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An Assignment of Module Two: Assignment 2

Institution of Learning: Strategia Netherlands

**Assignment 2**

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 called a **non-communicable disease**–that is, one that cannot be spread from one person to another. It is a **disease** that takes many years to develop. **Diabetes** is a defect in the way that our bodies process sugar, impairing the removal of sugar from the bloodstream.

**Diabetes mellitus** (**DM**), commonly known as **diabetes**, is a group of [metabolic disorders](https://en.wikipedia.org/wiki/Metabolic_disorder) characterized by sugar levels over a prolonged period.[[9]](https://en.wikipedia.org/wiki/Diabetes_mellitus#cite_note-9) Symptoms of high blood sugar include [frequent urination](https://en.wikipedia.org/wiki/Frequent_urination), [increased thirst](https://en.wikipedia.org/wiki/Polydipsia), and [increased hunger](https://en.wikipedia.org/wiki/Polyphagia).[[2]](https://en.wikipedia.org/wiki/Diabetes_mellitus#cite_note-WHO2013-2) If left untreated, diabetes can cause [many complications](https://en.wikipedia.org/wiki/Complications_of_diabetes_mellitus).[[2]](https://en.wikipedia.org/wiki/Diabetes_mellitus#cite_note-WHO2013-2) [Acute](https://en.wikipedia.org/wiki/Acute_(medicine)) complications can include [diabetic ketoacidosis](https://en.wikipedia.org/wiki/Diabetic_ketoacidosis), [hyperosmolar hyperglycemic state](https://en.wikipedia.org/wiki/Hyperosmolar_hyperglycemic_state), or death.[[3]](https://en.wikipedia.org/wiki/Diabetes_mellitus#cite_note-Kit2009-3) Serious long-term complications include [cardiovascular disease](https://en.wikipedia.org/wiki/Cardiovascular_disease), [stroke](https://en.wikipedia.org/wiki/Stroke), [chronic kidney disease](https://en.wikipedia.org/wiki/Chronic_kidney_disease), [foot ulcers](https://en.wikipedia.org/wiki/Diabetic_foot_ulcer), and [damage to the eyes](https://en.wikipedia.org/wiki/Diabetic_retinopathy).[[2]](https://en.wikipedia.org/wiki/Diabetes_mellitus#cite_note-WHO2013-2)

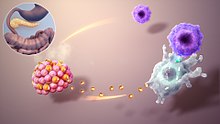
Diabetes is due to either the [pancreas](https://en.wikipedia.org/wiki/Pancreas) not producing enough [insulin](https://en.wikipedia.org/wiki/Insulin), or the cells of the body not responding properly to the insulin produced.

**Causes**

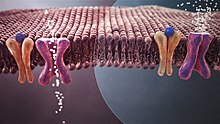
|  |  |  |
| --- | --- | --- |
| **Comparison of type 1 and 2 diabetes**[[16]](https://en.wikipedia.org/wiki/Diabetes_mellitus#cite_note-Will2011-16) | | |
| **Feature** | **Type 1 diabetes** | **Type 2 diabetes** |
| **Onset** | Sudden | Gradual |
| **Age at onset** | Mostly in children | Mostly in adults |
| **Body size** | Thin or normal[[35]](https://en.wikipedia.org/wiki/Diabetes_mellitus#cite_note-35) | Often [obese](https://en.wikipedia.org/wiki/Obese) |
| [**Ketoacidosis**](https://en.wikipedia.org/wiki/Diabetic_ketoacidosis) | Common | Rare |
| [**Autoantibodies**](https://en.wikipedia.org/wiki/Autoantibodies) | Usually present | Absent |
| **Endogenous insulin** | Low or absent | Normal, decreased or increased |
| [**Concordance**](https://en.wikipedia.org/wiki/Concordance_(genetics))**in**[**identical twins**](https://en.wikipedia.org/wiki/Identical_twin) | 50% | 90% |
| **Prevalence** | ~10% | ~90% |

Diabetes mellitus is classified into four broad categories: [type 1](https://en.wikipedia.org/wiki/Diabetes_mellitus_type_1), [type 2](https://en.wikipedia.org/wiki/Diabetes_mellitus_type_2), [gestational diabetes](https://en.wikipedia.org/wiki/Gestational_diabetes), and "other specific types".[[10]](https://en.wikipedia.org/wiki/Diabetes_mellitus#cite_note-Green2011-10) The "other specific types" are a collection of a few dozen individual causes.[[10]](https://en.wikipedia.org/wiki/Diabetes_mellitus#cite_note-Green2011-10) Diabetes is a more variable disease than once thought and people may have combinations of forms.[[36]](https://en.wikipedia.org/wiki/Diabetes_mellitus#cite_note-Tuomi2014-36) The term "diabetes", without qualification, usually refers to diabetes mellitus.

*Main article:*[*Diabetes mellitus type 1*](https://en.wikipedia.org/wiki/Diabetes_mellitus_type_1)

