Strategia Netherlands

Course; Post graduate diploma in Water Hygiene and sanitation

Assignment 2

Admission Number; PGD002

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Assignment

1. Consider a disease known as diabetes mellitus, which is characterized by an increase in the blood sugar level. Infectious agents may contribute to the development of the disease in early childhood, but are not the main cause of the disease. Can it be classified as communicable? Explain your reasons

Diabetes is one of the four major types of non-communicable diseases (cardiovascular disease, diabetes, cancer and chronic respiratory diseases). It is a chronic condition that occurs when the body either does not produce enough insulin or cannot effectively use the insulin it does produce. Insulin is a hormone that regulates the blood sugar (glucose) formed from the food consumed by a person. Diabetes therefore results in raised blood sugar levels which, if not controlled, over time lead to serious damage to many of the body's systems.

There are two major forms of diabetes. Type 1 diabetes is characterized by deficient insulin production and requires daily administration of insulin. Symptoms may occur suddenly and include extreme thirst, constant hunger, weight loss, excessive urination, blurred vision and fatigue. Type 2 diabetes results from the body's inability to effectively use its insulin. Ninety percent of people with diabetes have type 2 diabetes. Symptoms may be similar to those of type 1 diabetes, but are often less marked. Type 2 diabetes is largely the result of excess body weight and physical inactivity.

Consequences of diabetes

In 2012, diabetes was the direct cause of 1.5 million deaths, with more than 80% of these deaths occurring in low- and middle-income countries. WHO projects that diabetes will be the 7th leading cause of death by 2030. The overall risk of dying among people with diabetes is at least double that of their peers without diabetes. Diabetes increases the risk of heart disease and stroke, which are responsible for 50% to 80% of deaths in people with this condition. Diabetes is also a leading cause of blindness, amputation and kidney failure.

Actions needed

Governments are responsible for raising public awareness about diabetes, for creating environments that enable people to follow healthy lifestyles, for implementing measures that reduce the exposure of populations to risk factors that can lead to diabetes, and for ensuring access to acceptable standards of health care for all people with diabetes. Individuals need to take responsibility for their own health through simple lifestyle measures which include engaging in regular physical activity, maintaining a healthy weight and eating healthy food.

2. How would you classify pulmonary tuberculosis using the epidemiologic method? What is the main importance of such classification?

Tuberculosis remains one of the deadliest diseases in the world. The World Health Organization (WHO) estimates that each year more than 8 million new cases of tuberculosis occur and approximately 3 million persons die from the disease (1). Ninety five percent of tuberculosis cases occur in developing countries, where few resources are available to ensure proper

treatment and where human immunodeficiency virus (HIV) infection may be common. It is estimated that between 19 and 43% of the world's population is infected with Mycobacterium tuberculosis, the bacterium that causes tuberculosis infection and disease (2). In the United States, an estimated 15 million people are infected with M. tuberculosis (3). Although the tuberculosis case rate in the United States has declined during the past few years, there remains a huge reservoir of individuals who are infected with M. tuberculosis. Without application of effective treatment for latent infection, new cases of tuberculosis can be expected to develop from within this group. Tuberculosis is a social disease with medical implications. It has always occurred disproportionately among disadvantaged populations such as the homeless, malnourished, and over Crowded. Within the past decade it also has become clear that the spread of HIV infection and the immigration of persons from areas of high incidence have resulted in increased numbers of tuberculosis cases of the pasteurization of milk and effective tuberculosis control programs for cattle (13). Airborne transmission of both M. bovis and M. Africanism can also occur (14–16). Mycobacterium bovis BCG is a live-attenuated strain of M. bovis and is widely used as a vaccine for tuberculosis. It may also be used as an agent to enhance immunity against transitional-cell carcinoma of the bladder. When used in this manner, adverse reactions such as dissemination may be encountered, and in such cases M. bovis BCG may be cultured from nonurinary tract system specimens, i.e., blood, sputum, bone marrow, etc. (17).

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Transmission of Mycobacterium tuberculosis

Tuberculosis is spread from person to person through the air by droplet nuclei, particles 1 to 5 μm in diameter that contain *M. tuberculosis* complex (4). Droplet nuclei are produced when persons with pulmonary or laryngeal tuberculosis cough, sneeze, speak, or sing. They also may be produced by aerosol treatments, sputum induction, aerosolization during bronchoscopy, and through manipulation of lesions or processing of tissue or secretions in the hospital or laboratory. Droplet nuclei, containing two to three *M. tuberculosis* organisms (5), are so small that air currents normally present in any indoor space can keep them airborne for long periods of time (6). Droplet nuclei are small enough to reach the alveoli within the lungs, where the organisms replicate. Although patients with tuberculosis also generate larger particles containing numerous bacilli, these particles do not serve as effective vehicles for transmission of infection because they do not remain airborne, and if inhaled, do not reach alveoli. Organisms deposited on intact mucosa or skin does not invade tissue. When large particles are inhaled, they impact on the wall of the upper airways, where they are trapped in the mucous blanket, carried to the oropharynx, and swallowed or expectorated (7).

