**BACHELOR OF SCIENCE IN NURSING:**

**COMMUNITY HEALTH NURSING**

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| **COURSE MODULE** | **COURSE TOPIC** | **WEEK** |
| 2 | I | 7 |
| **DOH RELATED PROGRAMS** | | |
| **Expanded Program on Immunization** | | |

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* Read course and unit Rea
* Read study guide prior to class attendance
* Read course unit and objectives
* Read required learning resources; refer to unit

terminologies for jargons

* Proactively participate in classroom/online discussions
* Participate in weekly discussion board (Canvas)
* Answer and submit course unit tasks

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* Module, Reference Books, Laptop, Internet, Headset

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*Cognitive*

* Discuss Expanded Programs on Immunization concepts holistically and comprehensively.
* Identify the EPI vaccines, their content, form, effect and management.
* Discuss the vaccine preventable diseases comprehensively.
* Explain the processes on how to administer EPI vaccines, their contraindications, reporting and recording.

*Affective*

* Model professional behavior as community health nurse.
* Maintain a harmonious and collegial relationship among members of the health team for effective, efficient and safe client care.
* Listen to your professor as they teach the lesson.
* Value the importance of the Expanded Program of Immunization to the community.

*Psychomotor*

* Manage resources efficiently and effectively.



**IMMUNIZATION**

Immunization is the process whereby a person is made immune or resistant to an infectious disease, typically by the administration of a vaccine. Vaccines stimulate the body’s own immune system to protect the person against subsequent infection or disease.

Immunization is a proven tool for controlling and eliminating life-threatening infectious diseases and is estimated to avert between 2 and 3 million deaths each year. It is one of the most cost-effective health investments, with proven strategies that make it accessible to even the most hard-to-reach and vulnerable populations.

**IMMUNITY**

Immunity is the condition of being secure against any particular disease.

Immunity is the ability of the human body to tolerate the presence of material indigenous to the body, and to eliminate foreign material. This discriminatory ability provides protection from infectious disease, since most microbes are identified as foreign by the immune system. Immunity to a microbe is usually indicated by the presence of antibody to that organism.

There are two basic mechanisms for acquiring immunity, active and passive.

1. **Active immunity** is protection that is produced by the person’s own immune system. This type of immunity usually lasts for many years, often during a lifetime. Active immunization is the induction of immunity after exposure to an antigen. Antibodies are created by the recipient and may be stored permanently.
2. **Passive immunity** is protection by products produced by an animal or human and transferred to another human, usually by injection. Passive immunity often provides effective protection, but this protection wanes (disappears) with time, usually within a few weeks or months. Passive immunization is the transfer of active humoral immunity in the form of readymade antibodies, from one individual to another.

**VACCINE**

A vaccine helps the body’s immune system to recognize and fight pathogens like viruses or bacteria, which then keeps us safe from the diseases they cause. Vaccines protect against more than 25 debilitating or life-threatening diseases, including measles, polio, tetanus, diphtheria, meningitis, influenza, tetanus, typhoid and cervical cancer.

There are many types of vaccines, categorized by the antigen used in their preparation. Their formulations affect how they are used, how they are stored, and how they are administered.

***Types of Vaccines:***

1. **Live-attenuated vaccines (LAV)**

Available since the 1950s, live attenuated vaccines (LAV) are derived from disease- causing pathogens (virus or bacteria) that have been weakened under laboratory conditions. They will grow in a vaccinated individual, but because they are weak, they will cause no or very mild disease.

1. **Inactivated vaccines (killed antigen)**

Inactivated vaccines are made from microorganisms (viruses, bacteria, other) that have been killed through physical or chemical processes. These killed organisms cannot cause disease.

1. **Subunit (purified antigen)**
2. *Protein-based subunit vaccines*

Protein based subunit vaccines present an antigen to the

immune system without viral particles, using a specific, isolate protein of the pathogen. A weakness of this technique is that isolated proteins, if denatured, may bind to different antibodies than the protein of the pathogen.

1. *Polysaccharide vaccines*

Some bacteria when infecting humans are often protected by a polysaccharide (sugar) capsule that helps the organism evade the human defense systems especially in infants and young children.

Polysaccharide vaccines create a response against the molecules in the pathogen’s capsule. These molecules are small, and often not very immunogenic. As a consequence, they tend to:

* Not be effective in infants and young children (under 18–24 months)
* Induce only short-term immunity

1. *Conjugate subunit vaccines*

Conjugate subunit vaccines also create a response against the molecules in the pathogen’s capsule. In comparison to plain polysaccharide vaccines, they benefit from a technology that binds the polysaccharide to a carrier protein that can induce a long-term protective response even in infants.

1. **Toxoid (inactivated toxins)**

Toxoid vaccines are based on the toxin produced by certain bacteria. The toxin invades the bloodstream and is largely responsible for the symptoms of the disease. The protein-based toxin is rendered harmless (toxoid) and used as the antigen in the vaccine to elicit immunity.

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| Type of vaccine | Examples |
| Live-attenuated | BACTERIA: Tuberculosis (BCG) |
| VIRUS: Oral polio vaccine (OPV)  : Measles  : Rotavirus  : Yellow fever |
| Inactivated | BACTERIA: Whole-cell pertussis (wP) |
| VIRUS: Inactivated polio virus (IPV) |
| Sub-unit  : Protein-based  : Polysaccharide  : Conjugate | BACTERIA: Acellular pertussis (aP)  VIRUS: Hepatitis B (HepB)  Pneumococcal, Meningococcal, Salmonella typhi  BACTERIA: Haemophilius influenzae type b (Hib)  : Pneumococcal (PCV-7, PCV-10, PCV-13) |
| Toxoid | BACTERIA: Tetanus toxoid (TT)  : Diphtheria toxoid |

***EXPANDED PROGRAM ON IMMUNIZATION***

The Expanded Program on Immunization (EPI) was established in 1976 to ensure that infants/children and mothers have access to routinely recommended infant/childhood vaccines. Six vaccine preventable diseases were initially included in the EPI: TB, poliomyelitis, diphtheria, tetanus, pertussis, and measles.