* Type 1 diabetes mellitus is characterized by loss of the insulin-producing [beta cells](https://en.wikipedia.org/wiki/Beta_cell) of the [pancreatic islets](https://en.wikipedia.org/wiki/Pancreatic_islets), leading to insulin deficiency. This type can be further classified as [immune-mediated](https://en.wikipedia.org/wiki/Immune-mediated) or [idiopathic](https://en.wikipedia.org/wiki/Idiopathic_disease). The majority of type 1 diabetes is of the immune-mediated nature, in which a [T cell](https://en.wikipedia.org/wiki/T_cell)-mediated [autoimmune](https://en.wikipedia.org/wiki/Autoimmunity) attack leads to the loss of beta cells and thus insulin.[[37]](https://en.wikipedia.org/wiki/Diabetes_mellitus#cite_note-Rother-37) It causes approximately 10% of diabetes mellitus cases in North America and Europe. Most affected people are otherwise healthy and of a healthy weight when onset occurs. Sensitivity and responsiveness to insulin are usually normal, especially in the early stages. Type 1 diabetes can affect children or adults, but was traditionally termed "juvenile diabetes" because a majority of these diabetes cases were found in children.[[*citation needed*](https://en.wikipedia.org/wiki/Wikipedia:Citation_needed)]
* "Brittle" diabetes, also known as unstable diabetes or labile diabetes is a term that was traditionally used to describe the dramatic and recurrent swings in [glucose](https://en.wikipedia.org/wiki/Glucose) levels, often occurring for no apparent reason in insulin-dependent diabetes. This term, however, has no biologic basis and should not be used.[[38]](https://en.wikipedia.org/wiki/Diabetes_mellitus#cite_note-merck1-38) Still, type 1 diabetes can be accompanied by irregular and unpredictable high blood sugar levels, frequently with [ketosis](https://en.wikipedia.org/wiki/Ketosis), and sometimes with serious low blood sugar levels. Other complications include an impaired counter regulatory response to low blood sugar, infection, [gastroparesis](https://en.wikipedia.org/wiki/Gastroparesis" \o "Gastroparesis) (which leads to erratic absorption of dietary carbohydrates), and [endocrinopathies](https://en.wikipedia.org/wiki/Endocrinopathies" \o "Endocrinopathies) (e.g., [Addison's disease](https://en.wikipedia.org/wiki/Addison%27s_disease)).[[38]](https://en.wikipedia.org/wiki/Diabetes_mellitus#cite_note-merck1-38) These phenomena are believed to occur no more frequently than in 1% to 2% of persons with type 1 diabetes.[[39]](https://en.wikipedia.org/wiki/Diabetes_mellitus#cite_note-pmid406527-39)
* [](https://en.wikipedia.org/wiki/File:Type_1_Diabetes_Mellitus.jpg)
* Autoimmune attack in type 1 diabetes.
* Type 1 diabetes is partly [inherited](https://en.wikipedia.org/wiki/Genetic_disorder), with multiple genes, including certain [HLA genotypes](https://en.wikipedia.org/wiki/Human_leukocyte_antigen), known to influence the risk of diabetes. In genetically susceptible people, the onset of diabetes can be triggered by one or more [environmental factors](https://en.wikipedia.org/wiki/Environmental_factor),[[40]](https://en.wikipedia.org/wiki/Diabetes_mellitus" \l "cite_note-PetzoldSolimena2015-40) such as a [viral infection](https://en.wikipedia.org/wiki/Viral_infection) or diet. Several viruses have been implicated, but to date there is no stringent evidence to support this hypothesis in humans.[[40]](https://en.wikipedia.org/wiki/Diabetes_mellitus#cite_note-PetzoldSolimena2015-40)[[41]](https://en.wikipedia.org/wiki/Diabetes_mellitus#cite_note-ButaliaKaplan2016-41) Among dietary factors, data suggest that [gliadin](https://en.wikipedia.org/wiki/Gliadin" \o "Gliadin) (a protein present in [gluten](https://en.wikipedia.org/wiki/Gluten)) may play a role in the development of type 1 diabetes, but the mechanism is not fully understood.[[42]](https://en.wikipedia.org/wiki/Diabetes_mellitus#cite_note-SerenaCamhi2015-42)[[43]](https://en.wikipedia.org/wiki/Diabetes_mellitus#cite_note-VisserRozing2009-43)

*Main article:*[*Diabetes mellitus type 2*](https://en.wikipedia.org/wiki/Diabetes_mellitus_type_2)

* [](https://en.wikipedia.org/wiki/File:Type_2_Diabetes_Mellitus.jpg)
* Reduced insulin secretion and absorption leads to high glucose content in the blood.
* Type 2 DM is characterized by [insulin resistance](https://en.wikipedia.org/wiki/Insulin_resistance), which may be combined with relatively reduced insulin secretion.[[10]](https://en.wikipedia.org/wiki/Diabetes_mellitus#cite_note-Green2011-10) The defective responsiveness of body tissues to insulin is believed to involve the [insulin receptor](https://en.wikipedia.org/wiki/Insulin_receptor). However, the specific defects are not known. Diabetes mellitus cases due to a known defect are classified separately. Type 2 DM is the most common type of diabetes mellitus.[[2]](https://en.wikipedia.org/wiki/Diabetes_mellitus#cite_note-WHO2013-2)
* In the early stage of type 2, the predominant abnormality is reduced insulin sensitivity. At this stage, high blood sugar can be reversed by a variety of measures and [medications](https://en.wikipedia.org/wiki/Anti-diabetic_drug) that improve insulin sensitivity or reduce the [liver's glucose production](https://en.wikipedia.org/wiki/Glycogenolysis).
* Type 2 DM is primarily due to lifestyle factors and genetics.[[44]](https://en.wikipedia.org/wiki/Diabetes_mellitus#cite_note-Fat2009-44) A number of lifestyle factors are known to be important to the development of type 2 DM, including [obesity](https://en.wikipedia.org/wiki/Obesity) (defined by a [body mass index](https://en.wikipedia.org/wiki/Body_mass_index) of greater than 30), lack of [physical activity](https://en.wikipedia.org/wiki/Physical_activity), poor [diet](https://en.wikipedia.org/wiki/Diet_(nutrition)), [stress](https://en.wikipedia.org/wiki/Stress_(biology)), and [urbanization](https://en.wikipedia.org/wiki/Urbanization).[[16]](https://en.wikipedia.org/wiki/Diabetes_mellitus#cite_note-Will2011-16) Excess body fat is associated with 30% of cases in those of Chinese and Japanese descent, 60–80% of cases in those of European and African descent, and 100% of Pima Indians and Pacific Islanders.[[10]](https://en.wikipedia.org/wiki/Diabetes_mellitus#cite_note-Green2011-10) Even those who are not obese often have a high [waist–hip ratio](https://en.wikipedia.org/wiki/Waist%E2%80%93hip_ratio).[[10]](https://en.wikipedia.org/wiki/Diabetes_mellitus#cite_note-Green2011-10)
* Dietary factors also influence the risk of developing type 2 DM. Consumption of [sugar](https://en.wikipedia.org/wiki/Sugar)-sweetened drinks in excess is associated with an increased risk.[[45]](https://en.wikipedia.org/wiki/Diabetes_mellitus#cite_note-SSB2010-45)[[46]](https://en.wikipedia.org/wiki/Diabetes_mellitus#cite_note-46) The type of [fats](https://en.wikipedia.org/wiki/Fat) in the diet is also important, with [saturated fat](https://en.wikipedia.org/wiki/Saturated_fat) and [trans fats](https://en.wikipedia.org/wiki/Trans_fat) increasing the risk and [polyunsaturated](https://en.wikipedia.org/wiki/Polyunsaturated_fat) and [monounsaturated fat](https://en.wikipedia.org/wiki/Monounsaturated_fat) decreasing the risk.[[44]](https://en.wikipedia.org/wiki/Diabetes_mellitus#cite_note-Fat2009-44) Eating lots of [white rice](https://en.wikipedia.org/wiki/White_rice), and other [starches](https://en.wikipedia.org/wiki/Starch), also may increase the risk of diabetes.[[47]](https://en.wikipedia.org/wiki/Diabetes_mellitus#cite_note-47) A lack of physical activity is believed to cause 7% of cases.[[48]](https://en.wikipedia.org/wiki/Diabetes_mellitus#cite_note-pmid22818936-48)