Four factors determine the likelihood of transmission of *M. tuberculosis*: (*1*) the number of organisms being expelled into the air, (*2*) the concentration of organisms in the air determined by the volume of the space and its ventilation, (*3*) the length of time an exposed person breathes the

contaminated air, and (*4*) presumably the immune status of the exposed individual. HIV-infected persons and others with impaired cell-mediated immunity are thought to be more likely to become infected with *M. tuberculosis* after exposure than persons with normal immunity; also, HIV-infected persons and others with impaired cell-mediated immunity are much more likely to develop disease if they are infected. However, they are no more likely to transmit *M. tuberculosis* (8).

Techniques that reduce the number of droplet nuclei in a given space are effective in limiting the airborne transmission of tuberculosis. Ventilation with fresh air is especially important, particularly in health care settings, where six or more room-air changes an hour is desirable (9). The number of viable airborne tubercle bacilli can be reduced by ultraviolet irradiation of air in the upper part of the room (5). The most important means to reduce the number of bacilli released into the air is by treating the patient with effective antituberculosis chemotherapy (10). If masks are to be used on coughing patients with infectious tuberculosis, they should be fabricated to filter droplet nuclei and molded to fit tightly around the nose and mouth. Measures such as disposing of such personal items as clothes and bedding, sterilizing fomites, using caps and gowns and gauze or paper masks, boiling dishes, and washing walls are unnecessary because they have no bearing on airborne transmission.

There are five closely related mycobacteria grouped in the *M. tuberculosis* complex: *M. tuberculosis, M. bovis, M. africanum, M. microti*, and *M. canetti* (11, 12). *Mycobacterium tuberculosis* is transmitted through the airborne route and there are no known animal reservoirs. *Mycobacterium bovis* may penetrate the gastrointestinal mucosa or invade the lymphatic tissue of the oropharynx when ingested in milk containing large numbers of organisms. Human infection with *M. bovis* has decreased significantly in developed countries as a result of the pasteurization of milk and effective tuberculosis control programs for cattle (13). Airborne transmission of both *M. bovis* and *M. africanum* can also occur (14-16). *Mycobacterium bovis* BCG is a live-attenuated strain of *M. bovis* and is widely used as a vaccine for tuberculosis. It may also be used as an agent to enhance immunity against transitional-cell carcinoma of the bladder. When used in this manner, adverse reactions such as dissemination may be encountered, and in such cases *M. bovis* BCG may be cultured from nonurinary tract system specimens, i.e., blood, sputum, bone marrow, etc. (17).

B. Pulmonary Tuberculosis

Symptoms and physical findings. Cough is the most common symptom of pulmonary tuberculosis. Early in the course of the illness it may be nonproductive, but subsequently, as inflammation and tissue necrosis ensue, sputum is usually produced and is key to most of our diagnostic methods. Hemoptysis may rarely be a presenting symptom but usually is the result of previous disease and does not necessarily indicate active tuberculosis. Hemoptysis may result from residual tuberculous bronchiectasis, rupture of a dilated vessel in the wall of a cavity

(Rasmussen's aneurysm), bacterial or fungal infection (especially *Aspergillus* in the form of a mycetoma) in a residual cavity, or from erosion of calcified lesions into the lumen of an airway (broncholithiasis). Inflammation of the lung parenchyma adjacent to a pleural surface may cause pleuritic pain. Dyspnea is unusual unless there is extensive disease. Tuberculosis may, however, cause severe respiratory failure (40, 41).

Physical findings in pulmonary tuberculosis are not generally helpful in defining the disease. Rales may be heard in the area of involvement as well as bronchial breath sounds if there is lung consolidation.

Radiographic features of pulmonary tuberculosis. Pulmonary tuberculosis nearly always causes abnormalities on the chest film, although an endobronchial lesion may not be associated with a radiographic finding. In addition, in patients with pulmonary tuberculosis disease and HIV infection, a normal chest film is more common than in persons with tuberculosis disease without immune suppression. In primary tuberculosis occurring as a result of recent infection, the process is generally seen as a middle or lower lung zone infiltrate, often associated with ipsilateral hilar adenopathy. Atelectasis may result from compression of airways by enlarged lymph nodes. This manifestation is more common in children. If the primary process persists beyond the time when specific cell-mediated immunity develops, cavitation may occur (so-called “progressive primary” tuberculosis) (42).