**Figure 1 Percentage of children aged 12-23 months with specific immunizations (information gathered from vaccination card or mother’s report), Philippines, 2003 and 2008.**

The immunization coverage of children has improved (see figure 1). The 2009 National Demographic and Health Survey showed that 3 out of 4 births were protected against neonatal tetanus, that is, women whose last birth was protected against neonatal tetanus was 76%. The differentials in protection against neonatal tetanus among subgroups of women vary. Across regions, tetanus toxoid (TT) coverage ranged from 39% in ARMM to 88% in Central Visayas and Cagayan Valley. By level of education, TT coverage was lowest for women with high school education at 80% (NSO, 2009).

***Goals for the expanded program on immunization***

***and*** ***supporting legislation***

To achieve the over-all EPI goal of reducing the morbidity and mortality among children against the most common vaccine-preventable diseases, the following laws have given the mandate of protecting children through immunization to the DOH and LGUs:

* R.A. 10152, also known as Mandatory Infants and Children Health Immunization Act of 2011, mandates basic immunization covering the vaccine-preventable diseases. Added to the six immunizable diseases previously mentioned are hepatitis B, mumps, rubella, diseases caused by *Haemophilus influenzae* type B (Hib), and other diseases as determined by the Secretary of Health in a department circular. It gives the directive to government hospitals and health centers to provide for free mandatory basic immunization to infants and children up to 5 years of age.
* R.A. 7846 provided for compulsory immunization against hepatitis B for infants and children below 8 years old. It also provided for hepatitis B immunization within 24 hours after birth of babies of women with hepatitis B.

The following are the specific goals of the program:

1. To immunize all infants/children against the most common vaccine-preventable diseases.
2. To sustain the polio-free status of the Philippines.
3. To eliminate measles infection.
4. To eliminate maternal and neonatal tetanus.
5. To control diphtheria, pertussis, hepatitis B, and German measles.
6. To prevent extrapulmonary TB among children.

***EPI Diseases***

1. **TUBERCULOSIS (TB)**

**What is tuberculosis?**

Tuberculosis is caused by a bacterium *(Mycobacterium tuberculosis)*that is carried by almost 2 billion people. The disease killed more than 3 million people in 1995. It usually attacks the lungs, but other parts of the body, including the bones, joints and brain can also be affected.

There is a difference between tuberculosis infection and disease. People with the infection only do not feel ill and have no symptoms. The infection may last for a lifetime and the infected person may never develop the disease. Persons with the infection but not the disease cannot spread the infection to others.

People of all ages can contract tuberculosis. It spreads rapidly, particularly where people are living in crowded conditions, have poor access to care, and are malnourished.

**How is tuberculosis spread?**

Tuberculosis is spread through the air. When a person with the disease coughs or sneezes the germs enter the air. A person inhaling air that contains TB germs may become infected. TB can spread rapidly where people are living in crowded conditions, have difficulty in obtaining medical care, and are poorly nourished. In some areas it is possible to become infected from cattle with the disease, for instance by consuming unpasteurized milk.

The incubation period is 4-12 weeks but the infection may persist for months or years before the disease develops. A person with the disease can infect others for several weeks after he or she begins treatment. The risk of developing TB is highest in children aged under 3 years and in very old people, although anyone may be affected. Persons with TB infection who have weakened immune systems, for instance people with HIV/AIDS, are more likely to develop the disease than are those with normal immune systems.

Concern about TB has been heightened recently because some strains of the causative organism have developed resistance to drugs.

**What are the signs and symptoms?**

The symptoms of TB include general weakness, weight loss, fever and night sweats. In TB of the lungs (pulmonary TB) the symptoms include persistent cough, the coughing up of blood, and chest pain. However, in young children the only sign of pulmonary tuberculosis may be stunted growth or failure to thrive. Other signs and symptoms depend on the part of the body that is affected. For instance, in TB of the bones and joints there may be swelling, pain and crippling effects in the hips, knees or spine.

**What are the complications?**

TB weakens the body generally, increasing the likelihood that the affected person will contract other diseases or that existing diseases will become more severe.

**How is tuberculosis treated?**

People with TB must complete a course of curative therapy, which usually includes taking two or more anti-tuberculosis drugs for at least six months. Unfortunately, some people fail to take the medications as prescribed or to complete their course of therapy, or they may be given ineffective treatments. This may lead to multi-drug-resistant TB, which can be spread to other people.

**How is tuberculosis prevented?**

The best protection available for children against tuberculosis infection is immunization with BCG vaccine. In persons who have been thus immunized it is impossible to determine whether a positive tuberculin skin test reaction is caused by the immunization or by infection with the TB bacterium. However, such individuals can be further examined to determine whether they are infected.

1. **DIPHTHERIA**

**What is diphtheria?**

Diphtheria is caused by a germ called *Corynebacterium diphtheriae.*Major epidemics have occurred in Eastern Europe and Central Asia since the late 1980s. It tends to be a disease of the colder months and of temperate climatic zones.

The germ produces a toxin that can harm or destroy human body tissues and organs. One type of the disease affects the pharynx and other parts of the throat. Another type, commoner in the tropics, causes ulcers on the skin.

Diphtheria affects people of all ages, but mostly non-immunized children under 15 years of age.

**How is diphtheria spread?**

The type of diphtheria that affects the throat is spread in droplets and secretions from the nose, throat and eyes when there is close contact between infected and uninfected people. The other type is spread through contact with skin ulcers. This form of the disease is often disseminated on clothing and other articles that have been contaminated with fluid from skin ulcers.

People infected with diphtheria usually become ill within two to four days, although the symptoms may not appear until six days have elapsed. Infected individuals can usually spread the disease to others for up to four weeks, although rarely this can happen for up to six months. During outbreaks and epidemics some children may carry the germ without showing any signs or symptoms but can still spread the disease to other people.

The spread of the disease is favored in overcrowded and poor living conditions.

**What are the signs and symptoms?**

When diphtheria affects the throat and tonsils, the early symptoms are sore throat, loss of appetite and slight fever. Within two to three days a bluish-white or grey membrane forms in the throat and tonsils. If there is bleeding the membrane may become greyish-green or black. It sticks to the soft palate of the throat, and bleeding may occur if attempts are made to remove it. The patient may recover at this point or may develop severe weakness and die within six to ten days. Patients with severe disease do not show high fever but may develop swelling of the neck and obstruction of the airway.