**Gestational diabetes**

*Main article:*[*Gestational diabetes*](https://en.wikipedia.org/wiki/Gestational_diabetes)

* Gestational diabetes mellitus (GDM) resembles type 2 DM in several respects, involving a combination of relatively inadequate insulin secretion and responsiveness. It occurs in about 2–10% of all [pregnancies](https://en.wikipedia.org/wiki/Pregnancy) and may improve or disappear after delivery.[[49]](https://en.wikipedia.org/wiki/Diabetes_mellitus#cite_note-NDIC_Stats-49) However, after pregnancy approximately 5–10% of women with GDM are found to have DM, most commonly type 2.[[49]](https://en.wikipedia.org/wiki/Diabetes_mellitus#cite_note-NDIC_Stats-49) GDM is fully treatable, but requires careful medical supervision throughout the pregnancy. Management may include dietary changes, blood glucose monitoring, and in some cases, insulin may be required.
* Though it may be transient, untreated GDM can damage the health of the fetus or mother. Risks to the baby include [macrosomia](https://en.wikipedia.org/wiki/Macrosomia" \o "Macrosomia) (high birth weight), [congenital heart](https://en.wikipedia.org/wiki/Congenital_heart_defect) and [central nervous system](https://en.wikipedia.org/wiki/Central_nervous_system) abnormalities, and [skeletal muscle](https://en.wikipedia.org/wiki/Skeletal_muscle) malformations. Increased levels of insulin in a fetus's blood may inhibit fetal [surfactant](https://en.wikipedia.org/wiki/Surfactant) production and cause [infant respiratory distress syndrome](https://en.wikipedia.org/wiki/Infant_respiratory_distress_syndrome). A [high blood bilirubin level](https://en.wikipedia.org/wiki/Bilirubin#Hyperbilirubinemia) may result from [red blood cell destruction](https://en.wikipedia.org/wiki/Hemolysis). In severe cases, perinatal death may occur, most commonly as a result of poor placental perfusion due to vascular impairment. [Labor induction](https://en.wikipedia.org/wiki/Labor_induction) may be indicated with decreased placental function. A [caesarean section](https://en.wikipedia.org/wiki/Caesarean_section) may be performed if there is marked [fetal distress](https://en.wikipedia.org/wiki/Fetal_distress) or an increased risk of injury associated with macrosomia, such as [shoulder dystocia](https://en.wikipedia.org/wiki/Shoulder_dystocia).[[50]](https://en.wikipedia.org/wiki/Diabetes_mellitus#cite_note-50)

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

Pulmonary tuberculosis and Common Cold are two different diseases which can be transmitted through the air. Therefore, they are classified as airborne diseases, using epidemiologic method.

**Prevention and control measures of airborne diseases**

Although it’s impossible to completely avoid airborne pathogens, there are some things you can do to lower your chances of getting sick:

* Avoid close contact with people who have active symptoms of disease.
* Stay home when you’re sick. Don’t let vulnerable people come in close contact with you.
* If you must be around others, wear a face mask to prevent spreading or breathing in germs.
* Cover your mouth when you cough or sneeze. Use a tissue or your elbow to cut down on the possibility of transmitting germs on your hands.
* Wash your hands thoroughly (at least 20 seconds) and often, especially after sneezing or coughing.
* Avoid touching your face or other people with unwashed hands.

Vaccines can reduce your chances of getting some airborne diseases. Vaccines also lower the risk for others in the community.

In developing countries, mass immunization campaigns are helping to lower the transmission rates of some of these airborne diseases.

The importance of this classification is that it enables you to select prevention and control measures which are common to (shared by) communicable diseases in the same class, so as to interrupt the mode of transmission.

1. Describe four or more bacterial vaccine-preventable diseases that have the same modes of transmission.
   1. **Tuberculosis (also known as "TB")** is a disease caused by a type of bacteria called Mycobacterium tuberculosis. TB mainly infects the lungs, although it can also affect other organs like brain and spine. TB is spread from person to person through the air when someone with untreated TB coughs or sneezes, the air is filled with droplets containing the bacteria. Tuberculosis is curable and preventable.

In the 20th century, TB was a leading cause of death in the United States. Today, most cases are cured with [antibiotics](https://www.webmd.com/cold-and-flu/rm-quiz-antibiotics-myths-facts). But it takes a long time. You have to take meds for at least 6 to 9 months.

## How Does Tuberculosis Affect Your Body?

A TB infection doesn’t mean you’ll get sick. There are two forms of the disease:

**Latent TB:**You have the germs in your body, but your [immune system](https://www.webmd.com/cold-and-flu/10-immune-system-busters-boosters) stops them from spreading. That means you don’t have any symptoms and you’re not contagious. But the infection is still alive in your body and can one day become active. If you are at high risk for re-activation — for instance, you have HIV, your primary infection was in the last 2 years, your chest X-ray is abnormal, or you are immunocompromised --- your doctor will treat you with antibiotics to lower the risk for developing active TB.

**Active TB disease:**This means the germs multiply and can make you sick. You can spread the disease to others. Ninety percent of adult cases of active TB are from the reactivation of a latent TB infection.

## What Are the Symptoms of TB?

There aren’t any for latent TB. You’ll need to get a [skin](https://www.webmd.com/skin-problems-and-treatments/picture-of-the-skin) or [blood](https://www.webmd.com/heart/anatomy-picture-of-blood) test to find out if you’re infected.

But there are usually signs if you have active TB disease. They include:

* A [cough](https://www.webmd.com/cold-and-flu/cough-relief-12/slideshow-cough-treatments) that lasts more than 3 weeks
* [Chest pain](https://www.webmd.com/pain-management/guide/whats-causing-my-chest-pain)
* [Coughing up blood](https://www.webmd.com/lung/coughing-up-blood)
* Feeling [tired](https://www.webmd.com/women/guide/why-so-tired-10-causes-fatigue) all the time
* [Night sweats](https://www.webmd.com/menopause/guide/8-causes-of-night-sweats)
* Chills
* [Fever](https://www.webmd.com/first-aid/fevers-causes-symptoms-treatments)
* Loss of appetite
* [Weight loss](https://www.webmd.com/diet/default.htm)

**Prevention and control method**

If you have active TB disease, you must get treated right away. This might involve taking a number of [medications](https://www.webmd.com/drugs/index-drugs.aspx) for 6 to 12 months. It’s important to take all of your meds, as they’re prescribed, the entire time -- even if you feel better. If not, you can get sick again.