Tuberculosis that develops as a result of endogenous reactivation of latent infection usually causes abnormalities in the upper lobes of one or both lungs. Cavitation is common in this form of tuberculosis. The most frequent sites are the apical and posterior segments of the right upper lobe and the apical–posterior segment of the left upper lobe. Healing of the tuberculous lesions usually results in development of a scar with loss of lung parenchymal volume and, often, calcification. In the immunocompetent adult with tuberculosis, intrathoracic adenopathy is uncommon but may occur, especially with primary infection. In contrast, intrathoracic or extrathoracic lymphatic involvement is quite common in children. As tuberculosis progresses, infected material may be spread via the airways into other parts of the lungs, causing a patchy bronchopneumonia. Erosion of a parenchymal focus of tuberculosis into a blood or lymph vessel may lead to dissemination of the organism and a “miliary” (evenly distributed small nodules) pattern on the chest film. Disseminated tuberculosis can occur in primary disease and may be an early complication of tuberculosis in children (both immunocompetent and immunocompromised). When it occurs in children, it is most common in infants and the very young (< 5 yr).

Old, healed tuberculosis presents a different radiologic appearance from active tuberculosis. Dense pulmonary nodules, with or without visible calcification, may be seen in the hilar area or upper lobes. Smaller nodules, with or without fibrotic scars, are often seen in the upper lobes, and upper-lobe volume loss often accompanies these scars. Nodules and fibrotic lesions of old

healed tuberculosis have well-demarcated, sharp margins and are often described as "hard." Bronchiectasis of the upper lobes is a nonspecific finding that sometimes occurs from previous pulmonary tuberculosis. Pleural scarring may be caused by old tuberculosis but is more commonly caused by trauma or other infections. Nodules and fibrotic scars may contain slowly multiplying tubercle bacilli with significant potential for future progression to active tuberculosis. Persons who have nodular or fibrotic lesions consistent with findings of old tuberculosis on chest radiograph and a positive tuberculin skin test reaction should be considered high-priority candidates for treatment of latent infection regardless of age. Conversely, calcified nodular lesions (calcified granuloma) or apical pleural thickening poses a much lower risk for future progression to active tuberculosis (42, 43).

In patients with HIV infection, the nature of the radiographic findings depends to a certain extent on the degree of immunocompromise produced by the HIV infection. Tuberculosis that occurs relatively early in the course of HIV infection tends to have the typical radiographic findings described above (44, 45). With more advanced HIV disease the radiographic findings become more "atypical": cavitation is uncommon, and lower lung zone or diffuse infiltrates and intrathoracic adenopathy are frequent.

C. Extra pulmonary Tuberculosis

Extra pulmonary tuberculosis usually presents more of a diagnostic problem than pulmonary tuberculosis. In part this relates to its being less common and, therefore, less familiar to most clinicians (46, 47). In addition, extrapulmonary tuberculosis involves relatively inaccessible sites and, because of the nature of the sites involved, fewer bacilli can cause much greater damage. The combination of small numbers of bacilli and inaccessible sites causes bacteriologic confirmation of a diagnosis to be more difficult, and invasive procedures are frequently required to establish a diagnosis.

Extrapulmonary tuberculosis in HIV-infected patients. Presumably, the basis for the high frequency of extrapulmonary tuberculosis among patients with HIV infection is the failure of the immune response to contain *M. tuberculosis*, thereby enabling hematogenous dissemination and subsequent involvement of single or multiple nonpulmonary sites. Because of the frequency of extrapulmonary tuberculosis among HIV-infected patients, diagnostic specimens from any suspected site of disease should be examined for mycobacteria. Moreover, cultures of blood and bone marrow may reveal *M. tuberculosis* in patients who do not have an obvious localized site of disease but who are being evaluated because of fever.

Disseminated tuberculosis. Disseminated tuberculosis occurs because of the inadequacy of host defenses in containing tuberculous infection. This failure of containment may occur in either latent or recently acquired tuberculous infection. Because of HIV or other causes of immunosuppression, the organism proliferates and disseminates throughout the body. Multiorgan

involvement is probably much more common than is recognized because, generally, once *M. tuberculosis* is identified in any specimen, other sites are not evaluated. The term "miliary" is derived from the visual similarity of some disseminated lesions to millet seeds. Grossly, these lesions are 1- to 2-mm yellowish nodules that, histologically, are granulomas. Thus disseminated tuberculosis is sometimes called "miliary" tuberculosis. When these small nodules occur in the lung, the resulting radiographic pattern is also termed "miliary."

Because of the multisystem involvement in disseminated tuberculosis, the clinical manifestations are protean. The presenting symptoms and signs are generally nonspecific and are dominated by systemic effects, particularly fever, weight loss, night sweats, anorexia, and weakness (48-52). Other symptoms depend on the relative severity of disease in the organs involved. A productive cough is common because most patients with disseminated disease also have pulmonary involvement. Headache and mental status changes are less frequent and are usually associated with meningeal involvement (49). Physical findings likewise are variable. Fever, wasting, hepatomegaly, pulmonary findings, lymphadenopathy, and splenomegaly occur in descending order of frequency. A finding that is strongly suggestive of disseminated tuberculosis is the choroidal tubercle, a granuloma located in the choroid of the retina (53).

