15 -25 mg/kg

➤ Prevention

- ✓ The World Health Organisation has declared TB a global health emergency
- ✓ BCG, or bacille Calmette-Guérin, is a vaccine for tuberculosis (TB) disease. Is a live bacterial vaccine, given I.D. on the left deltoid area. BCG is used in many countries with a high prevalence of TB to prevent childhood tuberculous meningitis and miliary disease.
- ✓ TB control remains a worldwide challenge. There is a need to improve DOTS coverage and meet the emerging challenges of TB occurring in people with HIV/AIDS and multidrug resistant TB.
- ✓ Multi-drug-resistant tuberculosis (MDR-TB) is defined as resistance to the two most effective first-line TB drugs:rifampicin and isoniazid.
- ✓ Extensively drug-resistant TB (XDR-TB) is also resistant to three or more of the six classes of second-line drugs.
- ✓ Totally drug-resistant TB (TDR-TB), which was first observed in 2003 in Italy, but not widely reported until 2012, is resistant to all currently-used drugs
- ✓ Contraindications Immunosuppression. BCG vaccination should not be given to persons who are immunosuppressed (e.g., persons who are HIV infected) or who are likely to become immunocompromised (e.g., persons who are candidates for organ transplant).Pregnancy. BCG vaccination should not be given during pregnancy. Even though no harmful effects of BCG vaccination on the fetus have been observed, further studies are needed to prove its safety.

➤ Control measures

➤ Preventive measures

- BCG vaccination has limited application in developed countries where the incidence of TB is low. It is an effective vaccine in reducing TB meningitis and death in babies and children less than five years in countries of high TB prevalence. It is not recommended for general use, but should be considered for specific high risk groups such as infants and young children travelling for extended periods to countries with a high incidence of TB.
- Patients with pulmonary TB should be isolated either at home or in hospital until they have been on adequate anti-TB therapy for 14 days and sputum smears are negative.
- Appropriate education and counseling about minimizing the risk of transmission of infection should be provided to all patients, particularly those with pulmonary TB.
- Contact tracing and surveillance are the responsibility of the MOH and are managed by the TB Program. Anyone identified by health care workers as a contact of a case of TB should be referred to the TB Program.

## ❖ Diseases can be transmitted through contaminated Food & Water:

### 1) Hepatitis A infection ( Infectious Hepatitis)

- An infectious disease of the liver caused by the hepatitis A virus (HAV).
- Infection is transmitted by the faecal-oral route from person to person or via fomites. IP 2-6 weeks,
- Typically causes acute fever, malaise, anorexia, nausea and abdominal discomfort. This is followed a few days later by dark urine and jaundice.
- Symptoms usually last several weeks although convalescence may sometimes be prolonged. Severe illness may rarely occur when hepatitis A infection complicates pre-existing liver disease.
- Infants and young children infected with HAV may have a mild illness with few or no symptoms, with jaundice often being absent.
- Must be notified in writing within five days of diagnosis. Exclude from childcare, school or work for at least one week after the onset of illness or jaundice and until they are well.
- Diagnosis: IgM anti-HAV antibodies confirms recent infection.
- Treatment is supportive
- Not cause chronic infection. Immunity after infection is probably lifelong.
- Public health significance and occurrence: Hepatitis A occurs worldwide. In developing countries most people are infected during childhood. With good sanitation and hygiene in the developed world, most people now reach adulthood without
- Preventive measures (General measures are the same for all feco oral diseases)
  - ✓ General Measures
    - Education about good hygiene and proper sanitation is important, particularly hand washing before handling food and eating and after using the toilet.
    - Safe water supply by proper chlorination.
    - Safe food supply and handling. (sufficient vegetable & fruits washing)
    - Sanitary disposal of human feces & waste.
    - Health supervision of food handlers.
- ✓ Inactivated hepatitis A vaccines are available (>2 year old). A second dose is required for long term protection.
- ✓ The vaccine is recommended for travelers to high risk areas, persons in high risk occupations such as childcare workers and emergency services personnel, injecting drug users and men who have sex with men.
- ✓ **Control of contacts with** Normal immunoglobulin (IG) 0.02 mL/kg body weight intramuscularly is recommended for:
  - House hold and sexual contacts of the case
  - Staff and children in close contact with a case in a childcare center.
- ✓ Outbreak measures: Clusters of cases possibly related to a single source will require epidemiological and environmental investigation, including case finding and surveillance and public health measures to prevent further cases.



## 2) **Hepatitis E infection**

- Liver infection caused by with hepatitis E virus (HEV).
- IP 2 weeks – 2 months. The clinical course and mode of transmission of disease due to HEV is similar to that of hepatitis A.
- It is a self-limiting disease of adults aged 15–40 years.
- A high case fatality rate (up to 20%) has been described in pregnant women affected in their third trimester of pregnancy.
- Must be notified in writing within five days of diagnosis (Group B disease). School exclusion is not applicable.

## 3) **Rota Virus infection**

- Double-stranded RNA viruses (eight species) cause the most common cause of diarrhoeal disease (Gastroenteritis) among infants and young children. Nearly every child in the world is infected with rotavirus at least once by the age of five.
- Immunity develops with each infection, so subsequent infections are less severe; adults are rarely affected.
- Not Notifiable disease, transmitted by the faecal-oral route.
- Rotavirus is usually an easily prevented & managed disease of childhood,
- Iraq have added rotavirus vaccine to the routine childhood immunization program

## 4) **Cholera**

- An infection of the small intestine by some strains of the bacterium *Vibrio cholera* (Gram-negative, comma-shaped bacterium mostly serogroups O1 or O139).
- IP two hours to five days after exposure. Transmitted through fecal-oral route,
- Affects all ages but children & elderly are more severely affected.
- Symptoms may range from none, to mild, to severe. The classic symptom os sever case is large amounts of watery diarrhea that lasts a few days. Vomiting and muscle cramps may also occur. Diarrhea can be so severe that it leads within hours to severe dehydration and electrolyte imbalance. This may result in sunken eyes, cold skin, decreased skin elasticity, and wrinkling of the hands and feet. The dehydration may result in the skin turning bluish.
- School exclusion: exclude until diarrhea
- Risk factors for the disease include poor sanitation, not enough clean drinking water, and poverty. Cholera can kill within hours if left untreated. Case fatality rate may exceed 50%.
- Public health significance & occurrence: There are an estimated 3–5 million cholera cases and 100 000–120 000 deaths due to cholera every year. Cholera can occur in epidemics or pandemics. Epidemics are a marker for poverty and lack of basic sanitation.
- Occasionally the carrier state may persist for months and chronic biliary infection with intermittent shedding of organisms may last for years.
- Cholera remains a global threat to public health and one of the key indicators of social development. While the disease is no longer an issue in countries where minimum hygiene standards are met, it remains a threat in almost every developing country.

➤ Prevention :

- ✓ Same general measure for hepatitis A infection
- ✓ A multidisciplinary approach based on prevention, preparedness and response, along with an efficient surveillance system, is key for mitigating cholera outbreaks, controlling cholera in endemic areas and reducing deaths
- ✓ Oral cholera vaccines: There are two types of safe and effective oral cholera vaccines currently available on the market. Both are whole-cell killed vaccines.
- ✓ Control of contacts; Contacts should be observed for five days from the date of last exposure. This may include all fellow travelers of a case.
- ✓ Outbreak measures: A single case of cholera in a person with a history of no overseas travel is considered an outbreak. Initiate a thorough investigation to determine the vehicle and circumstances of transmission and plan control measures accordingly.
  - Educate the community.
  - Provide effective treatment facility.
  - Adapt emergency measures to ensure a safe water supply.
  - Ensure careful preparations and supervision of food and drink.
  - Initiate thorough investigation designed to find the vehicle and circumstances of transmission, and plan control measures .
  - Provide appropriate safe facility for sewage disposal.
  - Vaccination not recommended.
  - International measures: Report to WHO and adjacent country

**5) Typhoid Fever & Para typhoid Fever(Enteric fever)**

- Typhoid and paratyphoid fevers are caused by related but different strains of Salmonella spp Bacterial infection.
- Typhoid fever is due to Salmonella Typhi, while salmonella paratyphi caused paratyphoid fever (usually milder symptoms & fewer complication). May occur at any age but it is considered to be a disease mainly of children and young adults.
- Enteric fever affects only humans (who are the reservoir). IP 1-4 weeks. It is spread by eating or drinking food or water contaminated with the feces of an infected person.
- Symptoms may vary from mild to severe. Often there is a gradual onset of high fever over several days with relative bradycardia. Weakness, abdominal pain, constipation, and headaches also commonly occur. Diarrhea is uncommon and vomiting is not usually severe. Some people develop a skin rash with rose colored spots. In severe cases there may be confusion.
- Complications: In the third week of typhoid fever, a number of complications can occur:
  - Intestinal haemorrhage due to bleeding in congested Peyer's patches;
  - Intestinal perforation in the distal ileum: this is a very serious complication and is frequently fatal. It may occur without alarming symptoms until septicaemia or diffuse peritonitis sets in.
  - Encephalitis