If you have TB germs in your body but they haven’t become active, you have what doctors call “latent TB.” You can’t spread the disease to others. But your doctor may still recommend that you take medications to keep the germs from becoming active.

Follow these other tips to help prevent others from getting TB during your first few weeks of treatment, or until your doctor says you’re no longer contagious:

* Take all of your medicines as they’re prescribed, until your doctor takes you off them.
* Keep all your doctor appointments.
* Always cover your [mouth](https://www.webmd.com/oral-health/anatomy-of-the-mouth) with a tissue when you [cough](https://www.webmd.com/first-aid/coughs) or [sneeze](https://www.webmd.com/allergies/features/11-surprising-sneezing-facts). Seal the tissue in a plastic bag, and then throw it away.
* [Wash your hands](https://www.webmd.com/cold-and-flu/cold-guide/cold-prevention-hand-washing) after [coughing](https://www.webmd.com/cold-and-flu/cough-relief-12/slideshow-cough-treatments) or [sneezing](https://www.webmd.com/allergies/rm-quiz-sneezing).
* Don’t visit other people and don’t invite them to visit you.
* Stay home from work, school, or other public places.
* Use a fan or open windows to move around fresh air.
* Don’t use public transportation.

In countries with high rates of TB infection, infants are often given the Bacillus Calmette-Guérin [vaccine](https://www.webmd.com/vaccines/default.htm), or BCG. Doctors in the U.S. don’t generally recommend it because TB isn’t a widespread problem here.

Still, [health care](https://www.webmd.com/health-insurance/default.htm) workers who spend a lot of time around TB patients might benefit from the [vaccine](https://www.webmd.com/children/vaccines/ss/slideshow-vaccine-preventable-diseases). Doctors make that decision based on the [health care](https://www.webmd.com/health-insurance/america-asks-health-reform/what-is-the-aca) worker and their unique circumstances.

* 1. **Diphtheria**

Diphtheria is a highly contagious bacterial infection of the nose and throat. It is a disease of the past in most parts of the world. There have only been five cases of the bacterial infection in the United States in the last 10 years.

In countries where there is a lower uptake of booster vaccines, however, such as in India, there remain thousands of cases each year. In 2014, there were [7,321 cases](https://www.cdc.gov/diphtheria/about/index.html) of diphtheria reported to the World Health Organization (WHO), globally.

In people who are not vaccinated against the bacteria that cause diphtheria, infection can cause serious complications, such as nerve problems, heart failure, and even death.

Overall, [5 to 10 percent](https://www.cdc.gov/vaccines/pubs/pinkbook/dip.html) of people who get infected with diphtheria will die. Some people are more vulnerable than others, with a mortality rate of up to 20 percent in infected people under 5 years or older than 40 years of age.

**Causes**

Diphtheria is an infectious disease caused by the bacterial microorganism known as *Corynebacterium diphtheriae*. Other Corynebacterium species can be responsible, but this is [rare](http://www.msdmanuals.com/professional/infectious-diseases/gram-positive-bacilli/diphtheria).

Some strains of this bacterium produce a toxin, and it is this toxin that causes the most serious complications of diphtheria. The bacteria produce a toxin because they themselves are infected by a certain type of virus called a phage.

The toxin that is released:

* Inhibits the production of proteins by cells
* Destroys the tissue at the site of the infection
* Leads to membrane formation
* Gets taken up into the bloodstream and distributed around the body's tissues
* Causes [inflammation](https://www.medicalnewstoday.com/articles/248423.php) of the heart and nerve damage
* Can cause low platelet counts, or thrombocytopenia, and produce protein in the urine in a condition called proteinuria

**How do you catch diphtheria?**

Diphtheria is an infection spread only among humans. It is contagious by direct physical contact with:

* Droplets breathed out into the air
* Secretions from the nose and throat, such as mucus and saliva
* Infected skin lesions
* Objects, such as bedding or clothes an infected person has used, in rare cases

The infection can spread from an infected patient to any mucous membrane in a new person, but the toxic infection most often attacks the lining of the nose and throat.

**Symptoms**

Specific signs and symptoms of diphtheria depend on the particular strain of bacteria involved, and the site of the body affected.

One type of diphtheria, more common in the tropics, causes skin ulcers rather than respiratory infection.

These cases are usually less serious than the classic cases that can lead to severe illness and sometimes death.

The classic case of diphtheria is an upper respiratory infection caused by bacteria. It produces a gray pseudomembrane, or a covering that looks like a membrane, over the lining of the nose and throat, around the area of the tonsils. This pseudomembrane may also be greenish or blueish, and even black if there has been bleeding.

Early features of the infection, before the pseudomembrane appears, include:

* Low [fever](https://www.medicalnewstoday.com/articles/168266.php), malaise, and weakness.
* Swollen glands on the neck
* Swelling of soft tissue in the neck, giving a 'bull neck' appearance
* Nasal discharge
* Fast heart rate

Children with a diphtheria infection in a cavity behind the nose and mouth are more likely to have the following early features:

* Nausea and vomiting
* Chills, [headache](https://www.medicalnewstoday.com/articles/73936.php), and fever

After a person is first infected with the bacteria, there is an average incubation period of 5 days before early signs and symptoms appear.

After the initial symptoms have appeared, within 12 to 24 hours, a pseudomembrane will begin to form if the bacteria are toxic, leading to:

* A [sore throat](https://www.medicalnewstoday.com/articles/155412.php).
* Difficulty swallowing
* Possible obstruction that causes breathing difficulties

If the membrane extends to the larynx, hoarseness and a barking cough are more likely, as is the danger of complete obstruction of the airway. The membrane may also extend further down the respiratory system toward the lungs.

**Complications**

Potentially life-threatening complications can occur if the toxin enters the bloodstream and damages other vital tissues.

**Myocarditis or heart damage**

Myocarditis is an inflammation of the heart muscle. It can lead to heart failure and the greater the degree of bacterial infection, the higher the toxicity to the heart.

Myocarditis might cause abnormalities that are only apparent on a heart monitor, but it has the potential to cause sudden death.

Heart problems usually appear 10 to 14 days after the start of the infection, although problems can take weeks to appear.