The chest film is abnormal in most but not all patients with disseminated tuberculosis. In the series reported by Grieco and Chmel (48), only 14 of 28 patients (50%) had a miliary pattern on chest film, whereas 90% of 69 patients reported by Munt (49) had a miliary pattern. Overall, it appears that at the time of diagnosis approximately 85% of patients have the characteristic radiographic findings of miliary tuberculosis. Other radiographic abnormalities may be present as well. These include upper lobe infiltrates with or without cavitation, pleural effusion, and pericardial effusion. In patients with HIV infection the radiographic pattern is usually one of diffuse infiltration rather than discrete nodules.

Lymph node tuberculosis. Tuberculous lymphadenitis usually presents as painless swelling of one or more lymph nodes. The nodes involved most commonly are those of the posterior or anterior cervical chain or those in the supraclavicular fossa. Frequently the process is bilateral and other noncontiguous groups of nodes can be involved (54). At least initially the nodes are discrete and the overlying skin is normal. With continuing disease the nodes may become matted and the overlying skin inflamed. Rupture of the node can result in formation of a sinus tract, which may be slow to heal. Intrathoracic adenopathy may compress bronchi, causing atelectasis leading to lung infection and perhaps bronchiectasis. This manifestation is particularly common in children. Needle biopsy or surgical resection of the node may be needed to obtain diagnostic material if the chest radiograph is normal and the sputum smear and culture are negative.

In persons not infected with HIV but with tuberculous lymphadenitis, systemic symptoms are not common unless there is concomitant tuberculosis elsewhere. The frequency of pulmonary involvement in reported series of patients with tuberculous lymphadenitis is quite variable,

ranging from approximately 5 to 70%. In HIV-infected persons lymphadenitis is commonly associated with multiple organ involvement.

Pleural tuberculosis. There are two mechanisms by which the pleural space becomes involved in tuberculosis. The difference in pathogenesis results in different clinical presentations, approaches to diagnosis, treatment, and sequelae. Early in the course of a tuberculous infection a few organisms may gain access to the pleural space and, in the presence of cell-mediated immunity, cause a hypersensitivity response (55, 56). Commonly, this form of tuberculous pleuritis goes unnoticed, and the process resolves spontaneously. In some patients, however, tuberculous involvement of the pleura is manifested as an acute illness with fever and pleuritic pain. If the effusion is large enough, dyspnea may occur, although the effusions generally are small and rarely are bilateral. In approximately 30% of patients there is no radiographic evidence of involvement of the lung parenchyma; however, parenchymal disease is nearly always present, as evidenced by findings of lung dissections (57).

The second variety of tuberculous involvement of the pleura is empyema. This is much less common than tuberculous pleurisy with effusion and results from a large number of organisms spilling into the pleural space, usually from rupture of a cavity or an adjacent parenchymal focus via a bronchopleural fistula (58). A tuberculous empyema is usually associated with evident pulmonary parenchymal disease on chest films and air may be seen in the pleural space. In the absence of concurrent pulmonary tuberculosis, diagnosis of pleural tuberculosis requires thoracentesis and, usually, pleural biopsy.

Genitourinary tuberculosis. In patients with genitourinary tuberculosis, local symptoms predominate and systemic symptoms are less common (59, 60). Dysuria, hematuria, and frequent urination are common, and flank pain may also be noted. However, the symptoms may be subtle, and, often, there is advanced destruction of the kidneys by the time a diagnosis is established (61). In women genital involvement is more common without renal tuberculosis than in men and may cause pelvic pain, menstrual irregularities, and infertility as presenting complaints (60). In men a painless or only slightly painful scrotal mass is probably the most common presenting symptom of genital involvement, but symptoms of prostatitis, orchitis, or epididymitis may also occur (59). A substantial number of patients with any form of genitourinary tuberculosis are asymptomatic and are detected because of an evaluation for an abnormal routine urinalysis. In patients with renal or genital tuberculosis, urinalyses are abnormal in more than 90%, the main finding being pyuria, and/or hematuria. The finding of pyuria in an acid urine with no routine bacterial organisms isolated from a urine culture should prompt an evaluation for tuberculosis by culturing the urine for mycobacteria. Acid-fast bacillus (AFB) smears of the urine should be done, but the yield is low. The suspicion of genitourinary tuberculosis should be heightened by the presence of abnormalities on the chest film. In most series, approximately 40 to 75% of patients with genitourinary tuberculosis have chest radiographic abnormalities, although in many these may be the result of previous, not current, tuberculosis (59, 60).