In the type of diphtheria affecting the skin, the lesions may be painful, reddened and swollen. Any chronic skin lesions may become infected with diphtheria.

**What are the complications?**

Abnormal heart beats may occur during the early phase of the illness or weeks later, and heart failure may result. There may be inflammation of the heart muscle and valves, leading after many years to chronic heart disease and heart failure. Death occurs in 5-10% of cases.

**How is diphtheria treated?**

Persons in whom diphtheria is suspected should be given diphtheria antitoxin and antibiotics such as erythromycin or penicillin, and should be isolated to avoid exposing others to the germs. Throat cultures should be obtained in order to secure correct diagnosis. Patients become non-infectious about two days after the commencement of antibiotic treatment.

**How is diphtheria prevented?**

The most effective way of preventing diphtheria is to maintain a high level of immunization in the community. A mother can pass protective antibodies to her baby but this protection lasts only about six months.

In most countries, diphtheria toxoid vaccine is given together with pertussis vaccine and tetanus toxoid. A combination of tetanus and diphtheria vaccine may be recommended as a booster to maintain protection every ten years.

1. **POLIOMYLITIS (POLIO)**

**What is polio?**

Polio is caused by a virus. It is a crippling disease that can occur in adults but it is much commoner in children.

**How is polio spread?**

The virus enters the body through the mouth when people eat food or drink water contaminated by feces carrying it. Consequently, the disease is most likely to spread in areas of poor sanitation. The virus enters the bloodstream and may invade certain types of nerve cell, which it can damage or destroy.

It also occurs in throat secretions, and is sometimes spread in airborne droplets through close contact with persons carrying the infection who are sneezing or coughing, or through exposure to throat and nose secretions in other ways.

The disease is very easily spread. Nearly all children living in households where someone is infected themselves become infected. Persons are most likley to spread the virus seven to ten days before and seven to ten days after they first experience symptoms of the disease. Infected persons who do not have symptoms can also spread the disease.

**Many people who contract polio do not become seriously ill but may spread the disease to others who may become ill**

**.**

**About 1 child in every 100 infected by the polio virus develops paralysis.**

**What are the signs and symptoms?**

People infected with the virus may not feel ill. Some may have influenza-like symptoms such as fever, loose stools, sore throat, stomach upset, headache or stomachache. Sometimes there may be pain or stiffness in the neck, back and legs.

The most serious form of the disease is paralytic polio. It begins with the milder forms but usually causes severe muscle pain as well as the other symptoms. Paralysis usually develops during the first week of illness. The use of one or both legs or arms may be lost, and breathing may be impossible without the help of a respirator. The degree of recovery varies from person to person.

In childhood polio there is initially a slight fever. Within three to five days the child develops a headache, stiff neck, and muscle pain, and the fever then increases. After a further period of one to three days the child becomes paralyzed in the legs, arms, face or chest.

The incubation period ranges from 3 to 35 days. Laboratory testing of the stools or throat secretions is used to confirm cases of polio.

**What are the complications?**

About 1% of infected children become paralyzed, and a larger percentage of these children have some permanent paralysis. Death may occur if the muscles used for breathing are paralyzed and no respirator is available.

**How is polio treated?**

There is no treatment but the symptoms can be relieved somewhat. Sometimes the patient has to use a respirator in order for breathing to continue.

**How is polio prevented?**

Polio prevention involves immunization with oral polio vaccine (OPV). Antibodies from the mother provide protection to the infant for two to three months after birth. Infected people who recover can develop natural immunity that protects them against future infection.

OPV is recommended by EPI for the eradication of polio. It is cheap, easy to give, highly effective and safe. The EPI schedule comprises four doses, starting at birth and ending at 14 weeks of age.

**Polio is caused by a virus and can lead to severe, possibly lifelong, paralysis.**

**The disease is easily spread from person to person and from hand to mouth, through eating food or drinking water that has been contaminated**

**with feces from an infected individual.**

**The recommended method of prevention in children is to immunize**

**with oral polio vaccine (OPV).**

1. **MEASLES**

Measles kills more children than any other of the EPI target diseases. It is caused by a virus and is highly infectious, i.e., very easily spread. It is constantly present in some populations and often occurs in epidemic proportions. In conditions of crowding and poverty where large numbers of non-immunized people are in close contact the stage is set for measles epidemics. The disease is more severe in infants and adults than in children.

**How is measles spread?**

Measles is spread by contact with nose and throat secretions of infected people and in airborne droplets released when an infected person sneezes or coughs. Transmission by airborne droplets can occur even two hours after an infected person has left a room or other closed area.

An infected person can infect others a few days before and for several days after he or she develops symptoms. The disease spreads easily wherever infants and children gather together.

**What are the signs and symptoms?**

The incubation period ranges from 7 to 18 days. The first sign of infection is a high fever lasting one to seven days. During this period there may be a runny nose, cough, red and watery eyes, and small white spots inside the cheeks. After several days a slightly raised rash develops, spreading from the face and upper neck to the body and then to the hands and feet over a period of about three days. It lasts for five to six days and fades successively from the same areas. There may also be loss of appetite and loose stools, especially in infants.

**What are the complications?**

Complications occur particularly in children aged under 5 years and in adults aged over 20 years. Severe diarrhea may be a problem, especially in infants, possibly causing dehydration. In children there may be inflammation of the middle ear, respiratory tract infections and croup.

Pneumonia is the commonest cause of death associated with measles. This is usually because the measles virus weakens the immune system. The pneumonia may be caused by the measles virus itself or by other germs. Encephalitis, a dangerous swelling of the brain, may also develop.

Children aged under 12 months, if not immunized, are the most likely to acquire measles infection. Severe measles is particularly likely in poorly nourished children, especially those not receiving sufficient vitamin A, in children living in crowded conditions, and in those with immune systems that have been weakened by AIDS or other diseases. Measles is a major cause of blindness among children in Africa.