- Respiratory diseases such as pneumonia and acute bronchitis
  - Neuropsychiatric symptoms
  - Metastatic abscesses, cholecystitis, endocarditis, and osteitis
- Without treatment symptoms may last weeks or months.
  - Risk factors include poor sanitation and poor hygiene.
  - Carriers: About 10% of untreated typhoid fever patients discharge bacilli for 3 months after onset of symptoms. Fewer persons infected with paratyphoid organisms may become permanent gallbladder carriers. 2-5% of cases will become permanent carriers.
  - 16 million cases occur annually resulting in more than 600,000 deaths. More than 62% of the global cases occur in Asia, of which, 7 million occur annually in South East Asia.
  - Diagnosis:
    - ✓ Leucopenia make typhoid strongly suggestive in symptomatic patient.
    - ✓ Widal test measures titers of serum agglutinins against somatic (O) and flagellar (H) antigens which usually begin to appear during the 2nd week. In the absence of recent immunization, a high titre of antibody to O antigen > 1:640 is suggestive but not specific.
    - ✓ Polymerase chain reaction (PCR)
    - ✓ Blood cultures are positive in 70-80% of cases during the 1st week.
    - ✓ Stool and urine cultures are usually positive (45-75%) during the 2nd-3rd week.
    - ✓ Bone marrow aspirate cultures give the best confirmation (85-95%)
  - Management of typhoid fever: General: Supportive care includes + Specific: Antimicrobial therapy ( Chloramphenicol , Amoxicillin , Trimethoprim & Sulphamethoxazole , Fluroquinolones)
  - Prevention:
    - ✓ General measures
    - ✓ Immunization:
      - Injectable Typhoid vaccine
      - The live oral vaccine
    - ✓ Case detection and treatment with Isolation + Disinfection of stools and urine
    - ✓ Detection & treatment of carriers
    - ✓ Epidemic measures :
      - Search intensively for the case/ carrier who is the source of infection and for the vehicle( water and food)through which infection was transmitted.
      - Selectively eliminate suspected contaminated food .Pasteurize or boil milk.
      - Chlorinate suspected water supplies adequately under competent supervision.
      - Use vaccine should be considered before or during an outbreak.

## 6) **Shigellosis (Bacillary Dysentery)**

- Intestinal bacterial infection caused by Shigella species.
- It is a major public health problem in developing countries where sanitation is poor.
- Spread by fecal-oral transmission, IP 1-3 days

- Characterized by an acute onset of diarrhea, fever, nausea, vomiting and abdominal cramps. Typically the stools contain blood, mucus and pus, although some persons will present with watery diarrhea. It is usually more severe in young children.
- Illness is usually self-limited and lasts from several days to weeks with an average of four to seven days. The severity of infection depends on host factors such as age and nutritional status and the serotype.
- Complications include toxic mega colon and reactive arthritis. Rarely hemolytic uremic syndrome can occur. The infectious dose required to produce disease is low and may be as few as ten organisms.
- About 2% develop pains in their joints, irritation of the eyes, and painful urination. This is called post-infectious arthritis. It can last for months or years, and can lead to chronic arthritis.
- Asymptomatic infections occur and carriage may persist for months.
- Shigella is communicable during the acute phase and while the infectious agent is present in faeces which is usually no longer than four weeks.
- Shigellosis (Group B disease) must be notified in writing within five days of diagnosis. School exclusion: exclude until after diarrhea has ceased.
- Diagnosis: GSE & isolation of Shigella spp.
- Asymptomatic carriage and excretion may persist for months.
- Preventive measures
  - ✓ General control measures

Control of case: Treatment is usually supportive for mild illnesses. Antibiotics may shorten the duration and severity of illness (ampicillin, trimethoprim/sulfamethoxazole, ceftriaxone, or, among adults, ciprofloxacin).

  - ✓ Exclusion of cases & Symptomatic contacts from food handling and the care of children or patients until investigated.
  - ✓ Outbreak measures: Two or more related cases should be considered indicative of an outbreak and require investigation. These cases should be reported immediately.

## 7) **Entamoeba Histolytica**

- A protozoan parasite (*Entamoeba histolytica*) infection that exist in 2 forms: Infective Cyst and tissue Trophozoite.
- Infection mainly through ingestion of fecally contaminated food or water containing amebic cyst. IP Variable ,from a few days to several months or years, commonly 2 – 4 weeks.
- In the vast majority of cases, infection is asymptomatic and the carrier is unaware they are infected. However, in an estimated 10% of cases *E. histolytica* causes disease. Symptoms usually fever, chills, mild abdominal discomfort, bloody or mucous diarrhea and this may be missed by ulcerative colitis and carcinoma of colon.
- Once the trophozoites are excysted they colonize the large bowel, remaining on the surface of the mucus layer and feeding on bacteria and food particles.
- *E. histolytica* occurs in areas of poor sanitation in tropics mental institutions and homosexual males. In areas with good sanitations, amebic infections tend to cluster in households and institutions.

- Chronically ill or asymptomatic cyst passer is the source of infection which may continue for years
- Prevention:
  - ✓ General measures
  - ✓ Report of the cases to local health authorities.
  - ✓ Exclusion of carriers from food handling.
  - ✓ Specific treatment is one of important measures in the control of this disease.

## 8) Giardiasis

- Parasitic disease caused by Giardia lamblia (flagellate protozoan which lives in the duodenum and jejunum).
- IP 1-3 weeks, fecal oral transmission.(Group B disease) must be notified in writing within five days. Affected children are excluded from School
- Giardia infection is usually asymptomatic, but may present as acute or chronic diarrhea associated with abdominal cramps, bloating, nausea, vomiting, fever, fatigue and weight loss. Fat malabsorption may lead to steatorrhea.
- Diagnosis: GSE for cysts or trophozoites
- Public health significance and occurrence: Occurrence is worldwide and endemic in most regions. Infection is detected more frequently in children than adults.
- Prevention: General preventive measures + Symptomatic cases are usually treated with metronidazole or tinidazole. Treatment of asymptomatic carriers is rarely warranted.
- Outbreak measures: Two or more related cases may indicate an outbreak and requires prompt reporting. Attempt to identify a potentially common exposure such as child care attendance or exposure to farm animals and recreational swimming areas

## 9) Food Poisoning

- Food poisoning (Foodborne illness) is any illness resulting from the contamination of food with pathogenic bacteria, viruses, or parasites, chemical or natural toxins such as poisonous mushrooms.
- Common distressing & sometimes life-threatening problem throughout the world.
- Infected People may be symptom-free or may have symptoms ranging from mild intestinal discomfort to severe dehydration and bloody diarrhea.
- The incubation period ranges from hours to days, depending on the cause and on how much was consumed.
- More than 250 different pathogens can cause food poisoning. Some of the most common pathogens
  - Viruses: Hepatitis A or E virus
  - Bacteria such as Campylobacter, Salmonella, Shigella, Staph. Aureus, E. coli, Listeria and botulism.
  - Parasites such as Giardia and Amoeba.
- Campylobacter is a bacterium that causes acute diarrhea. Transmission usually occurs through ingestion of contaminated food, water, or unpasteurized milk. Symptoms of campylobacter include: Diarrhea (sometimes bloody), Nausea and vomiting, Abdominal pain, Malaise and Fever.

- Staphylococcus aureus: Gastrointestinal illness caused by eating foods contaminated with toxins produced by the bacterium Staphylococcus aureus which is found on the skin and in the nose of about 25% of healthy people and animals. It usually does not cause illness in healthy people, but it has the ability to make toxins that can cause food poisoning. Symptoms are mild and appear rapidly usually 1 to 6 hours after consumption. Vomiting, abdominal pain without fever usually last only 3 to 6 hours.
- Salmonella Infection: Salmonella is a bacterial infection that can spread to humans from domestic and wild animals, including poultry, pigs, cattle, and pets. It is caused by drinking unpasteurized milk or by eating undercooked poultry and poultry products such as eggs. Symptoms: Fever, Abdominal pain, Diarrhea, Nausea and Vomiting. Infections usually resolve in 5 to 7 days without treatment unless severely dehydrated or the infection spreads outside of the intestine.
- Shigella Infection: (Previous topics)
- E. Coli Infection: E. coli O157:H7 is a growing cause of food-borne illness. An estimated 73,000 cases of these E. coli infections occur in the U.S. every year, according to the CDC. Symptoms include: severe bloody diarrhea and abdominal cramps, but sometimes the infection causes non-bloody diarrhea, a slight fever, or no symptoms at all. Most infections are associated with
  - ✓ Eating undercooked, contaminated beef.
  - ✓ Drinking unpasteurized milk
  - ✓ Swimming in or drinking sewage-contaminated water.
- Botulism: (bacterium Clostridium botulinum: Rare but serious illness botulism. Foodborne botulism is caused by eating foods that contain the botulinum toxin which can be deadly and are considered medical emergencies. Symptoms usually develop 18 to 36 hours after consuming contaminated food (usually meat). Symptoms of botulism include: Blurred vision, Droopy eyelids, slurred speech, Difficulty swallowing, Dry mouth, Muscle weakness
- Prevention of Food Poisoning
  - ✓ Avoid eating raw or undercooked meat or poultry products, including eggs.
  - ✓ Wash hands frequently during and after food preparation. Those with a salmonella infection should not be involved in food preparation.
  - ✓ Wash hands with soap after handling birds, or pet feces.
  - ✓ Wash hands thoroughly after using the bathroom or changing diapers.
  - ✓ Honey should not be given to children younger than 12 months of age, as it can contain spores of C. botulinum and is known to cause infant botulism.
  - ✓ Pasteurization of milk and heating procedures for food.
  - ✓ Don't thaw frozen meat at room temperature. Let it thaw gradually in a refrigerator, or thaw it quickly in a microwave and cook immediately.
  - ✓ Check expiration dates on all foods.
  - ✓ Keep separate cutting boards for raw meat, poultry, and fish and another for produce.
  - ✓ Wash raw fruits and vegetables before eating.