Skeletal tuberculosis. The usual presenting symptom of skeletal tuberculosis is pain (62). Swelling of the involved joint may be noted, as may limitation of motion and, occasionally, sinus tracts. Systemic symptoms of infection are not common. Since the epiphyseal region of bones is highly vascularized in infants and young children, bone involvement with tuberculosis is much more common in children than adults. Approximately 1% of young children with tuberculosis disease will develop a bony focus (63). Because of the subtle nature of the symptoms, diagnostic evaluations often are not undertaken until the process is advanced. Delay in diagnosis can be especially catastrophic in vertebral tuberculosis, where compression of the spinal cord may cause severe and irreversible neurologic sequelae, including paraplegia.

Fortunately, such neurologic sequelae represent the more severe end of the spectrum. Early in the process the only abnormality noted may be soft tissue swelling. Subsequently, subchondral osteoporosis, cystic changes, and sclerosis may be noted before the joint space is actually narrowed. The early changes of spinal tuberculosis may be particularly difficult to detect by standard films of the spine. Computed tomographic scans and magnetic resonance imaging of the spine are considerably more sensitive than routine films and should be obtained when there is a high index of suspicion of tuberculosis. Bone biopsy may be needed to obtain diagnostic material if the chest radiograph is normal and the sputum smear and culture are negative.

Central nervous system tuberculosis. Tuberculous meningitis is a particularly devastating disease. Meningitis can result from direct meningeal seeding and proliferation during a tuberculous bacillemia either at the time of initial infection or at the time of breakdown of an old pulmonary focus, or can result from breakdown of an old parameningeal focus with rupture into the subarachnoid space. The consequences of subarachnoid space contamination can be diffuse meningitis or localized arteritis. In tuberculous meningitis the process is located primarily at the base of the brain (64). Symptoms, therefore, include those related to cranial nerve involvement as well as headache, decreased level of consciousness, and neck stiffness. The duration of illness before diagnosis is quite variable and relates in part to the presence or absence of other sites of involvement. In most series more than 50% of patients with meningitis have abnormalities on chest film, consistent with an old or current tuberculous process, often miliary tuberculosis.

Physical findings and screening laboratory studies are not particularly helpful in establishing a diagnosis. In the presence of meningeal signs on physical examination, lumbar puncture is usually the next step in the diagnostic sequence. If there are focal findings on physical examination or if there are suggestions of increased intracranial pressure, a computerized tomographic scan of the head, if it can be obtained expeditiously, should be performed before the lumbar puncture. With meningitis, the scan may be normal but can also show diffuse edema or obstructive hydrocephalus. Tuberculomas are generally seen as ring-enhancing mass lesions.

The other major central nervous system form of tuberculosis, the tuberculoma, presents a more subtle clinical picture than tuberculous meningitis (65). The usual presentation is that of a slowly

growing focal lesion, although a few patients have increased intracranial pressure and no focal findings. The cerebrospinal fluid is usually normal, and the diagnosis is established by computed tomographic or magnetic resonance scanning and subsequent resection, biopsy, or aspiration of any ring-enhancing lesion.

Abdominal tuberculosis. Tuberculosis can involve any intraabdominal organ as well as the peritoneum, and the clinical manifestations depend on the areas of involvement. In the gut itself tuberculosis may occur in any location from the mouth to the anus, although lesions proximal to the terminal ileum are unusual. The most common sites of involvement are the terminal ileum and cecum, with other portions of the colon and the rectum involved less frequently (66). In the terminal ileum or cecum the most common manifestations are pain, which may be misdiagnosed as appendicitis, and intestinal obstruction. A palpable mass may be noted that, together with the appearance of the abnormality on barium enema or small bowel films, can easily be mistaken for a carcinoma. Rectal lesions usually present as anal fissures, fistulae, or perirectal abscesses. Because of the concern with carcinoma, the diagnosis often is made at surgery. However, laparoscopy or colonoscopy with biopsy may be sufficient to obtain diagnostic material.

Tuberculous peritonitis frequently causes pain as its presenting manifestation, often accompanied by abdominal swelling (66-69). Fever, weight loss, and anorexia are also common. Active pulmonary tuberculosis is uncommon in patients with tuberculous peritonitis. Because the process frequently coexists with other disorders, especially hepatic cirrhosis with ascites, the symptoms of tuberculosis may be obscured. The combination of fever and abdominal tenderness in a person with ascites should always prompt an evaluation for intraabdominal infection, and a paracentesis should be performed. However, this is often not diagnostic, and laparoscopy with biopsy is recommended if tuberculosis is suspected.