People who recover from measles are immune for the rest of their lives, and infants born to mothers who have had measles are usually immune for six to eight months.

**What is the treatment for measles?**

The treatment of children suffering complications of measles can save their lives. Vitamin A administration can help to avoid the complications of eye damage and blindness. All children with severe measles, and all children in developing countries with measles, should receive vitamin A supplementation as soon as they are seen at a health facility, and a second dose should be given the next day. General nutritional support and the treatment of dehydration with oral rehydration solution may be necessary. It is very important to encourage children with measles to eat and drink.

**How is measles prevented?**

The prevention of measles involves immunization with measles vaccine. Children should receive one dose before the age of 1 year. In some countries, measles vaccine is combined with vaccines against the mumps and rubella viruses. Two doses of measles vaccine are recommended in some instances, as in refugee camps where there is a high probability of exposure to the disease.

Children should be immunized against measles on admission to hospital because of the danger of infection. If they are aged 6-9 months the initial dose should be followed by a second as soon as possible after the age of 9 months. Children admitted to hospital with measles should be isolated for at least four days after the skin rash appears. Malnourished children with measles should be isolated for the duration of the illness.

Some 124 million children under 5 years of age suffer vitamin A deficiency. In areas known to be deficient in vitamin A it can be given at the same time as measles vaccine or any other recommended EPI vaccine.

**Measles is a highly infectious viral disease that is spread from person to person through sneezing, coughing and close personal contact.**

**All children should receive measles vaccine before the age of 1 year.**

**Severe complications of measles can be avoided if proper treatment is given.**

1. **PERTUSSIS**

Pertussis, or whooping cough, is a disease of the respiratory tract caused by a germ called *Bordetella pertussis*which lives in the mouth, nose and throat. Many children with pertussis have coughing spells lasting four to eight weeks. The disease is common in non-immunized children everywhere. It has become increasingly so in recent years and severe epidemics have occurred in countries where immunization coverage has declined. The disease is most dangerous in children aged under 1 year.

**How is pertussis spread?**

Pertussis spreads very easily from person to person in droplets produced by coughing or sneezing. Most persons exposed to the germs become infected. In many countries the disease occurs in regular epidemic cycles of three to five years. The most susceptible people are the youngest non-immunized children.

The disease is most readily transmitted as from seven days after a person has been exposed to the germs until three weeks after the start of coughing. The incubation period can be up to 21 days.

**Young infants are the most likely to contract pertussis and the most likely to develop bacterial pneumonia, a life-threatening complication.**

**What are the signs and symptoms?**

There are usually three stages in the illness. Initially a child appears to have a common cold, with runny nose, watery eyes, sneezing, fever and a mild cough. The cough gradually worsens and the second stage involves numerous bursts of rapid coughing. At the end of these bursts the child takes in air with a high-pitched whoop. The child may turn blue because of a lack of oxygen during a long burst of coughing. Vomiting and exhaustion often follow the coughing attacks, which are particularly frequent at night. This stage usually lasts one to six weeks but may go on for up to ten weeks. The attacks become milder with the passage of time.

In the third stage, when recovery takes place, the coughing gradually becomes less intense and stops in two to three weeks. There is not usually a high fever during the illness.

**What are the complications?**

Complications are most probable in young infants. The commonest and the cause of most deaths is bacterial pneumonia. Convulsions and seizures may occur, these complications arising because of the reduced oxygen supply to the brain during coughing attacks or because of the toxins released by the pertussis germs. Less serious complications include loss of appetite, inflammation of the middle ear, and dehydration.

**What is the treatment for pertussis?**

Treatment with an antibiotic, usually erythromycin, may make the illness less severe. The use of antibiotics also reduces the ability of the patient to infect others because the medicaments kill germs in the nose and throat. Plenty of fluids should be given to prevent dehydration. Sometimes people in the same household as a patient are given antibiotics to reduce the probability of infection.

**How is pertussis prevented?**

Prevention involves immunization with pertussis vaccine, which is usually given in combination with diphtheria and tetanus vaccines. Newborns and infants are not protected against pertussis by maternal antibodies. A person infected with pertussis usually acquires lifelong immunity.

**Pertussis is a bacterial infection spread from person to person**

**by sneezing and coughing.**

**The disease is extremely contagious, especially where people live in**

**crowded conditions and nutrition is poor.**

**Infants and very young children are the people most likely to be infected,**

**to have serious complications, and to die from the disease.**

**The most effective way to prevent pertussis is**

**to immunize all children aged under 1 year.**

1. **TETANUS**

**What is tetanus?**

In tetanus or lockjaw, the affected person's muscles all contract, making the body stiff. The disease is particularly common and serious in newborn babies, when it is called neonatal tetanus.

Tetanus is caused by the germ *Clostridium tetani,*which grows in dead tissue, for instance in a wound or in a baby's umbilical cord. The germ is common in the environment, often occurring in soil containing manure. The bacteria form spores that can survive in the environment for years. The toxin they produce poisons the nerves that control the muscles, and this causes stiffness.

People of all ages can catch tetanus. Neonatal tetanus kills between 500 000 and 1 million babies every year. Almost all babies who catch the disease die. It is particularly common in rural areas and tropical lowlands.

**How is tetanus spread?**

Tetanus is not transmitted from person to person. A person may become infected if soil or dung enters a wound or cut. This may happen, for example, if a wound is made with a dirty tool. Tetanus germs are likely to grow in deep puncture wounds caused by dirty nails, needles, barbed wire, thorns, wood splinters and animal bites.

A newborn baby may become infected if the knife, razor or other instrument used to cut the umbilical cord is dirty. Infection may also occur if cow dung or ash is used to dress the cord, or if soil enters the baby's navel. If the hands of the person delivering are not clean the baby may become infected. Infants and children may also contract tetanus when dirty instruments are used for circumcision, scarification and skin-piercing, and when dirt, charcoal or other unclean substances are rubbed into a wound.

**Neonatal tetanus remains a serious problem in countries with poor immunization coverage and unclean practices associated with childbirth.**

**If untreated, tetanus is a very serious disease at any age. Almost every person contracting tetanus dies.**

**What are the signs and symptoms?**

In newborn babies the symptoms usually appear 4-14 days after birth. The incubation period is usually between three and ten days but may be as long as three weeks. The shorter the incubation period, the higher is the risk of death.