## ❖ Diseases can be transmitted through Vectors:

### 1) Malaria

- A mosquito-borne life-threatening infectious disease affecting humans and other animals caused by parasitic protozoans (a group of single-celled microorganisms) belonging to the Plasmodium type. Plasmodium falciparum, P. vivax (in Iraq), P. ovale and P. malariae.
- The disease causes over 1 million deaths per year in the world, most of these in young children in Africa.
- Malaria is preventable and curable, and increased efforts are dramatically reducing the malaria burden in many places. In 2015, 91 countries and areas had ongoing malaria transmission.
- Transmission by the bite of an infective female Anopheles mosquito. Most species feed at night, some important vectors also bite at dusk or in the early morning.
- Humans may infect mosquitoes as long as infective gametocytes are present in the blood; this varies with parasite species and with response to therapy.
- The mosquito remains infective for life.
- Three basic types of malaria
  - ✓ Benign tertian (P. vivax and P. ovale) with a fever every 2nd day (e.g., Monday; fever, Tuesday; no fever, Wednesday; fever).
  - ✓ Benign quartan (P. malariae) with a fever every 3rd day (e.g., Monday; fever, Tuesday; no fever, Wednesday; no fever, Thursday; fever).
  - ✓ Malignant tertian (P. falciparum), in which the cold stage is less pronounced and the fever stage is more prolonged and intensified (if the fever is recurring it occurs every 2nd day).
- Symptoms usually begin ten to fifteen days after being bitten.
- Causes symptoms that typically include fever, fatigue, vomiting, and headaches. After a fever-free interval, the cycle of chills, fever and sweating recurs daily, every other day or every third day.
- In severe cases it can cause yellow skin, seizures, coma, or death.
- If not properly treated, people may have recurrences of the disease months later.
- In those who have recently survived an infection, reinfection usually causes milder symptoms. This partial resistance disappears over months to years if the person has no continuing exposure to malaria.
- The most serious malarial infection, falciparum malaria (Malignant malaria) presents a clinical picture including fever, chills, sweats, anorexia, nausea, lassitude, headache, muscle and joint pain, cough and diarrhea, anaemia and/or splenomegaly
- Complications: Acute encephalopathy (cerebral malaria), severe anemia, icterus, renal failure (black-water fever), hypoglycaemia, respiratory distress, lactic acidosis and more rarely coagulation defects and shock. Severe malaria is a possible cause of coma and other CNS symptoms.
- There is no vaccination. Treatment is urgent! this is an emergency
- High Risk population: Pregnant women and young children when infected are highly susceptible to development of severe and complicated malaria.

- Case-fatality: Among untreated children and adults can reach 10%–40% or higher.
- Diagnosis: Demonstration of malaria parasites in blood films. Both thick & thin blood films should be done. PCR is the most sensitive method.
- True relapses with no parasitaemia (in vivax and ovale infections) may occur at irregular intervals for up to 5 years.
- Infections with *P. malariae* may persist for life with or without recurrent febrile episodes
- Preventive measures: There is no vaccine for malaria.
  - a. Mosquito elimination and the prevention of bites.
    - ✓ Elimination of mosquito breeding sites (water arear).
    - ✓ Insecticide-treated mosquito nets (ITNs) are the most universally useful measure for the prevention of malaria.
    - ✓ Indoor residual spraying with insecticides (IRS) targeting adult mosquitoes, where they rest indoors on sprayable surfaces.
    - ✓ In epidemic-prone areas, malaria surveillance should be based on weekly reporting and monitoring important factors environmental conditions and human population movements.
  - b. Prophylaxis with antimalarial drugs for travelers to malarious areas, and “standby” or emergency self-treatment is recommended when a febrile illness occurs in a falciparum malaria area. Chloroquine (5 mg base/kg/week) plus Proguanil (3 mg/kg/day) may be safely given to infants.
    - ✓ The most important factors that determine the survival of patients with falciparum malaria are early diagnosis and immediate treatment.
  - c. Specific Treatment of cases & patients should be in mosquito-proof areas from dusk to dawn.
    - ✓ Investigation of contacts and source of infection:
    - ✓ Specific treatment for all forms of malaria: Chloroquine- sensitive *P. falciparum*, *P. vivax*, *P. Malariae* and *P. ovale* is the oral administration of a total of 25 mg of chloroquine base/kg administered. Plasmodium falciparum is nowadays resistant to chloroquine and to sulfadoxine-pyrimethamine. Primaquine, is the drug of choice for prevention of relapses of *P. vivax* and *P. ovale* infections.
- Previously, Iraq was considered as one of the important foci of malarial disease, the available reports denoted that the number of infections was reached 1 million per year in the early 1950. But, after approving plan of eradication of disease at beginning of 1957, then plan of control, Iraq has achieved a dramatic reduction in the number of malaria cases to less than 4000 cases per year by the 1990. Then, the plan of control of disease changes from control to final elimination of local transmission of malaria at the end of 2010.
- The most malarial species that caused infection in Iraq is the Plasmodium vivax.
- Malaria is a nationally notifiable disease; clinicians and health-care facilities are mandated by legislation and local regulations to report cases to CDC center
- In countries with high or moderate rates of malaria transmission, national malaria control programmes aim to maximize the reduction of malaria cases and deaths. As countries approach elimination, enhanced surveillance systems can help ensure that



every infection is detected, treated and reported to a national malaria registry. Patients diagnosed with malaria should be treated promptly with effective antimalarial medicines for their own health and to prevent onward transmission of the disease in the community.

## **2) Leishmaniasis**

- Group of parasitic diseases caused by protozoa of the genus *Leishmania*, convey to humans by the bite of female phlebotomine sandfly in which the flagellate (promastigotes) forms of leishmania develop.
- In human, the leishmania are found in the cells (obligatory intracellular parasite) of the monocytes/macrophage systems oval form known as amastigotes.
- Reservoir: Humans, wild rodents (gerbils), and domestic dogs
- More than 350 million people at risk of Leishmaniasis in 88 countries around the world.
- Leishmaniasis is a poverty-related disease. It affects the poorest of the poor and is associated with malnutrition, displacement, poor housing, and illiteracy, and gender discrimination, weakness of the immune system and lack of resources.
- Leishmaniasis is also linked to environmental changes, such as deforestation, building of dams, new irrigation schemes and urbanization, and the accompanying migration of non-immune people to endemic areas.
- In Iraq, especially in middle and southern governorates, Leishmaniasis was considered as endemic disease since long time. Leishmaniasis occurs mostly in rural areas of warm and tropical countries where public health infrastructures were inadequate.
- The leishmaniasis are diseases with a wide range of clinical symptoms: cutaneous, mucocutaneous and visceral.
- Cutaneous Leishmaniasis; "Baghdad boil", "Delhi boil"
  - A polymorphic protozoan disease of skin (some time involve the mucus membrane). 2 million new cases per year
  - The disease starts with a macule then a papule that enlarges and typically becomes an indolent ulcer (single or multiple) → may heal spontaneously or with treatment → disfiguring scar. Recurrence of cutaneous lesion may occur
  - The disease can produce a large number of lesions - sometimes up to 200 - causing serious disability and invariably leaving the patient permanently scarred, which can cause serious social stigma
- Visceral Leishmaniasis (VL); "Kala-azar", "Dum-Dum fever", "Black fever".
  - A chronic systemic disease caused by intracellular protozoa of the genus *Leishmania* (*L. donovani*).
  - Incubation period: At least a week, up to many months.
  - The disease is characterized by fever, hepatosplenomegaly, lymphadenopathy, anemia, leukopenia, thrombocytopenia and progressive emaciation and weakness.
  - Untreated clinically evident disease is usually fatal.
  - Visceral leishmaniasis occurs with a yearly incidence of 500 000 cases, the disease

occurs as scattered cases among infants, children and adolescents but occasionally in epidemic waves.