Pericardial tuberculosis. The symptoms, physical findings, and laboratory abnormalities associated with tuberculous pericarditis may be the result of either the infectious process itself or the pericardial inflammation causing pain, effusion, and eventually hemodynamic effects. The systemic symptoms produced by the infection are quite nonspecific. Fever, weight loss, and night sweats are common in reported series (70-72). Symptoms of cardiopulmonary origin tend to occur later and include cough, dyspnea, orthopnea, ankle swelling, and chest pain. The chest pain may occasionally mimic angina but usually is described as being dull, aching, and often affected by position and by inspiration.

Apart from fever, the most common physical findings are those caused by the pericardial fluid or fibrosis–cardiac tamponade or constriction. Varying proportions of patients in reported series have signs of full-blown cardiac constriction when first evaluated. It is assumed that in these patients the acute phase of the process was unnoticed. In the absence of concurrent extracardiac tuberculosis, diagnosis of pericardial tuberculosis requires aspiration of pericardial fluid or, usually, pericardial biopsy.

3. Describe four or more bacterial vaccine-preventable diseases that have the same modes of transmission.

Measles

Measles is a highly contagious viral infection that involves the respiratory system, including the lungs and breathing tubes. The measles virus gets into the air when someone who has it coughs or sneezes. It can also last for up to 2 hours on something they touched. Most people who aren't immune -- 90% -- will get it if they are near an infected person.

Measles can cause pneumonia, brain swelling, and death. Before the vaccine, 3 million to 4 million people in the U.S. got measles each year, 48,000 were hospitalized, and 400-500 died.

Whooping Cough (Pertussis)

Whooping cough is a lung infection that makes it hard to breathe due to severe coughing. People can breathe in the pertussis bacteria when someone who has whooping cough coughs or sneezes. It can be life-threatening, especially in babies less than 1 year old. Whooping cough can lead to pneumonia, seizures, and slowed or stopped breathing.

Flu

Flu is a viral infection of the nose, lungs, and throat. When someone with the flu coughs, sneezes, or talks, droplets can spread up to 6 feet away. People get the virus from the air or by touching something the sick person touched and then touching their own nose or mouth. Up to 49,000

Americans die from the flu each year. The flu can create severe complications for people with asthma or diabetes.

Polio

Polio is viral disease that affects the muscles. The polio virus lives in the intestines. You can get infected by coming into contact with a sick person's feces. Most people get no symptoms or flu-like symptoms that last a few days, but polio can cause brain infection, paralysis, and death. It was one of the most feared and devastating diseases of the 20th century. Polio cases are down sharply thanks to vaccination, but the disease is not gone from the world. A highly contagious viral infection that involves the respiratory system, including the lungs and breathing tubes.The measles virus gets into the air when someone who has it coughs or sneezes. It can also last for up to 2 hours on something they touched. Most people who aren't immune -- 90% -- will get it if they are near an infected person. Measles can cause pneumonia, brain swelling, and death. Before the vaccine, 3 million to 4 million people in the U.S. got measles each year, 48,000 were hospitalized, and 400-500 died.

Pneumococcal Disease

Pneumococcal Disease is a bacterial disease that can cause many types of illness, including pneumonia, ear and blood infections, and meningitis (which affects the brain and spinal cord). By coming into contact with an infected person's mucus or saliva. Complications can be serious and fatal. As pneumonia, it's especially deadly in people older than 65. If it causes meningitis or infects the blood, these can be life-threatening.

Tetanus

Tetanus is a bacterial disease that causes lockjaw, breathing problems, muscle spasms, paralysis, and death. The bacteria that causes tetanus is found in soil, dust, and manure. It can get in your body through a cut or open sore. 10% to 20% of tetanus cases are fatal. Deaths are more common in people who are older than 60 or who have diabetes.

Meningococcal Disease

Meningococcal diseases is bacterial disease that can cause meningitis, an infection and swelling of the brain and spinal cord. It can also infect the blood. It's caused by bacteria that live in the back of an infected person' nose and throat. It can spread through kissing or just living with someone who is infected. Symptoms are usually fever that starts suddenly, headache, and stiff neck. Getting diagnosed and treated ASAP is key, between 1,000-1,200 people in the U.S. get meningococcal disease each year. Even with antibiotics, as many as 15% die.

Hepatitis B

Hepatitis B is a chronic liver disease caused by the hepatitis B virus. People with hepatitis B have the virus in their blood and other bodily fluids. Adults usually spread it through sex or sharing needles. A pregnant woman can pass it to her baby. Hepatitis B is 100 times more infectious than HIV, the disease that causes AIDS. It can lead to liver cancer and other long-lasting liver diseases, which can be deadly.

Mumps

Mumps is a disease caused by a virus that gives people swollen salivary glands, a fever, headache, and muscle aches. It also makes you feel tired and curbs your appetite. When someone with mumps coughs or sneezes, the virus gets into the air, and other people can breathe it in. It can lead to meningitis and cause long-lasting health problems, including deafness and sterility in men. Mumps is now rare in the U.S., thanks to the MMR (measles-mumps-rubella) vaccine. But outbreaks still happen, usually among people spending time close together, like living in a dorm.