Heart problems associated with diphtheria include:

* Changes visible on an electrocardiograph (ECG) monitor.
* Atrioventricular dissociation, in which the chambers of the heart stop beating together
* Complete [heart block](https://www.medicalnewstoday.com/articles/180986.php), where no electrical pulses travel across the heart.
* Ventricular [arrhythmias](https://www.medicalnewstoday.com/articles/8887.php), which involve the beating of the lower chambers becoming abnormal
* Heart failure, in which the heart is unable to maintain sufficient [blood pressure](https://www.medicalnewstoday.com/articles/270644.php) and circulation

**Neuritis or nerve damage**

Neuritis is inflammation of nerve tissue that results in damage to nerves. This complication is relatively uncommon and usually appears after a severe respiratory infection with diphtheria. Typically, the condition develops as follows:

* In the 3rd week of illness, there can be paralysis of the soft palate.
* After the 5th week, paralysis of eye muscles, limbs, and diaphragm.
* [Pneumonia](https://www.medicalnewstoday.com/articles/151632.php) and respiratory failure may occur due to paralysis of the diaphragm.

**Less severe disease from infection at other locations**

If the bacterial infection affects tissues other than the throat and respiratory system, such as the skin, the illness is generally milder. This is because the body absorbs lower amounts of the toxin, especially if the infection only affects the skin.

The infection can coexist with other infections and skin conditions and may look no different from [eczema](https://www.medicalnewstoday.com/articles/14417.php), [psoriasis](https://www.medicalnewstoday.com/info/psoriasis/), or [impetigo](https://www.medicalnewstoday.com/articles/162945.php). However, diphtheria in the skin can produce ulcers where there is no skin at the center with clear edges and sometimes grayish membranes.

Other mucous membranes can become infected by diphtheria - including the conjunctiva of the eyes, women's genital tissue, and the external ear canal.

**History**

Humans have known about diphtheria for thousands of years. Its timeline is as follows:

Nowadays, diphtheria is extremely rare thanks to widespread vaccination against the infectious disease.

* **5th century BCE**: Hippocrates is first to describe the disease. He observes that it can cause the formation of a new layer on mucous membranes.
* **6th century**: First observations of diphtheria epidemics by the Greek physician Aetius.
* **Late 19th century**: The bacteria responsible for diphtheria are identified by the German scientists Edwin Klebs and Friedrich Löffler.
* **1892**: Antitoxin treatment, derived from horses, first used in the U.S.
* **1920s**: Development of the toxoid used in vaccines.

**Prevention**

Vaccines are routinely used to prevent diphtheria infection in almost all countries. The vaccines are derived from a purified toxin that has been removed from a strain of the bacterium.

Two strengths of diphtheria toxoid are used in routine diphtheria vaccines:

* **D:** a higher-dose primary vaccine for children under 10. This is usually given in three doses - at 2, 3, and 4 months of age.
* **D:** a lower-dose version for use as a primary vaccine in children over 10, and as a booster for reinforcing the usual immunization in babies, about 3 years after the primary vaccine, normally between 3.5 and 5 years of age.

Modern vaccination schedules include diphtheria toxoid in the childhood immunization, known as diphtheria and [tetanus](https://www.medicalnewstoday.com/articles/163063.php) toxoids and acellular [pertussis](https://www.medicalnewstoday.com/articles/257706.php) vaccine (DTaP).

This vaccine is the option of choice recommended by the U.S. Centers for Disease Control and Prevention (CDC), and more information is [provided](http://www.cdc.gov/vaccines/hcp/vis/vis-statements/dtap.html), including why some children should not get the DTaP vaccine or should wait.

The doses are given the following ages:

* 2 months
* 4 months and after an interval of 4 weeks
* 6 months and after an interval of 4 weeks
* 15 to 18 months and after an interval of 6 months

If the fourth dose is given before the age of 4, this fifth, booster dose is recommended at 4 through 6 years of age. However, this is not needed if the fourth primary dose was given on or after the fourth birthday.

Booster doses of the adult form of the vaccine, tetanus-diphtheria toxoids vaccine (Td), may be needed every 10 years to maintain immunity.

* 1. **Pertussis**, also known as **whooping cough**, is a highly contagious respiratory disease. **Pertussis** is known for uncontrollable, violent coughing which often makes it hard to breathe.

**Causes**

Pertussis, a respiratory illness commonly known as whooping cough, is a very contagious disease caused by a type of bacteria called *Bordetella pertussis*. These bacteria attach to the cilia (tiny, hair-like extensions) that line part of the upper respiratory system. The bacteria release toxins (poisons), which damage the cilia and cause airways to swell.

**Transmission**

Pertussis is a very contagious disease only found in humans. Pertussis spreads from person to person. People with pertussis usually spread the disease to another person by coughing or sneezing or when spending a lot of time near one another where you share breathing space. Many babies who get pertussis are infected by older siblings, parents, or caregivers who might not even know they have the disease.

Infected people are most contagious up to about 2 weeks after the cough begins. Antibiotics may shorten the amount of time someone is contagious.

While pertussis vaccines are the most effective tool to prevent this disease, no vaccine is 100% effective. When pertussis circulates in the community, there is a chance that a fully vaccinated person, of any age, can catch this disease. If you have gotten the pertussis vaccine but still get sick, the infection is usually not as bad.

Symptoms

Pertussis (whooping cough) can cause serious illness in babies, children, teens, and adults. Symptoms of pertussis usually develop within 5 to 10 days after you are exposed. Sometimes pertussis symptoms do not develop for as long as 3 weeks.

Early Symptoms

The disease usually starts with cold-like symptoms and maybe a mild cough or fever. In babies, the cough can be minimal or not even there. Babies may have a symptom known as “apnea.” Apnea is a pause in the child’s breathing pattern. Pertussis is most dangerous for babies. About half of babies younger than 1 year who get the disease need care in the hospital.

In those who have gotten the pertussis vaccine:

* In most cases, the cough won’t last as many days
* Coughing fits, whooping, and vomiting after coughing fits occur less often
* The percentage of children with apnea (long pause in breathing), cyanosis (blue/purplish skin coloration due to lack of oxygen) and vomiting is less

Early symptoms can last for 1 to 2 weeks and usually include:

* Runny nose
* Low-grade fever (generally minimal throughout the course of the disease)
* Mild, occasional cough
* Apnea – a pause in breathing (in babies)

Pertussis in its early stages appears to be nothing more than the common cold. Therefore, healthcare professionals often do not suspect or diagnose it until the more severe symptoms appear.