- The disease is prevalent in the Mediterranean and red sea littorals, India China, and Africa. In Europe, reoccurrence of the disease in certain foci (south of Spine and France) as a result of AIDS epidemic.
- One of the major threats to control of VL is its interaction with HIV infection. VL has emerged as an important opportunistic infection associated with HIV. In areas endemic for VL, many people have asymptomatic infection. In southern Europe, up to 70% of cases of visceral leishmaniasis in adults are associated with HIV infection.
- In Iraq, the disease mainly found in middle and southern governorates, it affects children <5 years old.
- Diagnosis
  - ✓ Culture of the organism from a biopsy specimen or aspirated material
  - ✓ Demonstration of intracellular amastigotes in stained smears from bone marrow, spleen, liver, lymph nodes or blood
  - ✓ PCR technique is the most sensitive but expensive.
  - ✓ Serological diagnosis is based on IFA and ELISA tests at are expensive
  - ✓ (k39/k26) are inexpensive, easy to use and reliable for field study
- Preventive measures:
  - ✓ Currently no vaccine available.
  - ✓ Vector control:
    - Apply residual insecticides periodically. Phlebotomine sandflies have a relatively short flight range and are highly susceptible to control by systematic spraying with residual insecticides. Possible breeding places of sandflies, such as stone walls, animal houses and rubbish heaps, must be sprayed.
    - Insecticide-treated bed nets are a good vector control alternative, especially in anthroponotic foci.
  - ✓ Reservoir control: Destroy gerbils (and their burrows) implicated as reservoirs in local areas by deep ploughing and removal of plants they feed on.
  - ✓ Case management: Detect cases systematically and treat rapidly. This applies to all forms of leishmaniasis and is one of the important measures to prevent development of destructive mucosal lesions Mainly pentavalent antimonials, either sodium stibogluconate, or meglumine antimonate
  - ✓ Effective disease surveillance is important. Early detection and treatment of cases helps reduce transmission and helps monitor the spread and burden of disease.

### **3) Viral Hemorrhagic Fever**

- Viral hemorrhagic fevers (VHFs) are a diverse group of sever animal and human illnesses in which fever and hemorrhage are caused by a RNA viral infection.
- VHFs may be caused by five distinct families of RNA viruses: the families Arenaviridae, Filoviridae, Bunyaviridae, Flaviviridae, and Rhabdoviridae.
- All types of VHF are characterized by fever and bleeding disorders and all can

progress to high fever, shock and death in many cases.

- Some of the VHF agents cause relatively mild illnesses, such as the Scandinavian nephropathia epidemica (a Hantavirus), while others, such as Ebola virus, can cause severe, life-threatening disease.
- Some viral hemorrhagic fevers are spread by mosquito or tick bites. Others are transmitted by contact with infected blood or semen.
- Case-fatality rates vary from less than 10% (eg, in dengue HF) to approximately 90%, in Ebola-Zaire and the recent Angola Marburg outbreak.
- Diagnosing specific viral hemorrhagic fevers in the first few days of illness can be difficult because the initial signs and symptoms are common to many other diseases.
  - ✓ Medical and travel history and any exposure to rodents or mosquitoes.
  - ✓ Blood sample for virological classification
- Prevention:
  - ✓ No vaccine available
  - ✓ Increasing awareness in communities and among health-care providers of the clinical symptoms of patients
  - ✓ Avoidance of mosquitoes and ticks, especially when traveling in areas where there are outbreaks of viral hemorrhagic fevers. Wear light-colored long pants and long-sleeved shirts or, better yet, permethrin-coated clothing. Avoid unnecessary activities at dusk and dawn when mosquitoes are most active and apply mosquito repellent to skin and clothing.
  - ✓ Strict isolation of patients
  - ✓ Protective clothes and equipment for healthcare providers in contact with patients
  - ✓

## ❖ **Diseases can be transmitted through direct contact with animals:**

### 1) **Rabies (Hydrophobia)**

- An infectious acute viral disease causes inflammation of the brain (encephalomyelitis) that is almost always fatal following the onset of clinical signs most often transmitted through the bite of a rabid animal (usually dog)
- Rabies virus: A rhabdovirus of the genus Lyssavirus
- The time period between contracting the disease and the start of symptoms is usually one to two months (could be week to year)
- Reservoir Wild and domestic animals including: dogs , Bats ,Foxes , Wolves
- Transmission: Virus-laden saliva of rabid animal introduced through a bite or scratch.
- Early symptoms can include fever and tingling at the site of exposure. These symptoms are followed by one or more of the following symptoms: violent movements, uncontrolled excitement, Hyper-salivation, fear of water (Hydrophobia), an inability to move parts of the body, confusion, and loss of consciousness.
- Once symptoms appear, the result is nearly always death.
- Rabies is a vaccine-preventable viral disease which occurs in more than 150 countries and territories. Every year, more than 15 million people worldwide receive a post-bite vaccination.

- No tests are available to diagnose rabies infection in humans before the onset of clinical disease.
- Prevention
  - ✓ Rabies is a vaccine-preventable disease.
  - ✓ Eliminating rabies in dogs. Vaccinating dogs is the most cost-effective strategy for preventing rabies in people.
  - ✓ Maintain active surveillance for rabies in animal.
  - ✓ Detain and clinically observe for 10 days any health – appearing dog or cat known to have bitten a person (unwanted dogs & cats may be sacrificed immediately and examined for rabies by fluorescent and microscopy)
  - ✓ Pre-Exposure Vaccination: Individual at high risk ( veterinarians, work with rabies in laboratory settings , animal control and wildlife officers are just a few of the people who should consider rabies pre-exposure vaccinations Three 1.0-mL injections of HDCV or PCEC vaccine should be administered intramuscularly (deltoid area) -- one injection per day on days 0, 7, and 21 or 28
  - ✓ Post-exposure prophylaxis (PEP): means the treatment of a bite victim that is started immediately after exposure to rabies in order to prevent rabies from entering the central nervous system which would result in imminent death. It depends on type of contact with suspect rabid animal Vaccination status of individual. This consists of:
    - Local treatment of the wound, initiated as soon as possible after exposure. Immediate and thorough flushing and washing of the wound for a minimum of 15 minutes with soap and water, detergent, povidone iodine or other substances that kill the rabies virus.
    - A course of potent and effective rabies vaccine that meets WHO standards;
    - The administration of rabies immunoglobulin (RIG), if indicated
    - Effective treatment soon after exposure to rabies can prevent the onset of symptoms and death.

## 2) Toxoplasmosis

- Common parasitic infection of humans and animals. Infection is frequently asymptomatic (80% of people), or present as acute disease with lymphadenopathy or resemble infectious mononucleosis.
- A systemic coccidian protozoan disease caused by *Toxoplasma gondii* an intracellular protozoan that complete its sexual life cycle phase in the cat.
- Mode of transmission: (Not transmitted from person to person spread except in-utero)
  - ✓ Adults most commonly acquire toxoplasmosis by eating raw or undercooked meat or consumption of contaminated, unpasteurised milk.
  - ✓ Children may become infected by ingestion of oocysts in dirt or sandpit after fecal contamination by cats, particularly kittens, or other animals.
  - ✓ The infection may also be transmitted through blood transfusion and organ transplantation.
  - ✓ Transplacental transmission may occur when a woman has a primary infection during pregnancy.