Muscular stiffness in the jaw is a common first sign. This is followed by stiffness of the neck, difficulty in swallowing, stiffness of the stomach muscles, muscle spasms, *sweating*and fever.

Newborn babies with tetanus appear normal at birth but stop sucking three to ten days later. At 5-13 days they are still not breast-feeding, the whole body becomes stiff, severe muscle contractions and convulsions occur, and death follows in most cases.

**What are the complications?**

Fractures of the spine or other bones may occur as a result of muscle spasms and convulsions. Abnormal heartbeat, coma, pneumonia and other infections may also occur. Death is particularly likely in very young and old age groups.

**What is the treatment for tetanus?**

Wounds should be thoroughly cleaned and dead tissue should be removed. For persons with wounds that are neither clean nor minor and who are not fully protected against tetanus, tetanus immune globulin should be given.

Antibiotics may also be used.

Persons who recover from tetanus do not have natural immunity.

**How is tetanus prevented?**

The prevention of neonatal tetanus requires women of childbearing age to receive tetanus toxoid. This results in the protection of mothers and in tetanus antibodies being transferred from them to their fetuses. Infants are thus protected against the disease at birth. Clean practices during delivery and clean wound care are also very important in preventing tetanus.

**All children should be immunized against tetanus because antibodies transferred from the mother before birth last for only a few months.**

**Tetanus is caused by a germ found in the natural environment.**

**Infection occurs when unclean objects puncture or cut the skin and umbilical cord and during unclean delivery practices.**

**Nearly all newborns with tetanus die.**

**The most important way to achieve prevention is to immunize women of childbearing age and to ensure clean delivery practices.**

1. **HEPATITIS B**

**What is hepatitis B?**

This disease, caused by the hepatitis B virus, affects the liver. People usually recover, but some continue to carry the virus for many years and can spread the infection to others throughout the time that they are chronic carriers.

**How is hepatitis B spread?**

The hepatitis B virus is carried in the blood, saliva, semen, vaginal fluids and most other body fluids. However, it is usually spread by contact with blood in the following ways:

* Injection with unsterilized needles or syringes containing hepatitis B virus from an infected person, for instance another patient or a needle-user.
* Transmission of hepatitis B virus by mothers to their babies during the birth process, when contact with blood always occurs.
* Transmission between children during social contact through cuts, scrapes and scratches.
* Transmission during sexual intercourse through contact with blood or other body fluids.

The virus does not occur in an infected person's stools unless they contain blood. It does occur in the milk of infected mothers but in such small amounts that nursing can proceed.

The disease occurs all over the world and can affect all age groups. Most chronic carriers are in China, South-East Asia, and Africa.

The incubation period averages six weeks but may be as long as six months.

**What are the signs and symptoms?**

The younger a person is when infected the more likely it is that he or she will show no signs or symptoms. A person with no symptoms may remain infected for many years and can spread the infection to others. Such a person is more likely than one showing symptoms to suffer complications caused by liver damage in the long term.

Infected people may feel weak and may experience stomach upsets and other influenza-like symptoms. They may also have very dark urine or very pale stools. Jaundice may appear as yellow skin or a yellow color in the whites of the eyes. The symptoms may last several weeks. General weakness and fatigue may continue for months. A laboratory blood test is required to determine with certainty whether a person has hepatitis B virus or disease.

Most acute infections in adults are followed by complete recovery, and the affected people rarely become chronic carriers. However, many children, even though they are not acutely ill as a rule, do become chronic carriers, and many develop severe complications.

**What are the complications?**

Infected persons who recover and do not become carriers possess antibodies and are protected throughout their lives.

The consequences of acute infection can be severe. Death occurs in a small percentage of adults. Most serious complications, including chronic hepatitis, cirrhosis, liver failure and liver cancer, occur in persons with chronic infection.

**Most babies born to mothers who are carriers also become carriers.**

**About 25% of untreated babies who are infected with hepatitis B virus subsequently develop severe chronic liver disease or even liver cancer.**

**What is the treatment for hepatitis B?**

There is no treatment for the acute condition. In chronic infection the disease can sometimes be stopped by certain medications.

**How is hepatitis B prevented?**

Safe and effective hepatitis B vaccine is available. EPI recommends that children receive three doses during the first year of life, the first dose being administered either at birth or at about six weeks of age on the occasion of the first clinic visit, and the third at 14 weeks. If possible, all pregnant women should be tested to determine whether they carry the virus in their blood. Babies of mothers who are carriers should then receive an injection of hepatitis B antibodies (hepatitis B immune globulin) together with the first dose of vaccine at birth.

In some countries the hepatitis B vaccine is offered to or recommended for adolescents and young adults, since the virus is sexually transmitted and is also easily spread through needle-sharing.

Persons with hepatitis B virus should not donate blood and should not allow other persons to come into contact with their blood or other body fluids. They should use barrier methods when having sex and should not share eating utensils, toothbrushes, needles or razors with other people.

Health care workers should use all necessary precautions with all patients because patients who are carriers of the virus can spread the infection to them quite easily through blood contact.

**The hepatitis B virus is spread through contact between people's blood**

**and other body fluids.**

**The disease occurs in both acute and chronic forms.**

**The younger a person is on becoming infected, the less probable it is that symptoms will occur but the more probable it is that he or she will become a carrier of the disease and develop a severe liver condition later.**

**Most people are infected by non-symptomatic carriers of the disease, and many children are infected by mothers who are carriers.**

1. **YELLOW FEVER**

**What is yellow fever?**

Yellow fever, an acute disease of short duration, is caused by a virus. It occurs in tropical and subtropical areas, mainly in sub-Saharan Africa and Central and South America, and affects people of all ages.

**How is yellow fever spread?**

The yellow fever virus is spread by mosquitos when they bite humans. It is not spread directly from person to person. The mosquitos act as hosts for the infection and deliver it to people, and are said to be vectors of the disease. They breed in small accumulations of stagnant water. Once infected, mosquitos carry the virus for life.