Hib (Haemophilus Influenzae Type B)

Haemophilus influenza type B is a bacterial disease that infects the lungs (pneumonia), brain or spinal cord (meningitis), blood, bone, or joints. Some people have Hib bacteria in their nose or throat but are not ill. When they cough or sneeze, the bacteria go airborne. Babies and young children are especially at risk because their immune systems are weak. Before the Hib vaccine, about 20,000 U.S. children younger than 5 got Hib each year. About 3% to 6% of them died.

4. What are the causes and methods for preventing bacterial meningitis?

Meanings of meningitis

Meningitis is an inflammation of the membranes (meninges) surrounding your brain and spinal cord. The swelling from meningitis typically triggers symptoms such as headache, fever and a stiff neck. Most cases of meningitis in the United States are caused by a viral infection, but bacterial, parasitic and fungal infections are other causes. Some cases of meningitis improve without treatment in a few weeks. Others can be life-threatening and require emergency antibiotic treatment.Seek immediate medical care if you suspect that someone has meningitis. Early treatment of bacterial meningitis can prevent serious complications. Viral infections are the most common cause of meningitis, followed by bacterial infections and, rarely, fungal infections. Because bacterial infections can be life-threatening, identifying the cause is essential.

Bacterial meningitis

Bacteria that enter the bloodstream and travel to the brain and spinal cord cause acute bacterial meningitis. But it can also occur when bacteria directly invade the meninges. This may be caused by an ear or sinus infection, a skull fracture, or, rarely, after some surgeries.

Causes of Meningitis

Several strains of bacteria can cause acute bacterial meningitis, most commonly:

- **Streptococcus pneumoniae (pneumococcus).** This bacterium is the most common cause of bacterial meningitis in infants, young children and adults in the United States. It more commonly causes pneumonia or ear or sinus infections. A vaccine can help prevent this infection.
- **Neisseria meningitidis (meningococcus).** This bacterium is another leading cause of bacterial meningitis. These bacteria commonly cause an upper respiratory infection but can cause meningococcal meningitis when they enter the bloodstream. This is a highly contagious infection that affects mainly teenagers and young adults. It may cause local epidemics in college dormitories, boarding schools and military bases. A vaccine can help prevent infection.
- **Haemophilus influenzae (haemophilus).** Haemophilus influenzae type b (Hib) bacterium was once the leading cause of bacterial meningitis in children. But new Hib vaccines have greatly reduced the number of cases of this type of meningitis.
- **Listeria monocytogenes (listeria).** These bacteria can be found in unpasteurized cheeses, hot dogs and lunchmeats. Pregnant women, newborns, older adults and people with weakened immune systems are most susceptible. Listeria can cross the placental barrier, and infections in late pregnancy may be fatal to the baby.

Prevention

Common bacteria or viruses that can cause meningitis can spread through coughing, sneezing, kissing, or sharing eating utensils, a toothbrush or a cigarette.

These steps can help prevent meningitis:

- **Wash your hands.** Careful hand-washing helps prevent the spread of germs. Teach children to wash their hands often, especially before eating and after using the toilet, spending time in a crowded public place or petting animals. Show them how to vigorously and thoroughly wash and rinse their hands.

- **Practice good hygiene.** Don't share drinks, foods, straws, eating utensils, lip balms or toothbrushes with anyone else. Teach children and teens to avoid sharing these items too.
- **Stay healthy.** Maintain your immune system by getting enough rest, exercising regularly, and eating a healthy diet with plenty of fresh fruits, vegetables and whole grains.
- **Cover your mouth.** When you need to cough or sneeze, be sure to cover your mouth and nose.
- **If you're pregnant, take care with food.** Reduce your risk of listeriosis by cooking meat, including hot dogs and deli meat, to 165 F (74 C). Avoid cheeses made from unpasteurized milk. Choose cheeses that are clearly labeled as being made with pasteurized milk.