- IP 1-3 weeks. The most common sign in symptomatic patients is enlarged lymph nodes, especially around the neck.
- Dormant infection persists for life. More serious disease can develop or reactivate in immunosuppressed patients with brain, heart or eye involvement, pneumonia and occasionally death. Cerebral toxoplasmosis or chorioretinitis are frequent complications of AIDS when lymphocyte CD4 cell count drops below 100/cu mm.
- Another important clinical condition of Acute toxoplasmosis occurs in pregnant women which can affect the fetus.
  - ✓ In early pregnancy: Brain damage as well as liver, spleen and eye disorders may occur leading to death of fetus or manifestations chorioretinitis, brain damage with intracerebral calcification, hydrocephaly, microcephaly, fever, jaundice, rash, hepatosplenomegaly).
  - ✓ Infection in late pregnancy may result in persistent eye infection through life.
  - ✓ Toxoplasmosis acquired after birth: usually results in no symptoms or only a mild illness.
- Toxoplasmosis occurs worldwide in mammals and birds. Infection in humans is common.
- Diagnosis: Serological results require careful interpretation and should preferably be performed.
  - ✓ In general, toxoplasma-specific IgG antibody appears two to three weeks after acute infection, peaks in six to eight weeks and often persists lifelong.
  - ✓ Presence of toxoplasma-specific IgM antibody suggests infection within the last two years. False positive IgM results are common and should always be repeated before final interpretation. They are common in autoimmune disease.
  - ✓ A specific PCR performed on amniotic fluid may determine if a fetus has become infected.
- Immunity is thought to be lifelong however patients undergoing immunosuppressive therapy, in particular for haematological malignancies, or patients with AIDS, are at high risk of developing illness from reactivated
- Preventive measures
  - ✓ No immunization is available.
  - ✓ Pregnant women and immunosuppressed people should be advised to:
    - Cook meat thoroughly and avoid uncooked meat products
    - Not consume unpasteurized milk or its products
    - Wash all raw fruit and vegetables carefully before eating
    - Wash hands thoroughly before meals and after handling raw meat
  - ✓ Isolation of patient is not required.
  - ✓ Specific anti-protozoal treatment may be indicated in immunosuppressed persons, infections during pregnancy, or where there is eye or other organ involvement. Infants who acquire an infection before birth may require prolonged treatment to reduce the risk of ongoing active infection. Multi-drug therapy: pyrimethamine plus trisulfapyrimidines (or sulfadiazine) and folinic acid ( for patients with sever symptomatic disease. Treatment in pregnancy is problematic. Spiramycin is used to prevent placental infection

### 3) **Brucellosis (Mediterranean fever, Malta fever)**

- Worldwide disease of domestic and wild animals (zoonosis) that can be transmitted to humans caused by infection with the bacterial genus *Brucella* (small, gram-negative, nonmotile, nonspore-forming, rod-shaped, coccobacilli bacteria).
- Can cause chronic disease, which usually persists for life.
- Primarily a disease of cattle. Can affect dogs & pigs. *B. melitensis* is the most virulent and invasive species; it usually infects goats and occasionally sheep. Symptoms include profuse sweating and joint and muscle pain.
- Humans are accidental hosts, but brucellosis continues to be a major public health concern worldwide and is the most common zoonotic infection. It causes more than 500,000 infections per year worldwide. The heaviest disease burden lies in countries of the Mediterranean basin and Arabian Peninsula.
- Brucellosis constitutes occupational risk for: farmers, veterinarians, abattoirs and Laboratory personnel.
- Human brucellosis carries a low mortality rate (<5%), mostly secondary to endocarditis, which is a rare complication of brucellosis).
- Routes of transmission to human include:
  - ✓ Direct contact with animals or their secretions, through cuts and skin abrasions.
  - ✓ Infected aerosols inhaled or inoculated into eye conjunctival sac.
  - ✓ Ingestion of unpasteurized dairy products.
  - ✓ Meat products: rare source of infection because: Meat is rarely eaten raw and
  - ✓ Blood and bone marrow may transmit disease when ingested in some cultures.
  - ✓ Human-to-human transmission: Unusual, but rare cases suspected to be sexually transmitted.
- Clinical Presentation in human:
  - ✓ Subclinical brucellosis
  - ✓ Acute or subacute brucellosis
  - ✓ Chronic brucellosis
  - ✓ Localized brucellosis.
  - ✓ Relapsing brucellosis
    - The usual presentation: Fever is the most common symptom which is associated with chills with constitutional symptoms of brucellosis including anorexia, fatigue, weakness, and malaise (>90% of cases). Bone and joint symptoms include arthralgias, low back pain, spine and joint pain, and, rarely, joint swelling.
    - Neuropsychiatric symptoms of brucellosis are common including Headache, depression, and fatigue.
    - Gastrointestinal symptoms include abdominal pain, constipation, diarrhea, and vomiting.
    - Neurologic symptoms of brucellosis can include weakness, dizziness, unsteadiness of gait and urinary retention.
    - Cough and dyspnea develop in up to 19% of persons with brucellosis.
    - Signs: Fever which is associated with relative bradycardia. Hepatosplenomegaly (or isolated hepatomegaly or splenomegaly).

- Osteoarticular findings can include tenderness and swelling over affected joints, bursitis, decreased range of motion, and joint effusion (rare).
  - Neurologic findings vary according to the presentation of neurologic disease, as follows: Acute meningoencephalitis (most common neurological manifestation), Depressed level of consciousness, meningeal irritation, cranial nerve involvement, coma, seizure, and respiratory depression, Peripheral polyradiculoneuropathy - Hypotonia and areflexia in most cases, paraparesis, and an absence of sensory involvement
  - Cutaneous manifestations including erythema nodosum, papulonodular eruption, impetigo or vasculitic lesions.
  - Ocular findings can include uveitis, keratoconjunctivitis, optic neuritis or cataract.
- Diagnosis:
- ✓ History of animal contact In endemic area, it should be in the DDx of any nonspecific febrile illness.
  - ✓ CBC shows leukopenia, relative lymphocytosis or pancytopenia. Blood culture has sensitivity of 60% and subcultures are still advised for at least 4 weeks.
  - ✓ Bone marrow culture has sensitivity of 80-90%.
  - ✓ Serology Serum tube agglutination test. ELISA it measures IgM, IgG and IgA allowing for better interpretation.
  - ✓ PCR: it is used for rapid and accurate diagnosis of brucellosis.
- Management: Doxycycline 100 mg PO bid and rifampin 600-900 mg/d PO: Both drugs are to be given for 6 weeks (more convenient but probably increases the risk of relapse). Ciprofloxacin also can be used.
- Children younger than 8 years: The use of rifampin and trimethoprim-sulfamethoxazole (TMP-SMX) for 6 weeks is the therapy of choice. Relapse rate appears to be approximately 5% or less.
- Prevention of human brucellosis:
- ✓ Control and elimination of Brucellosis in domestic animals.
  - ✓ Health education in endemic areas
  - ✓ Effective attenuated live bacterial vaccines exist for animal only.
  - ✓ Routine pasteurization of milk
  - ✓ In labs strict biosafety precautions

#### **4) Anthrax (Malignant Pustule)**

- Infection caused by the bacterium *Bacillus anthracis* (gram +ve, rod-shaped, spore forming bacteria) which can be found naturally in soil and commonly affects domestic and wild animals around the world.
- It is a disease of rural area. Anthrax can be transmitted to humans by contact with infected animals or their products when spores get into the body. It can occur in four forms: skin (most common, 80%), inhalation, intestinal, and injection. Can be fatal especially pulmonary type.
- Symptoms begin between one day and two months after the infection is contracted.

- The skin form presents with a small blister with surrounding swelling that often turns into a painless ulcer with a black center.
- The inhalation form presents with fever, chest pain, and shortness of breath. The intestinal form presents with nausea, vomiting, diarrhea, or abdominal pain.
- The injection form presents with fever and an abscess at the site of drug injection. Anthrax is spread by contact with the spores of the bacteria, which are often from infectious animal products. Contact is by breathing, eating, or through an area of broken skin. It does not typically spread directly between people.
- Risk factors include people who work with animals or animal products, travelers, postal workers, and military personnel.
- Diagnosis can be confirmed based on finding antibodies or the toxin in the blood or by culture of a sample from the infected site.
- Prevention:
  - ✓ Health education
  - ✓ Vaccination is recommended for people who are at high risk.
  - ✓ Immunizing animals against anthrax is recommended
  - ✓ Two months of antibiotics, such as doxycycline or ciprofloxacin, after exposure can also prevent infection.
  - ✓ Antitoxin is recommended for those with widespread infection.[7]

## ❖ **Diseases can be transmitted through Blood & Blood products:**

### 1) **Hepatitis B virus infection**

- A viral infection that attacks the liver and can cause both acute and chronic infection.
- Hepatitis B is an important occupational hazard for health workers. However, it can be prevented by currently available safe and effective vaccine.
- Infectious agent: Hepatitis B virus (HBV) DNA virus.
- Ip is 6 weeks –6 months with an average of 60–90 days.
- The virus is transmitted by exposure to infectious blood or body fluids.
  - ✓ HBV can survive outside the body for at least 7 days. During this time, the virus can still cause infection if it enters the body of a person who is not protected by the vaccine.
  - ✓ Infection around the time of birth or from contact with other people's blood during childhood is the most frequent method by which hepatitis B is acquired in areas where the disease is common.
  - ✓ In areas where the disease is rare, intravenous drug use and sexual intercourse are the most frequent routes of infection.
  - ✓ Other risk factors include working in healthcare, blood transfusions, dialysis, Tattooing and acupuncture
  - ✓ Hepatitis B viruses cannot be spread by holding hands, sharing eating utensils, kissing, hugging, coughing, sneezing, or breastfeeding.
- Many people have no symptoms during the initial infection. Some develop a rapid onset of sickness with vomiting, yellowish skin, tiredness, dark urine & abdominal pain.