Mosquitos may acquire the virus by biting either infected monkeys or infected humans, and they can subsequently spread it to humans.

**What are the signs and symptoms?**

The illness may be so mild that it is not noticed or diagnosed. It can be confused with malaria, hepatitis and other diseases. Three to six days after a person has been infected by a mosquito, he or she suddenly develops fever, chills, headache, backache, general muscle pain. upset stomach and vomiting. When the disease progresses, the person becomes slow and weak and there is bleeding of the gums and blood in the urine. There may be jaundice and black vomiting.

**What are the complications?**

The disease usually lasts two weeks, after which the patient either recovers or dies. Death may follow convulsions and coma. In areas where the disease is endemic about 5% of infected persons die from the disease. In epidemics, when large numbers of people are infected during a short period, up to 50% of infected people may die.

Yellow fever is diagnosed by performing a laboratory blood test. Persons recovering from yellow fever have lifelong immunity.

**Yellow fever causes about 30 000 deaths annually.**

**Children in 33 African countries are at highest risk for the disease.**

**The disease is of short duration and can be fatal.**

**What is the treatment for yellow fever?**

There is no specific treatment. Patients may require fluids to compensate for dehydration.

**How is yellow fever prevented?**

The disease is prevented by immunization with yellow fever vaccine, which is given to children in a single dose, usually when they are aged 9 months and at the same time as measles vaccine. The vaccine is very safe and effective, producing antibodies against yellow fever which can last for 30 years or longer.

Prevention should also involve the elimination of the accumulations of stagnant water in which the vector mosquitos breed.

**Yellow fever is caused by a virus that is transmitted by mosquitos.**

**It is an acute disease from which patients either recover completely or die.**

**There is a safe and effective vaccine against the disease for children.**

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***Immunization schedule for infants and young children***

Immunization is an essential health intervention for eligible children and women, and this service is available in all health facilities and institutions providing health services for women and children nationwide. Wednesday is the immunization day in government health facilities unless otherwise revised by local traditions, customs, and other exceptions.

Infants are given this service according to the schedule and manner prescribed by the DOH. The schedule and manner of administration of infant immunizations are shown on Table 1.

Table 1 EXPANDED PROGRAM ON IMMUNIZATION MANUAL, REVISED EDITION, 1995, DEPARTMENT OF HEALTH, REPUBLIC OF THE PHILIPPINES AO NO. 2006-0015

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Antigen | Age | Dose | Route | Site |
| BCG vaccine | At birth | 0.05 ml | Intradermal | Right deltoid region (arm) |
| Hepatitis B vaccine | At birth | 0.5 ml | Intramuscular | Anterolateral thigh muscle |
| DPT-HepB-Hib  (Pentavalent vaccine) | 6 weeks  10 weeks  14 weeks | 0.5 ml | Intramuscular | Anterolateral thigh muscle |
| Oral polio vaccine | 6 weeks  10 weeks  14 weeks | 2 drops | Oral | Mouth |
| Anti-measles vaccine  (AMV1) | 9-11 months | 0.5 ml | Subcutaneous | Outer part of the upper arm |
| Measles-mumps-rubella vaccine (AMV2) | 12-15 months | 0.5 ml | Subcutaneous | Outer part of the upper arm |
| Rotavirus vaccine | 6 weeks  10 weeks | 1.5 ml | Oral | Mouth |

Receiving the antigens at the earliest possible age reduces the chance of the child getting infected or sick of the immunizable diseases. Administration of the hepatitis B vaccine at birth reduces the chance of the child becoming a carrier. Studies also show that measles vaccine is 85% effective.

In 2012, two new vaccines were introduced as part of EPI: Rotavirus vaccine and Hib vaccine. Rotavirus infects the large intestine. It is the most common cause of severe diarrhea I infants and children. Children between the ages of 6 and 24 months are at great risk of developing severe Rotavirus infection. In the Philippines, at least 30% of diarrhea-related hospitalizations are caused by Rotavirus.

Hib is a bacterium responsible for serious illness, such as meningitis and pneumonia, with almost all cases younger than 5 years, with those between 4 and 18 months of age especially vulnerable.

The following are important considerations related to the schedule and manner of administering infant immunizations:

* Use only sterile syringe and needle per client
* There is no need to restart a vaccination series regardless of the time that has elapsed between doses.
* All the EPI antigens are safe and effective when administered simultaneously, that is, during the same immunization session but at different sites. It is *not* recommended, however, to mix different vaccines in one syringe before injection, or to use a fluid vaccine for reconstitution of a freeze-dried vaccine. When a vaccine is administered to an infant at the same time with another injectable vaccine, the vaccines should be administered on different sites. However, if more than one injection has to be given on the same limb, the injection sites should be 2.5-5cm apart to prevent overlapping of local reactions.
* The recommended sequence of the coadministration of vaccines is OPV first followed by Rotavirus vaccine, then other appropriate vaccines.
* OPV is administered by putting drops of vaccine straight from the dropper onto the child’s tongue. Do not let the dropper touch the tongue.
* Only monovalent hepatitis B vaccine must be used for the birth dose. Pentavalent vaccine must not be used for the birth dose because DPT and Hib vaccine should not be given at birth. A monovalent vaccine is one that contains an antigen against a single disease. Pentavalent vaccines contain antigens against five diseases: diphtheria, pertussis, tetanus, hepatitis B, and Hemophilus influenzae B.
* Children who have not received AMV1 as scheduled and children whose parents or caregivers do not know whether they have received AMV1 shall be given AMV1 as soon as possible, then AMV2 one month after the AMV1 dose.
* All children entering day care centers/ preschool and Grade I shall be screened for measles immunization. Those without the immunization shall be referred to the nearest health facility for immunization.
* The first dose of Rotavirus vaccine is administered only to infants aged 6 weeks to 15 weeks. The second dose is given only to infants aged 10 weeks up to a maximum of 32 weeks.
* Administer the entire dose of the Rotavirus vaccine slowly down one side of the mouth (between the cheek and gum) with the tip of the applicator directed toward the back of the infant’s mouth. To prevent spitting or failed swallowing, stimulate the rooting or sucking reflex of the young infant. For infants aged 5 months or older, lightly stroke the throat in a downward motion to stimulate swallowing.