Later-stage Symptoms

After 1 to 2 weeks and as the disease progresses, the traditional symptoms of pertussis may appear and include:

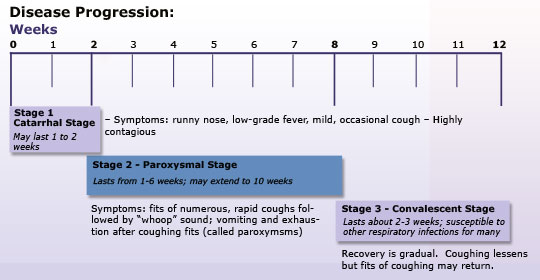
* Paroxysms (fits) of many, rapid coughs followed by a high-pitched “whoop” sound
* Vomiting (throwing up) during or after coughing fits
* Exhaustion (very tired) after coughing fits

Pertussis in Babies

It is important to know that many babies with pertussis don’t cough at all. Instead it causes them to stop breathing and turn blue.

Pertussis can cause violent and rapid coughing, over and over, until the air is gone from your lungs. When there is no more air in the lungs, you are forced to inhale with a loud “whooping” sound. This extreme coughing can cause you to throw up and be very tired. Although you are often exhausted after a coughing fit, you usually appear fairly well in-between. Coughing fits generally become more common and bad as the illness continues, and can occur more often at night. The coughing fits can go on for up to 10 weeks or more. In China, pertussis is known as the “100 day cough.”

The “whoop” is often not there if you have milder (less serious) disease. The infection is generally milder in teens and adults, especially those who have gotten the pertussis vaccine.

[](https://www.cdc.gov/pertussis/images/pertussis-timeline-lg.jpg)

Recovery

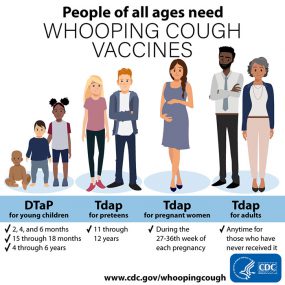
Recovery from pertussis can happen slowly. The cough becomes milder and less common. However, coughing fits can return with other respiratory infections for many months after the pertussis infection started.

**Prevention**

Vaccines

The best way to prevent pertussis (whooping cough) among babies, children, teens, and adults is to get vaccinated. Also, keep babies and other people at high risk for pertussis complications away from infected people.

In the United States, the recommended pertussis vaccine for babies and children is called DTaP. This is a combination vaccine that helps protect against three diseases: diphtheria, tetanus and pertussis.

[](https://www.cdc.gov/pertussis/images/pertussis-vacc-all.jpg)

This [graphic](https://www.cdc.gov/pertussis/images/pertussis-vacc-all.jpg)highlights CDC’s whooping cough vaccination recommendations for young children, preteens, pregnant women, and adults.

Vaccine protection for these three diseases fades with time. Before 2005, the only booster (called Td) available contained protection against tetanus and diphtheria. This vaccine was recommended for teens and adults every 10 years. Today there is a booster (called Tdap) for preteens, teens, and adults that contains protection against tetanus, diphtheria and pertussis.

Being up-to-date with pertussis vaccines is especially important for families with and caregivers of new babies.

**Infection**

If your doctor confirms that you have pertussis, your body will have a natural defense (immunity) to future pertussis infections. Some observational studies suggest that pertussis infection can provide immunity for 4 to 20 years. Since this immunity fades and does not offer lifelong protection, CDC still recommends pertussis vaccination.

**Antibiotics**

If you or a member of your household has been diagnosed with pertussis, your doctor or local health department may recommend preventive antibiotics (medications that can help prevent diseases caused by bacteria) to other members of the household to help prevent the spread of disease. Additionally, they may recommend preventive antibiotics to some other people outside the household who have been exposed to a person with pertussis, including

* People at risk for serious disease
* People who have routine contact with someone that is considered at high risk of serious disease

Babies younger than 1 year old are most at risk for serious complications from pertussis. Pregnant women are not at increased risk for serious disease. However, experts consider those in their third trimester to be at increased risk since they could in turn expose their newborn to pertussis. You should discuss whether or not you need preventative antibiotics with your doctor. This is especially important if there is a baby or pregnant woman in your household. It is also important if you plan to have contact with a baby or pregnant woman.

**Hygiene**

Like many respiratory illnesses, pertussis spreads by coughing and sneezing while in close contact with others, who then breathe in the bacteria. CDC recommends practicing good hygiene to prevent the spread of respiratory illnesses. To practice good hygiene you should:

* Cover your mouth and nose with a tissue when you cough or sneeze.
* Put your used tissue in the waste basket.
* Cough or sneeze into your upper sleeve or elbow, not your hands, if you don’t have a tissue.
* Wash your hands often with soap and water for at least 20 seconds.
* Use an alcohol-based hand rub if soap and water are not available.
  1. **Pneumonia**

Pneumonia is an infection that inflames the air sacs in one or both lungs. The air sacs may fill with fluid or pus (purulent material), causing cough with phlegm or pus, fever, chills, and difficulty breathing. A variety of organisms, including bacteria, viruses and fungi, can also cause pneumonia.

Pneumonia can range in seriousness from mild to life-threatening. It is most serious for infants and young children, people older than age 65, and people with health problems or weakened immune systems.

Symptoms

The signs and symptoms of pneumonia vary from mild to severe, depending on factors such as the type of germ causing the infection, and your age and overall health. Mild signs and symptoms often are similar to those of a cold or flu, but they last longer.

Signs and symptoms of pneumonia may include:

* Chest pain when you breathe or cough
* Confusion or changes in mental awareness (in adults age 65 and older)
* Cough, which may produce phlegm
* Fatigue
* Fever, sweating and shaking chills
* Lower than normal body temperature (in adults older than age 65 and people with weak immune systems)
* Nausea, vomiting or diarrhea
* Shortness of breath

Newborns and infants may not show any sign of the infection. Or they may vomit, have a fever and cough, appear restless or tired and without energy, or have difficulty breathing and eating.

**When to see a doctor**

See your doctor if you have difficulty breathing, chest pain, persistent fever of 102 F (39 C) or higher or persistent cough, especially if you're coughing up pus.

It's especially important that people in these high-risk groups see a doctor:

* Adults older than age 65
* Children younger than age 2 with signs and symptoms
* People with an underlying health condition or weakened immune system
* People receiving chemotherapy or taking medication that suppresses the immune system

For some older adults and people with heart failure or chronic lung problems, pneumonia can quickly become a life-threatening condition.

**Causes**

Many germs can cause pneumonia. The most common are bacteria and viruses in the air we breathe. Your body usually prevents these germs from infecting your lungs. But sometimes these germs can overpower your immune system, even if your health is generally good.

Pneumonia is classified according to the types of germs that cause it and where you got the infection.