- The onset is usually insidious with anorexia, abdominal discomfort, nausea, vomiting, and occasional rash and arthralgia. It often progresses to dark and jaundice.
- May progress to fulminating and often fatal case with extensive acute hepatic necrosis.
- Must be notified in writing within five days of diagnosis. School exclusion is not applicable.
- Hepatitis B virus is a major cause of chronic hepatitis, cirrhosis and hepatocellular carcinoma. An estimated two billion people have been infected with HBV worldwide, 350 million of whom are chronic carriers.
- More than 686 000 people die every year due to complications of hepatitis B, including cirrhosis and liver cancer
- Must be notified in writing within five days of diagnosis. School exclusion is not applicable.
- High risk groups.
  - ✓ People who frequently require blood or blood products, dialysis patients, recipients of solid organ transplantations
  - ✓ People interned in prisons;
  - ✓ persons who inject drugs;
  - ✓ Household and sexual contacts of people with chronic HBV infection;
  - ✓ People with multiple sexual partners;
  - ✓ Health-care workers and others who may be exposed to blood and blood products through their work (dentists, lab workers)
  - ✓ Travellers who have not completed their hepatitis B vaccination series, who should be offered the vaccine before leaving for endemic areas.
  - ✓ Fetus of infected mother
- Diagnosis: Serology: (Ag and Ab)
  - ✓ The virus has: HBs (surface)Ag, core (HBc Ag), & Be-Ag associated with viral replication and enhanced infectivity
  - ✓ Dx:
  - ✓ HBV surface antigen (HBs Ag) is most frequently used to screen HBV. It is the first detectable viral Ag to appear. HBe Ag appear shortly after.
  - ✓ HBV core (HBcAg): After 4 months
  - ✓ Anti Core IgM is present during acute phase
  - ✓ Anti Core IgG indicates chronic infection.
  - ✓ Patients with HBe Ag have continued active replication
  - ✓ Immunized or previously exposed people have Negative HBs Ag & HBe Ag, they have IgG Anti HB Core, and Positive anti HBs and e.
  - ✓ The time between the removal of the HBsAg and the appearance of anti-HBs is called the window period.
  - ✓ Acute HBV infection lasts < six months. The body clears the virus and recovers completely. Chronic HBV infection lasts > 6 months are newly acquired or reflect chronic carriage.
- Preventive measures:
  - ✓ Health education especially risk group

- ✓ Universal vaccination for hepatitis B. All children are offered a birth dose which should be given within the first seven days after birth and thereafter the infant should receive hepatitis B vaccine at 2, 4 and 12 months of age.
- ✓ For those not immunized in childhood, all preadolescent children aged 10–13 years receive hepatitis B vaccine. This is carried out in Year 7 of school. These children receive two doses of adult formulation hepatitis B vaccine.
- ✓ Health care workers should ascertain their HBV immune status, particularly those engaging in invasive procedures.
- ✓ Control of case: All newly acquired cases should be interviewed to identify likely risk factors for their infection and to identify others who may be at risk of infection.
- ✓ Isolation of HBV positive patients is not required. The infected person should be educated about transmission routes, safe injecting and sexual practises, blood and body fluid precautions, and not donating organs or blood.

## 2) **Hepatitis C virus Infection** HCV

- A liver disease caused by the hepatitis C virus (RNA virus): the virus can cause both acute and chronic hepatitis infection, ranging in severity from a mild illness lasting a few weeks to a serious, lifelong illness.
- Same mode of transmission of HBV IP= 2-26 Wks
- Most infections with HCV are asymptomatic and acute infection may only be detected in patients by the development of elevated serum alanine aminotransferase (ALT) levels. When symptoms and signs do occur, they are similar to other forms of viral hepatitis but usually milder.
- Globally, between 130–150 million people globally have chronic hepatitis C infection. A significant number of those who are chronically infected will develop liver cirrhosis or liver cancer.
- Of those chronically infected, approximately 10–20% will develop liver cirrhosis over a period of 15–40 years and an estimated 5% will develop hepatocellular carcinoma after 40 years. Approximately 700 000 people die each year from hepatitis C-related liver diseases.
- There is currently no vaccine for hepatitis C;
- School exclusion is not required.
- Method of diagnosis: Combination of a HCV antibody test and PCR to detect HCV RNA. A positive antibody test implies previous infection by the virus and a positive HCV RNA implies ongoing infection.
- Preventive measures: Same as HBV, but there is no vaccine

## 3) **Hepatitis D virus (HDV)**

- Hepatitis D (hepatitis delta) is a disease caused by the hepatitis D virus (HDV), a small spherical enveloped RNA virus.
- HDV is considered to be a subviral satellite because it can propagate only in the presence of the hepatitis B virus (HBV).

- Transmission of HDV can occur either via simultaneous infection with HBV (coinfection) or superimposed on chronic hepatitis B or hepatitis B carrier state (superinfection).
  - Both superinfection and coinfection with HDV results in more severe complications compared to infection with HBV alone. These complications include a greater likelihood of experiencing liver failure in acute infections and a rapid progression to liver cirrhosis, with an increased risk of developing liver cancer in chronic infections.[2] In combination with hepatitis B virus, hepatitis D has the highest fatality rate of all the hepatitis infections, at 20%.
- 4) Incubation period; Approximately two to eight weeks.
- Method of diagnosis: Detection of total antibody to HDV (anti-HDV). A positive HDV IgM result indicates ongoing replication or detection of HDV-specific RNA by polymerase chain reaction (PCR) testing. PCR is the most sensitive assay for assessing HDV viraemia.
  - Mode of transmission & prevention: same as HBV, but no vaccine

#### **4) Acquired Immune Deficiency Syndrome AIDS (HIV infection, AIDS)**

- Caused by infection with human immunodeficiency virus (HIV)
- The virus attack CD4+ T cell (Helper lymphocyte)
- The initial period following the contraction of HIV is called acute HIV, or primary HIV. This period characterized by influenza-like illness period followed by long period (years) without symptoms.
- As the infection progresses, it affect immune system, person much more susceptible to infections, like TB, Kala Azar, & other pathogens.
- The late symptoms of the infection are referred to as AIDS. The persons are much more susceptible to opportunistic infections (e.g infection of the lung known as pneumocystis pneumonia) and tumors that do not usually affect normal people (e.g Kaposi's sarcoma).
- This stage is often complicated by severe weight loss, and deterioration in general health.
- The most common initial conditions in AIDS are pneumocystis pneumonia (40%), cachexia (HIV wasting syndrome) (20%), & esophageal candidiasis. Other common signs include recurrent respiratory tract infections.
- Since its discovery, AIDS has caused 45 million deaths worldwide. In 2013 it resulted in about 1.34 million deaths. Approximately 40 million people are living with HIV globally.
- AIDS-HIV came to Iraq via contaminated blood in 1986, with hemophiliacs being the primary victims.
- Transmission: by three main routes
  - 1) Sexual contact (especially homosexual).
  - 2) Exposure to infected body fluids (IV injection, dialysis) or tissues (tissue transplant).
  - 3) From mother to child during pregnancy, or delivery, (Vertical transmission).

➤ Dx: Needs to

- 1) Confirm positive test for HIV (ELISA Test for HIV antibodies) and,
- 2) Evidence of an AIDS-defining condition: Severely depleted CD<sub>4</sub> cells (< 200 CD<sub>4</sub><sup>+</sup> T cells /ml<sup>3</sup> compared with ≈ 1,000 CD<sub>4</sub><sup>+</sup> T cells normally)

- HIV screening is recommended for all people 15 years to 65 years of age including all pregnant women with screening of all blood & blood products.
- There is no cure for AIDS, but medications are effective in fighting HIV and its complications. Antiviral Medications reduce HIV replication in the body, keep the immune system as healthy as possible and decrease complications. Several drugs are available now: Abacavir (Ziagen), Didanosine (Videx)...etc. Combinations of 2 or more drugs make it possible to take lower doses and maintain effectiveness.
- Prevention of HIV spread: HIV positive individuals should be declared to medical personnel, & advised to refrain from donating blood and unsafe sex.
- Preventive measures:
  - ✓ HIV/AIDS prevention programs can be effective only with full community and political commitment to change and/or reduce high HIV-risk behaviors.
  - ✓ Public and school health education must stress that having multiple and especially concurrent and/or overlapping sexual partners or sharing drug both increase the risk of HIV infection.
  - ✓ Expansion of facilities for treating drug users reduces HIV transmission.
  - ✓ HIV testing and counseling is an important intervention for raising awareness of HIV status, promoting behavioral change and diagnosing HIV infection.
  - ✓ HIV testing and counseling can be undertaken for:
    - a) persons who are ill or involved in high-risk behaviors,
    - b) attendees at antenatal clinics, to diagnose maternal infection and prevent vertical transmission;
    - c) couple counseling (marital or premarital);
    - d) Anonymous and/or confidential HIV counseling and testing.
  - ✓ All pregnant women must be counseled about HIV early in pregnancy and encouraged to undertake an HIV test as a routine part of standard antenatal care.
  - ✓ All donated units of blood must be tested for HIV antibody; only donations testing negative can be used.
  - ✓ Health care workers should wear latex gloves, eye protection and other personal protective equipment in order to avoid contact with blood or with fluids.