Immunizations

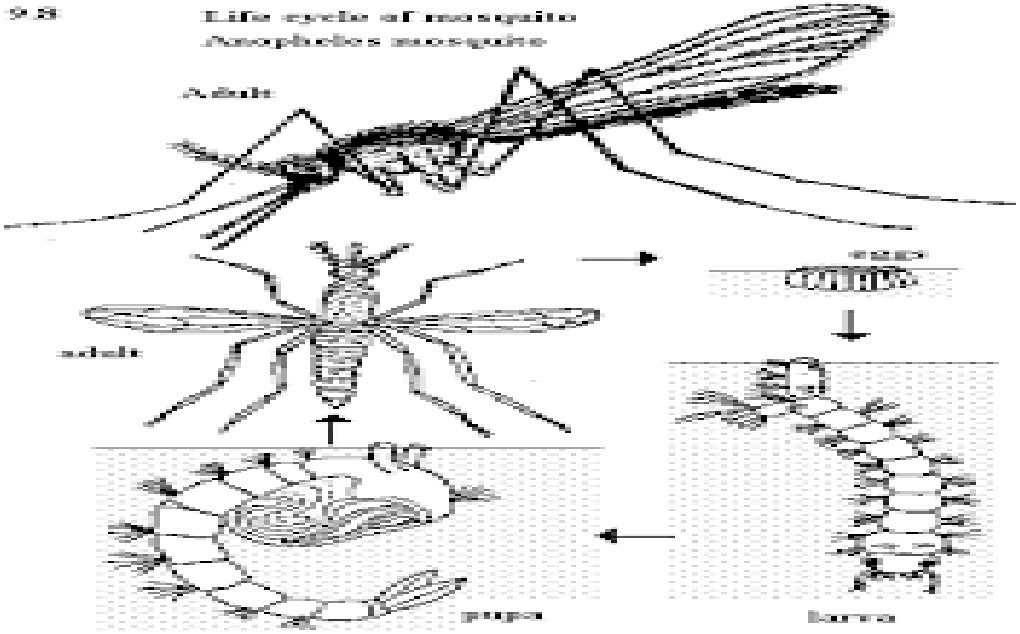
Some forms of bacterial meningitis are preventable with the following vaccinations:

- **Haemophilus influenzae type b (Hib) vaccine.** Children in the United States routinely receive this vaccine as part of the recommended schedule of vaccines, starting at about 2 months of age. The vaccine is also recommended for some adults, including those who have sickle cell disease or AIDS and those who don't have a spleen.
- **Pneumococcal conjugate vaccine (PCV13).** This vaccine also is part of the regular immunization schedule for children younger than 2 years in the United States. Additional doses are recommended for children between the ages of 2 and 5 who are at high risk of pneumococcal disease, including children who have chronic heart or lung disease or cancer.
- **Pneumococcal polysaccharide vaccine (PPSV23).** Older children and adults who need protection from pneumococcal bacteria may receive this vaccine. The Centers for Disease Control and Prevention recommends the PPSV23 vaccine for all adults older than 65; for younger adults and children age 2 and older who have weak immune systems or chronic illnesses such as heart disease, diabetes or sickle cell anemia; and for anyone who doesn't have a spleen.
- **Meningococcal conjugate vaccine.** The Centers for Disease Control and Prevention recommends that a single dose be given to children ages 11 to 12, with a booster shot given at age 16. If the vaccine is first given between ages 13 and 15, the booster is recommended between ages 16 and 18. If the first shot is given at age 16 or older, no booster is necessary.

  This vaccine can also be given to children between the ages of 2 months and 10 years who are at high risk of bacterial meningitis or who have been exposed to someone with the disease. It's also used to vaccinate healthy but previously unvaccinated people who have been exposed in outbreaks.

5. Explain two characteristics that illustrate how the Anopheles larvae are different from other mosquito larvae. Using illustration is advised

There are two common types of mosquitoes that lay their eggs in water: anophelines, which can be vectors of malaria, and culicines, which do not carry malaria. It is very important that you know the difference in the morphology (structure and shape) of these mosquitoes to identify the exact breeding habitats that support the development of the potential vectors Now study the differences in the body structure and resting position in water collections of the anopheline and culicine larvae, as illustrated in Figure 5.7. You don't need magnifying or other equipment to distinguish anopheline and culicine larvae. You can tell the difference by looking at the larvae in the vector breeding waters. Your mentor will show you the difference between the two during your practical training. This will be a very important part of your task as a Health Extension Practitioner: identifying water collections that shelter anopheline larvae and taking action to eliminate such breeding grounds or kill the larvae. There are four stages in the mosquito life cycle, and three of them — eggs, larvae and pupae are to be found in water.



Eggs

Mosquito eggs either clump together in a 'raft' (Culex) or float separately (Aedes); anopheline eggs float separately and each of them has 'floats'.

Larvae

The culicine larva has a breathing tube (siphon) which it also uses to hang down from the water surface, whereas the anopheline larva has no siphon and rests parallel to and immediately below the surface.

Pupae

Pupae of both anophelines and culicines are comma-shaped and hang just below the water surface. They swim when disturbed. The breathing trumpet of the anopheline pupa is short and has a wide opening, whereas that of the culicine pupa is long and slender with a narrow opening. However, it is difficult to distinguish anopheline from culicine pupae in the field.

Adults

With live mosquitoes, you can distinguish between adult anopheline and culicine mosquitoes by observing their resting postures. Anophelines rest at an angle between 50o and 90o to the surface, whereas culicines rest more or less parallel to the surface.

References

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