**Community-acquired pneumonia**

Community-acquired pneumonia is the most common type of pneumonia. It occurs outside of hospitals or other health care facilities. It may be caused by:

* **Bacteria.** The most common cause of bacterial pneumonia in the U.S. is Streptococcus pneumoniae. This type of pneumonia can occur on its own or after you've had a cold or the flu. It may affect one part (lobe) of the lung, a condition called lobar pneumonia.
* **Bacteria-like organisms.** Mycoplasma pneumoniae also can cause pneumonia. It typically produces milder symptoms than do other types of pneumonia. Walking pneumonia is an informal name given to this type of pneumonia, which typically isn't severe enough to require bed rest.
* **Fungi.** This type of pneumonia is most common in people with chronic health problems or weakened immune systems, and in people who have inhaled large doses of the organisms. The fungi that cause it can be found in soil or bird droppings and vary depending upon geographic location.
* **Viruses.** Some of the viruses that cause colds and the flu can cause pneumonia. Viruses are the most common cause of pneumonia in children younger than 5 years. Viral pneumonia is usually mild. But in some cases it can become very serious.

**Hospital-acquired pneumonia**

Some people catch pneumonia during a hospital stay for another illness. Hospital-acquired pneumonia can be serious because the bacteria causing it may be more resistant to antibiotics and because the people who get it are already sick. People who are on breathing machines (ventilators), often used in intensive care units, are at higher risk of this type of pneumonia.

**Health care-acquired pneumonia**

Health care-acquired pneumonia is a bacterial infection that occurs in people who live in long-term care facilities or who receive care in outpatient clinics, including kidney dialysis centers. Like hospital-acquired pneumonia, health care-acquired pneumonia can be caused by bacteria that are more resistant to antibiotics.

**Aspiration pneumonia**

Aspiration pneumonia occurs when you inhale food, drink, vomit or saliva into your lungs. Aspiration is more likely if something disturbs your normal gag reflex, such as a brain injury or swallowing problem, or excessive use of alcohol or drugs.

Risk factors

Pneumonia can affect anyone. But the two age groups at highest risk are:

* Children who are 2 years old or younger
* People who are age 65 or older

Other risk factors include:

* **Being hospitalized.** You're at greater risk of pneumonia if you're in a hospital intensive care unit; especially if you're on a machine that helps you breathe (a ventilator).
* **Chronic disease.** You're more likely to get pneumonia if you have asthma, chronic obstructive pulmonary disease (COPD) or heart disease.
* **Smoking.** Smoking damages your body's natural defenses against the bacteria and viruses that cause pneumonia.
* **Weakened or suppressed immune system.** People who have HIV/AIDS, who've had an organ transplant, or who receive chemotherapy or long-term steroids are at risk.

Complications

Even with treatment, some people with pneumonia, especially those in high-risk groups, may experience complications, including:

* **Bacteria in the bloodstream (bacteremia).** Bacteria that enter the bloodstream from your lungs can spread the infection to other organs, potentially causing organ failure.
* **Difficulty breathing.** If your pneumonia is severe or you have chronic underlying lung diseases, you may have trouble breathing in enough oxygen. You may need to be hospitalized and use a breathing machine (ventilator) while your lung heals.
* **Fluid accumulation around the lungs (pleural effusion).** Pneumonia may cause fluid to build up in the thin space between layers of tissue that line the lungs and chest cavity (pleura). If the fluid becomes infected, you may need to have it drained through a chest tube or removed with surgery.
* **Lung abscess.** An abscess occurs if pus forms in a cavity in the lung. An abscess is usually treated with antibiotics. Sometimes, surgery or drainage with a long needle or tube placed into the abscess is needed to remove the pus.

**Prevention**

To help prevent pneumonia:

* **Get vaccinated.** Vaccines are available to prevent some types of pneumonia and the flu. Talk with your doctor about getting these shots. The vaccination guidelines have changed over time so make sure to review your vaccination status with your doctor even if you recall previously receiving a pneumonia vaccine.
* **Make sure children get vaccinated.** Doctors recommend a different pneumonia vaccine for children younger than age 2 and for children ages 2 to 5 years who are at particular risk of pneumococcal disease. Children who attend a group child care center should also get the vaccine. Doctors also recommend flu shots for children older than 6 months.
* **Practice good hygiene.** To protect yourself against respiratory infections that sometimes lead to pneumonia, wash your hands regularly or use an alcohol-based hand sanitizer.
* **Don't smoke.** Smoking damages your lungs' natural defenses against respiratory infections.
* **Keep your immune system strong.** Get enough sleep, exercise regularly and eat a healthy diet.
  1. **Meningococcal meningitis**

Meningococcal meningitis is an infection of the brain and spinal cord by the bacterium Neisseria meningitidis (also known as the meningococcus bacterium). The disease is caused by several groups of meningococcus bacteria, which are given distinguishing codes such as type A, B, C, Y and W135.

The disease occurs globally, but in sub-Saharan Africa, meningitis epidemics occur every two to three years. An epidemic is a sudden and significant increase in the number of cases of a communicable disease, which may go on rising for weeks, months or years. Meningitis epidemics are common in many countries of Sub-Saharan Africa, including Ethiopia. In Ethiopia, these epidemics are usually caused by group A and C type meningococcus bacteria, and are more common in western Ethiopia. The disease is most common in young children, but it also can affect young adults living in crowded conditions, in institutions, schools and refugee camps.

*In populations over 30,000 people, a meningitis epidemic is defined as 15 cases per 100,000 inhabitants per week; or in smaller populations, five cases in one week or an increase in the number compared to the same period in previous years*.

**Mode of transmission**

Meningococcal meningitis is transmitted to a healthy person by airborne droplets from the nose and throat of infected people when they sneeze or cough. The disease is marked by the sudden onset of intense headache, fever, nausea, vomiting, sensitivity to light and stiffness of the neck. Other signs include lethargy (extreme lack of energy), coma (loss of consciousness), and convulsions (uncontrollable shaking, seizures)

Box 3.2 summarizes the general signs of meningitis, which may also be caused by some other serious conditions, and the more specific signs which are characteristic of meningitis.

Box 3.2 General and more specific signs of meningitis in infants

General signs of meningitis:

 Drowsy, lethargic or unconscious

 Reduced feeding

 Irritable

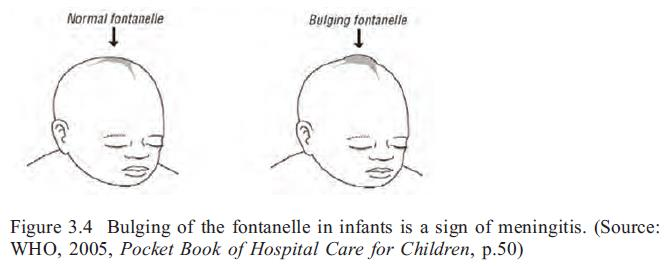
 High pitched cry.