***EPI Vaccines***

Preparations used in EPI are either inactivated (killed) microorganisms, attenuated microorganisms, fragments from microorganisms like hepatitis B vaccine, or toxoids. Attenuated vaccines are live microorganisms that have been altered so that they are no longer pathogenic, but are still antigenic. Toxoids are inactivated or altered bacterial exotoxins.

Table 2  **EPI VACCINES, CONTENTS AND FORM**

|  |  |  |
| --- | --- | --- |
| Vaccine | Contents | Form |
| BCG (Bacillus Calmette-Guerin) | Live, attenuated bacteria | Freeze-dried, reconstituted with a special diluent |
| Hepatitis B vaccine | RNA-recombinant, using Hepatitis B surface antigen (HBs Ag) | Cloudy, liquid, in an auto-disable injection syringe if available |
| DPT-HepB-Hib  (Pentavalent vaccine) | Diphtheria toxoid, inactivated pertussis bacteria, tetanus toxoid, recombinant DNA surface antigen, and synthetic conjugate of *Haemophilus influenzae* B bacilli | Liquid, in an auto-disable injection syringe |
| Oral polio vaccine | Live, attenuated virus (trivalent) | Clear, pinkish liquid |
| Anti-measles vaccine (AMV1) | Live, attenuated virus | Freeze-dried, reconstituted with a special diluent |
| Measles-mumps-rubella vaccine (AMV2) | Live, attenuated viruses | Freeze-dried, reconstituted with a special diluent |
| Rotavirus vaccine | Live, attenuated virus | Clear, colorless liquid, in a container with an oral applicator |
| Tetanus toxoid | Weakened toxin | Sometimes slightly turbid in appearance: Clear, colorless liquid; sometimes slightly turbid… |

***Target setting and vaccine requirements***

The first specific goal of EPI in the Philippines indicates a target of 100% immunization of infants/children against the most common vaccine-preventable diseases. At the RHU/health center level, the public health nurse is responsible for preparing vaccine requirements and overseeing vaccine allocation. Vaccine requirement is calculated based on eligible population. The nurse uses the following formulas to estimate eligible population:

***Maintaining the potency of EPI vaccines***

Vaccines confer immunity only when they are potent, and to retain the potency, vaccines must be properly stored, handled, and transported. The following points are important considerations to maintain the potency of EPI vaccines.

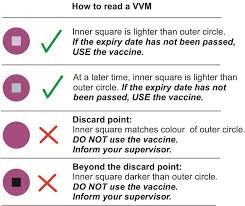
* ***Maintain the COLD CHAIN***

The cold chain is a system for ensuring the potency of a vaccine from the time of manufacture to the time it is given to an eligible client.

The person directly responsible for cold chain management at each level is called the Cold Chain Officer. At the RHU/health center, the public health nurse acts as the Cold Chain Officer. This means that the nurse is in charge of maintaining the cold chain equipment and supplies, such as the freezer/refrigerator, transport box, vaccine bags/carriers, cold chain monitors, thermometers, and cold packs. The nurse implements an emergency plan in the event an electrical breakdown or power failure.

EPI vaccines and the special diluents have the following cold chain requirements:

* OPV: -15 to 25⁰C. OPV has to be stored in the freezer. In the vaccine bag, OPV is placed in contact with cold packs.
* All other vaccines, including measles vaccine, MMR, and Rotavirus vaccine, have to be stored in the refrigerator at a temperature of +2 to +8⁰C. These vaccines should be stocked neatly on the shelves of the refrigerator. Do not stock vaccines at the refrigerator door shelves.
* Hepatitis B vaccine, Pentavalent vaccine, Rotavirus vaccine, and TT are damaged by freezing, so they should not be stored in the freezer. Wrap the containers of these vaccines with paper before putting them in the vaccine bag with cold packs.
* Keep diluents cold by storing them in the refrigerator in the lower or door shelves.
* ***Other considerations to maintain potency***
* Observe the first expiry-first out (FEFO) policy.
* Comply with the recommended duration of storage and transport. At the health center/RHU with a refrigerator, the duration of storage should not exceed one month. Using transport boxes, vaccines can be kept only up to maximum of 5 days.
* Take note if the vaccine container has a vaccine vial monitor (VVM) and act accordingly. The VVM is a round disc of heat-sensitive material placed on a vaccine vial to register cumulative heat exposure. A direct relationship exists between rate of color change and temperature: the lower the temperature, the slower the color change; the higher the temperature, the faster the color change.



* Abide by the open-vial policy of the DOH. A multidose vial may be opened for one or two clients if the health worker feels that a client cannot come back for the scheduled immunization session. Multidose liquid vaccines, such as OPV, Pentavalent vaccine, hepatitis B vaccine, and TT from which one or more doses have been taken **following standard sterile procedures**, may be used in the next immunization sessions for **up to maximum of 4 weeks**, provided that **all** the following conditions are met:
* The expiry date has not passed.
* The vaccine has not been contaminated.
* The vials have been stored under appropriate cold chain conditions.
* The vaccine vial septum has not been submerged in water.
* The VVM on the vial, if attached, has not reached the discard point.
* Reconstitute freeze-dried vaccines such as BCG, AMV, and MMR *only* with the diluents supplied with them.
* Discard reconstituted freeze-dried vaccines 6 hours after reconstitution of at the end of the immunization session, whichever comes sooner.
* Protect BCG from sunlight and Rotavirus vaccine from light.

***Side effects of adverse reactions of immunization***

Vaccine recipients or their parents/guardians should be informed of side effects or adverse reactions of vaccine(s) to be given. Adverse events should be monitored closely.

BCG injection results in the formation of a wheal that disappears within 30 minutes. After about 2 weeks, a small red tender swelling appears at the injection site, which may develop into a small abscess which ulcerates. The ulcer heals by itself and leaves a scar. The whole course from vaccination to the formation of a scar takes about 12 weeks. This is an expected response and does not require any management.