## ❖ **Sexually Transmitted Diseases (STD):**

- STD or Sexually transmitted infections (STI), or venereal diseases (VD): are infections that are commonly spread by sex.
- Most STIs initially do not cause symptoms. This results in a greater risk of passing the disease on to others
- Symptoms and signs of disease may include vaginal discharge, penile discharge, ulcers on or around the genitals, and pelvic pain. STIs acquired before or during birth may result in poor outcomes for the baby.

- Some STIs may cause problems with the ability to get pregnant.
- More than 30 different bacteria, viruses, and parasites can cause STIs.
- Bacterial STIs include chlamydia, gonorrhea, and syphilis among others.
- Viral STIs include genital herpes, HIV/AIDS, and genital warts among others. Parasitic STIs include trichomoniasis among others.
- While usually spread by sex, some STIs can also be spread by non-sexual contact with contaminated blood and tissues, breastfeeding, or during childbirth.
- STI diagnostic tests are easily available in the developed world, but this is often not the case in the developing world.
- The most effective way of preventing STIs is by not having sex or safe sex practice.
- Some vaccinations may also decrease the risk of certain infections including hepatitis B and some types of HPV.
- Safer sex practices such as use of condoms, restrict sexual partners, and being in a relationship where each person only has sex with the other also decreases the risk.
- Circumcision in males may be effective to prevent some infections.
- Most STIs are treatable or curable
- Of the most common infections, syphilis, gonorrhea, chlamydia, trichomoniasis are curable, while herpes, hepatitis B, HIV/AIDS, and HPV are treatable but not curable
- In 2008, it was estimated that 500 million people were infected with either syphilis, gonorrhea, chlamydia or trichomoniasis.
- At least an additional 530 million people have genital herpes and 290 million women have human papillomavirus.
- STIs other than HIV resulted in 142,000 deaths in 2013.
- There is often shame and stigma associated with these infections.

### 1) **Human Papilloma Virus**

- Infection with Human papillomavirus (HPV). Non-enveloped DNA virus, of which over 150 types are known
- Most HPV infections cause no symptoms and resolve spontaneously.
- In some, they persist and result in warts or precancerous lesions.
- The precancerous lesions increase the risk of cancer of the cervix, vulva, vagina, penis, anus, mouth, or throat.
- Nearly all cervical cancer is due to HPV with two types, HPV16 and HPV18, accounting for 70% of cases. Between 60 and 90% of the other cancers are also linked to HPV.
- HPV6 and HPV11 are common causes of genital warts and respiratory papillomatosis.
- More than 40 types are transmitted through sexual contact and infect the anus and genitals.
- Median duration of infection 8 months, 9% persistent after 2 years
- Risk factors for persistent HPV infections include early age of first sexual intercourse, multiple partners, smoking, and poor immune function.
- HPV is typically spread by sustained direct skin-to-skin contact with vaginal and anal sex being the most common methods.

- Occasionally, it can spread from a mother to her baby during pregnancy.
- Prevention;
  - ✓ HPV vaccines can prevent the most common types of infection.
  - ✓ To be effective, they must be used before an infection occurs and are therefore recommended between the ages of nine and 13.
  - ✓ Cervical cancer screening, such as with the Papanicolaou test (pap) or looking at the cervix after using acetic acid, can detect early cancer or abnormal cells that may develop into cancer.
  - ✓ Genital warts: treatment: can be removed by freezing Most treatment is cosmetic not curative. Very high recurrence rates

## 2) Syphilis

- Sexually transmitted infection caused by the bacterium *Treponema pallidum* subspecies *pallidum*.
- It may also be transmitted from mother to baby during pregnancy or at birth, resulting in congenital syphilis.
- The signs and symptoms of syphilis vary depending in which of the four stages it presents (primary, secondary, latent, and tertiary).
- Syphilis has been known as "the great imitator" as it may cause symptoms similar to many other diseases.
- The primary stage classically presents with a single chancre (a firm, painless, non-itchy skin ulceration) but there may be multiple sores.
- In secondary syphilis a diffuse rash occurs, which frequently involves the palms of the hands and soles of the feet. There may also be sores in the mouth or vagina.
- In latent syphilis, which can last for years, there are few or no symptoms.
- In tertiary syphilis there are gummas (soft non-cancerous growths), neurological, or heart symptoms.
- Diagnosis: Serological testing: VDRL (Venereal Disease Research Laboratories), T. Pallidum haemagglutination assay (TPHA), Fluorescent treponemal Ab absorption(
- Syphilis can be effectively treated with antibiotics. The preferred antibiotic for most cases is benzathine penicillin G injected into a muscle. In those who have a severe penicillin allergy, doxycycline or tetracycline may be used.
- No vaccine available

## 3) Chlamydia Infection

- Sexually transmitted infection caused by the bacterium *Chlamydia trachomatis*.
- Chlamydia is one of the most common sexually transmitted infections worldwide affecting about 4.2% of women and 2.7% of men.[6][7] In 2013 about 141 million new cases occurred globally.
- Most people who are infected have no symptoms.
- When symptoms do develop this can take a few weeks following infection to occur. Symptoms in women may include vaginal discharge or burning with urination. Symptoms in men may include discharge from the penis, burning with urination, or pain and swelling of one or both testicles.

- The infection can spread to the upper genital tract in women causing pelvic inflammatory disease which may result in future infertility or ectopic pregnancy.
- Repeated infections of the eyes that go without treatment can result in trachoma, a common cause of blindness in the developing world.
- Chlamydia can be spread during vaginal, anal, or oral sex, and can be passed from an infected mother to her baby during childbirth.
- The eye infections may also be spread by personal contact, flies, and contaminated towels in areas with poor sanitation. Chlamydia trachomatis only occurs in humans.
- Leading cause of preventable infertility in women or vertical transmission during child birth leads to conjunctivitis in Newborn Diagnosis is often by screening which is recommended yearly in sexually active women under the age of twenty five, others at higher risk, and at the first prenatal visit.
- Testing can be done on the urine or a swab of the cervix, vagina, or urethra. Rectal or mouth swabs are required to diagnose infections in those areas.
- Prevention is by not having sex, the use of condoms. No vaccine, but Chlamydia can be cured by antibiotics with typically either azithromycin or doxycycline being used. Erythromycin or azithromycin is recommended in babies and during pregnancy. Sexual partners should also be treated and the infected people advised not to have sex for seven days and until symptom free.
- Chlamydia Screening Recommendations. All sexually active women under 26 yrs

#### **4) Gonorrhea**

- Sexually transmitted infection caused by the bacterium Neisseria gonorrhoeae. Gram-negative intracellular diplococcus
- Incubation period: usually 1-14 days for symptomatic disease
- Many people have no symptoms. Men may have burning with urination, discharge from the penis, or testicular pain. Women may have burning with urination, vaginal discharge, vaginal bleeding between periods, or pelvic pain. Complications in women include pelvic inflammatory disease and in men include inflammation of the epididymis.
- Gonorrhea affects about 0.8% of women and 0.6% of men
- If untreated gonorrhea can occasionally spread to affect joints or heart valves.
- Gonorrhea is spread through sexual contact with an infected person. This includes oral, anal, and vaginal sex. It can also spread from a mother to a child during birth.
- Diagnosis is by testing the urine, urethra in males, or cervix in females.
- Testing all women who are sexually active and less than 25 years of age each year as well as those with new sexual partners is recommended. This same recommendation applies in men who have sex with men.
- Gonorrhea can be prevented with the use of condoms, having sex with only one person who is uninfected, and by not having sex.
- Treatment is usually with ceftriaxone by injection and azithromycin by mouth. Resistance has developed to many previously used antibiotics and higher doses of ceftriaxone are occasionally required. Sexual partners from the last 2 months should also be treated.

## 5) Pubic Lice (Crabs)

- The crab louse (*Pthirus pubis*, also pubic louse) is an insect that is an obligate ectoparasite of humans, feeding exclusively on blood.
- Tiny insects usually are found in the person's pubic hair. Pubic lice are that can crawl from the pubic hair of one person to the pubic hair of another person during sex.
- Although the louse cannot jump, it can also live in other areas of the body that are covered with coarse hair, such as the eyelashes.
- Humans are the only known hosts of the crab louse, although a closely related species.
- Dry clean or use very hot water to wash all bedding, towels, or recently worn clothing to kill the lice.
- Pubic lice can be spread even when use a condom.