More specific signs of meningitis:

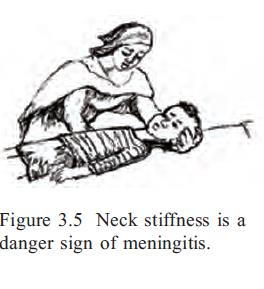
 Convulsion (fits)

 Bulging fontanelle in infants

During examination of a baby with meningitis, you will notice stiffness of the neck, or bulging of the fontanelle – the soft spot on top of the head of infants (see Figure 3.4). The fontanelle bulges because the infection causes fluid to build up around the brain, raising the pressure inside the skull. A bulging fontanelle due to meningitis is observed in infants since the bones of the skull are not yet fused together



Children may also show rigid posture due to irritation of the covering part of the brain or spinal cord. To check the presence of neck stiffness, ask the parents to lay the child in his/her back in the bed and try to flex the neck of the child (Figure 3.5).



If meningitis is not treated, mortality is 50% in children. This means that half of all cases end in death. However, with early treatment, mortality is reduced to between 5 to 10%. But about 10 to 15% of those surviving meningococcal meningitis will suffer from serious complications afterwards, including mental disorders, deafness and seizures.

**Prevention and control of meningococcal meningitis**

* Early identification and prompt treatment of cases in the health facility and in the community.
* Education of people in the community on the symptoms of meningitis, the mode of transmission and the treatment of the disease.
* Reporting any cases of meningitis to the District Health Office; and avoiding close contact with the sick persons. Your health education messages should tell everyone about this.
* Vaccination against meningococcus bacteria of types A, C, Y and W135, as described in the Immunization Module.

A mass immunization campaign that reaches at least 80% of the entire population with meningococcus vaccines can prevent an epidemic. However, these vaccines are not effective in young children and infants, and they only provide protection for a limited time, especially in children younger than two years old. A single case of meningitis could be a warning sign for the start of an epidemic. As a community Health Extension Practitioner, you will need to educate your community about the symptoms of meningitis and how it is transmitted. All cases should be reported to the District Health Office.

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

**Causes**

Bacterial meningitis can be caused by a range of bacteria, [including](https://www.cdc.gov/meningitis/bacterial.html):

* *Haemophilus influenzae (H. influenzae)* type B (Hib)
* *Neisseria meningitides (N. meningitides)*
* *Streptococcus pneumoniae (S. pneumonia)*
* *Listeria monocytogenes (L. monocytogenes*
* Group B Streptococcus

At different ages, people are more likely to be affected by different strains.

The bacteria that cause meningitis usually pass from one person to another, for example, through droplets in coughs and sneezes or through saliva or spit. Some types can spread through food.

Group B streptococcus can pass from mothers to newborns during delivery.

Some people are carriers. They have the bacteria, but they do not develop symptoms. Living in a house with either a carrier or someone who has meningitis increases the risk.

It is important to follow the recommended vaccination schedule to prevent meningitis. *H. influenza*is the main cause of bacterial meningitis in children under 5 in countries that do not offer the Hib vaccine.

**Prevention**

As several types of bacteria can cause bacterial meningitis, so a range of vaccines is necessary to prevent infection.

The first vaccine was created in [1981](http://www.ct.gov/dph/cwp/view.asp?a=3136&q=388352) to protect against 4 of the 13 subtypes of *N. meningitides*.

A survey of 17 million people in the U.S. found that the incidence of all types of meningitis fell by [31 percent](http://www.nejm.org/doi/full/10.1056/NEJMoa1005384#t=article) from 1998 to 2007, after the introduction of routine vaccinations against meningitis-causing bacteria.

The **meningococcal vaccine** is the primary vaccine in the U.S. All children should have this at the age of [11 to 12 years](https://www.cdc.gov/vaccines/parents/diseases/teen/mening.html) and again at 16 years, when the risk of infection is higher.

The **Hib vaccine** protects children against *H. Influenzae*. Before its introduction in the U.S. in 1985, *H. Influenzae* infected over [20,000](https://www.cdc.gov/vaccines/hcp/vis/vis-statements/hib.html) children under 5 years annually, with a 3 to 6 percent mortality rate. Widespread vaccination has reduced the incidence of bacterial meningitis by over 99 percent.

The Hib vaccine is given in four doses at the ages of [2, 4, 6, and 12 to 15](https://www.cdc.gov/vaccines/hcp/vis/vis-statements/hib.html) months.

Side effects of the vaccines may include redness and soreness at the site of the injection and a fever. Always check with a doctor to ensure that no allergies to any part of the vaccinations are present.

To prevent the spread of bacterial meningitis and other diseases, it is important to practice good hygiene, such as frequent handwashing.

Being aware of the signs and symptoms of bacterial meningitis will make it easier to take immediate action can be taken if necessary.

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

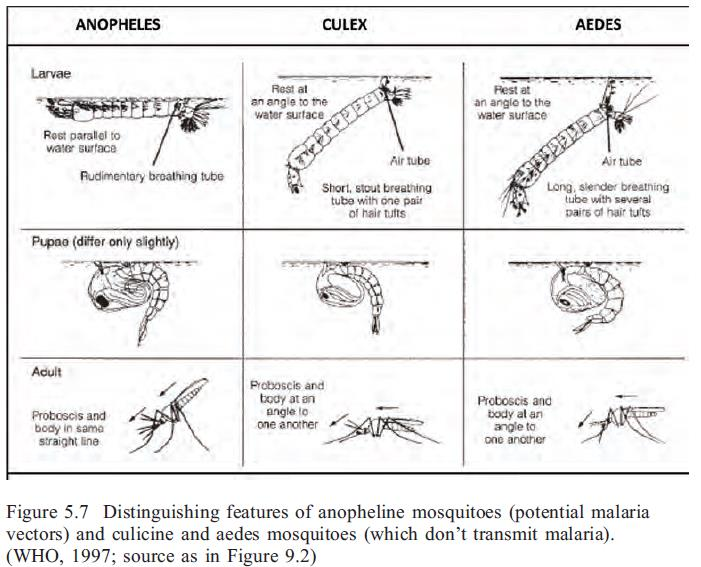
Larvae

* 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.

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.

And below is the table for illustration.



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