**Table 3 SIDE EFFECTS OF VACCINATION AND THEIR MANAGEMENT**

|  |  |  |
| --- | --- | --- |
| Vaccines | Side effects | Management |
| BCG | Koch’s phenomenon: an acute inflammatory reaction within 2-4 days after vaccination; usually indicates previous exposure to tuberculosis | No management is needed |
| Deep abscess at vaccination site; almost invariably due to subcutaneous or deeper injection | Refer to the physician for incision and drainage |
| Indolent ulceration: an ulcer which persists after 12 weeks from vaccination date | Treat with INH powder |
| Glandular enlargement: enlargement of lymph glands draining the injection site | If suppuration occurs, treat as deep abscess |
| Hepatitis B vaccine | Local soreness at the injection site | No treatment is necessary |
| DPT-HepB-Hib  (Pentavalent vaccine) | Fever that usually lasts for only 1 day. Fever beyond 24 hours is not due to the vaccine but to other causes | Advise parents to give antipyretic |
| Local soreness at the injection site | Reassure parents that soreness will disappear after 3-4 days |
| Abscess after a week or more usually indicates that the injection was not deep enough or the needle was not sterile | Incision and drainage may be necessary |
| Convulsions: although very rare, may occur in children older than 3 months; caused by pertussis vaccine | Proper management of convulsions; pertussis vaccine should not be given anymore |
| OPV | None |  |
| Anti-measles vaccine | Fever 5-7 days after vaccination in some children; sometimes, there is a mild rash | Reassure parents and instruct them to give antipyretic to the child |
| MMR | Local soreness, fever, irritability, and malaise in some children | Reassure parents and instruct them to give antipyretic to the child |
| Rotavirus vaccine | Some children develop mild vomiting and diarrhea, fever, and irritability | Reassure parents and instruct them to give antipyretic and Oresol to the child |
| Tetanus toxoid | Local soreness at the injection site | Apply cold compress at the site. No other treatment is needed |

***Contraindications to immunization***

In general, there are no contraindications to immunization of a sick child if the child is well enough to go home. Sending children away and telling mothers to bring them back for immunization when they are well enough is a bad practice because it delays the immunization. Bring the child back to the RHU/health center for immunization at another time may not be easy for the mother, leaving the child at risk of getting sick if an immunizable disease.

There are few absolute contraindications to the EPI vaccines. Do not give:

* Pentavalent vaccine/DPT to children over 5 years of age.
* Pentavalent vaccine/DPT to a child with recurrent convulsions or another active neurological disease of the central nervous system.
* Pentavalent vaccine 2 or 3/DPT 2 or 3 to a child who has had convulsions or shock within 3 days of the most recent dose.
* Rotavirus vaccine when the child has a history of hypersensitivity to a previous dose of the vaccine, intussusceptions or intestinal malformation, or acute gastroenteritis; and
* BCG to a child who has signs and symptoms of AIDS or other immune deficiency conditions or who are immunosuppressed.

Some conditions are considered false contraindications. If they are seen in children, the health worker may continue with the appropriate immunizations. These are:

* Malnutrition, which should be considered as an indication that the child especially needs the protection conferred by immunization;
* Low-grade fever;
* Mild respiratory infection; and
* Diarrhea. Children with diarrhea who are due for OPV should receive a dose of OPV during the visit. However, the dose is not counted. The child should return when the next dose of OPV is due.

***EPI Recording and Reporting***

EPI recording and reporting are accomplished using the FHSIS.

**Fully Immunized Children (FIC)** are those who were given BCG, three doses of OPV, three doses of DPT and hepatitis B vaccine or three doses of Pentavalent vaccine, and one dose of anti-measles vaccine before reaching one year of age.

**Completely immunized child** refers to children who completed their immunization schedule at the age of 12-23 months.

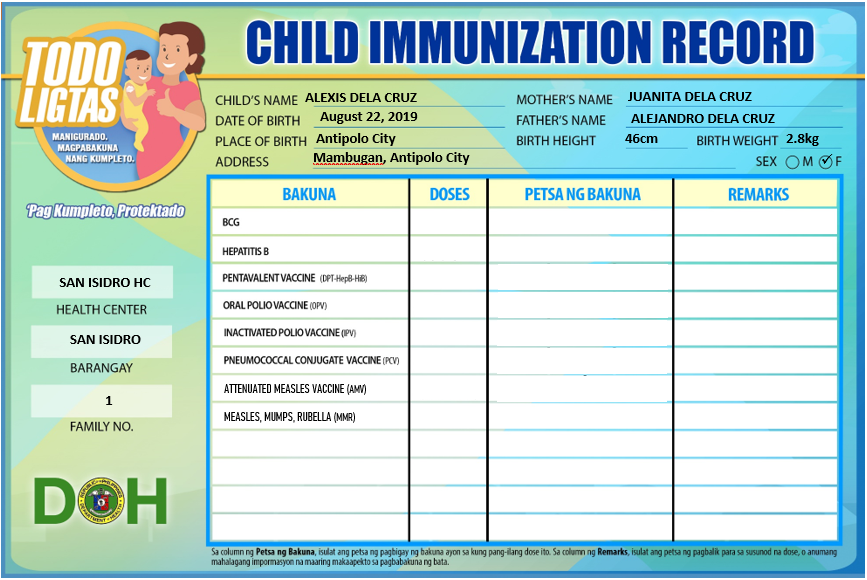
A **child protected at birth (CPAB)** is a term used to describe a child whose mother has received (a) two doses of TT during this pregnancy, provided that the second dose was given at least a month prior to delivery; or (b) at least three doses of TT anytime prior to pregnancy with this child.



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**Directions:**

1. Supply the schedule immunization dates of Baby Alexis based on the DOH protocol in giving EPI, for her to become an FIC by the time she reaches 1 yr of age. The schedule of immunization at San Isidro Health Center is every Wednesday, where Baby Alexis is brought by her mother. Take note that the baby had a fever October 19, 2019 at 38⁰C. She was brought to the Health Center and seen by the MD and was given a paracetamol, 0.6ml every 4 hours and continuous TSB was advised.



1. List down the possible immunization reactions, and explain briefly.



Famorca, Z., Nies, M., & McEwen, M., (2013). Nursing Care of the Community. ELSEVIER MOSBY.





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