## 6) Scabies

- Previously known as the seven-year itch, is a contagious skin infestation by the mite *Sarcoptes scabiei*.
- Scabies is one of the three most common skin disorders in children, along with ringworm and bacterial skin infections
- Scabies is most often spread during a relatively long period of direct skin contact with an infected person such as that which may occur during sex.
- The most common symptoms are severe itchiness and a pimple-like rash. Occasionally tiny burrows may be seen in the skin.
- When first infected, usually two to six weeks are required before symptoms occur. If a person develops a second infection later in life, symptoms may begin within a day.
- These symptoms can be present across most of the body or just certain areas such as the wrists, between fingers, or along the waistline. The head may be affected, but this is typically only in young children. The itch is often worse at night. Scratching may cause skin breakdown and an additional bacterial infection of the skin.
- The mites burrow into the skin to live and deposit eggs.
- Crowded living conditions such as those found in child care facilities, group homes, and prisons increase the risk of spread.
- Diagnosis is based on the signs and symptoms, the mite is very small and usually not directly visible.
- A number of medications are available to treat those infected, including permethrin,

## ❖ Common Helminthic Diseases:

- Commonly known as parasitic worms
- Large multicellular organisms can generally be seen with the naked eye .
- They are referred to as intestinal worms even not all helminths reside in the intestines; Ex: Schistosomes.
- Can be classified
  - A.Nematodes (Roundworms): Ex: 1) *Ascaris Lumricodis*  
2) *Ancylostoma Duodenal*



- B. Cestodes (Tapeworms): Ex: 3) Taenia saginata (Beef Tapeworm)  
 4) Taenia solium (Pork Tapeworm)  
 5) Hydatid disease (cyst)(dog tapeworm)
- C. Trematodes (flukes): Ex: 6) Schistosomiasis

### **1) Ascaris Lumricodis:**

- ✓ Largest intestinal roundworm. Most common helminth infection of humans worldwide especially in poor sanitation area.
- ✓ Adult: Cylindrical shape, Male: 15–30 cm Female: 20–35 cm in length
- ✓ Female worms produce 200,000 eggs a day, leave body with feces to soil.
- ✓ Vegetables contaminated with the eggs lead to infection .
- ✓ Infections with a large number of worms may cause C/F: Abdominal pain, Fatigue, Vomiting Weight loss .
- ✓ Adults feed on the contents of the small intestine and in heavy infections cause malnutrition (especially children).
- ✓ Can cause intestinal obstruction, which can be fatal.
- ✓ Migration of larvae may cause localized reactions in various organs. Penetration of the larvae from capillaries into the lungs can lead to Loeffler's pneumonia, in which pools of blood and dead epithelial cells clog air spaces in the lungs. Resulting bacterial infections can be fatal.
- ✓ Dx: Egg in stool

### **2) Ancylostoma Duodenal:**

- ✓ Intestinal Hookworms. Lives in the SI
- ✓ Males are 8 mm to 11 mm Females 10 mm to 13 mm
- ✓ Females can lay 10,000 to 30,000 eggs per day .
- ✓ Infective larva penetrates the intact skin, most commonly through the feet and enters the blood circulation.
- ✓ Carried to lungs, alveoli, ascend the bronchi and trachea and are coughed up, and swallowed back into SI.
- ✓ C/F: Abdominal pain, loss of appetite. Heavy infection causes severe protein deficiency or iron deficiency anemia
- ✓ Education, improved sanitation & controlled disposal of human feces. Wearing shoes.
- ✓ Dx: Egg in stool

### **3) Taenia Saginata (Beef Tapeworm)**

- ✓ It is an intestinal parasite in humans causing taeniasis
- ✓ Cattle are the intermediate hosts, where larval development occurs ,
- ✓ Humans are definitive hosts harboring the adult worms which release egg.
- ✓ Adult worm 4 to 10 m in length
- ✓ Usually asymptomatic, but heavy infection often results in weight loss, abdominal pain, diarrhea, headaches, nausea, and loss of appetite .
- ✓ Intestinal obstruction in humans can be alleviated by surgery.
- ✓ Dx: GSE → parasite eggs
- ✓ Prevention: Not eat undercooked beef.

#### **4) Taenia Solium (Pork Tapeworm)**

- ✓ It is an intestinal parasite most prevalent in countries where pork (intermediate host) is eaten.
- ✓ The adult worm (2 - 3 m in length) is found in humans (definite host)
- ✓ Its head called a scolex, bears 4 suckers attach to the intestinal wall of the host.
- ✓ Usually asymptomatic, but heavy infection often results in weight loss, abdominal pain, diarrhea, headaches, nausea, and loss of appetite .
- ✓ Intestinal obstruction in humans can be alleviated by surgery .
- ✓ Dx: GSE → parasite eggs
- ✓ Prevention: Not eat pork (Islam forbids the consumption of pork).

#### **5) Hydatid Disease (cyst)(dog tapeworm)**

- ✓ The most common form of echinococcosis found in humans caused by *Echinococcus granulosus* (Cystic type, also known as unilocular)
- ✓ The second common form is *Echinococcus multilocularis* or alveolar echinococcosis (also known as alveolar colloid of the liver)
- ✓ Disease is prevalent in areas where livestock is raised in association with dogs.
- ✓ The worm has a life cycle that requires definitive hosts (carnivores e.g dogs) and intermediate hosts (herbivores e.g sheep and cattle).
- ✓ Humans are accidental intermediate hosts infected by handling soil, dirt or animal hair that contains eggs
- ✓ Incubation period: Varies from months to years.
- ✓ The disease develops as a slow-growing mass (cyst) in the body. Usually filled with a clear fluid called hydatid fluid.
- ✓ Depending on the location & size of the cyst in the body, the patient could have symptoms and signs. 75% of cases in the liver, the lungs (in 5–15% of cases) and other organs in the body such as the spleen, brain, heart, and kidneys (in 10–20% of cases).
- ✓ Diagnosis: Us, ST Scan
- ✓ Treatment: Albendazole (15 mg/kg daily in 2 divided doses for 4 days before the procedure and for at least 4 weeks afterward) is given for prophylaxis of secondary peritoneal echinococcosis due to inadvertent spillage of fluid during this treatment. Surgery is the treatment of choice for complicated *E. granulosus* cysts.
- ✓ Albendazole should also be given prophylactically. Praziquantel (50 mg/kg daily for 2 weeks) may hasten the death of protoscolices.
- ✓ Prevention measures include limiting the areas where dogs are allowed and preventing animals from consuming meat infected with cysts.
  - Prevent dogs from feed in ted sheep
  - Control stray dog populations.
  - Restrict home slaughter of sheep and other livestock.
  - Not consuming any food or water that may have been contaminated by fecal matter from dogs.
  - Washing hands with soap and warm water after handling dogs, and before handling food.
  - Teach children the importance of washing hands to prevent infection.

6) **Schistosomiasis:** Also known as, snail fever

- ✓ Parasitic disease caused by blood flukes of the genus *Schistosoma*.
- ✓ More than 250 million people, 85% of who live in Africa, are infected with Schistosomiasis. More than 200,000 deaths per year
- ✓ Most human schistosomiasis is caused by *S. hematobium*, *S. mansoni*, and *S. japonicum*.
- ✓ Transmission by contact with fresh water contaminated with the parasites. These parasites are released from infected snails (intermediate host). → penetrate the skin
- ✓ The disease common among children as they are more likely to play in contaminated water .
- ✓ Other high risk groups include farmers, fishermen, and people using unclean water during daily living.
- ✓ **Bilharzia:** The urinary tract or the intestines infected by *S. hematobium*. Adults are found in the venous plexuses around the urinary bladder and the causing hematuria and fibrosis of the bladder. The Signs and symptoms may include abdominal pain, and blood in the urine (hematuria). Long time infection→ infertility or bladder squamous cell CA
- ✓ Mainly due to immunologic reactions to eggs trapped in tissues .
- ✓ Antigens released from the egg stimulate a granulomatous reaction involving T cells, macrophages, and eosinophils →clinical disease
- ✓ Initially, the inflammatory reaction is reversible. In the latter stages of the disease, the pathology is associated with collagen deposition and fibrosis, resulting in organ damage that may be only partially reversible.
- ✓ Incubation period: acute systemic manifestations may occur in primary infections 2-6 weeks after exposure immediately preceding and during initial egg deposition.
- ✓ Acute systemic manifestations are uncommon, but can occur with *S. hematobium* infection.
- ✓ Laboratory diagnosis: Microscopic identification of eggs in stool or urine is the most practical method for diagnosis. Tissue biopsy (rectal biopsy for all species and biopsy of the bladder for *S. haematobium*)
- ✓ Treatment: Schistosomiasis is readily treated using a single oral dose of the drug Praziquantel
- ✓ Prevention
  - The main focus of prevention is eliminating the water-borne snails which are natural reservoirs for the disease
  - This is usually done by identifying bodies of water, such as lakes, ponds, etc., Which are infested, forbidding or warning against swimming and adding niclosamide, acrolein, copper sulfate, etc., to the water in order to kill the snails.
  - Irrigations schemes can be designed to make it hard for the snails to colonize the water, and to reduce the contact with the local population.
  - Screening of the disease in endemic areas (GUE)

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