

# Immunity/Vaccinations

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## OBJECTIVE / RATIONALE

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The ability to develop immunity to diseases is a key factor in maintaining health and wellness. The student will learn the difference in naturally acquired and artificially acquired immunity and understand the importance of vaccinations for individual and community health.

TEKS 121.3 2A, 2B, 2C, 2D, 5C  
121.14 5D

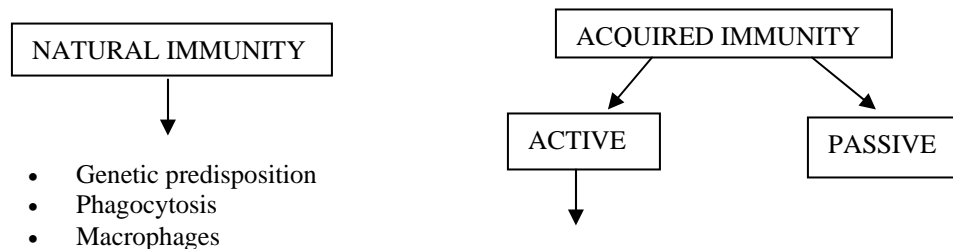
TAKS ELA 1, 2, 3, 4, 5  
Mathematics 3  
Social Studies 2, 3, 5  
Science 2, 3, 4

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## KEY POINTS

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- I. Immune System – the body’s special defense response against foreign organisms.
  - A. System includes
    1. Lymphoid organs
      - a) lymph nodes
      - b) spleen
      - c) thymus gland
    2. Their products
      - a) lymphocytes
      - b) antibodies
    3. macrophages – phagocytes that are found in the blood, brain, liver, lymph nodes, and spleen
  - B. Immunity – the capacity to resist certain types of organisms and toxins (poisons) that will damage tissues and organs.
    1. Natural (innate) immunity – one’s own ability to fight off disease
    2. Acquired immunity – the body develops specific immunity (antibodies and cells) against invading agents such as lethal bacteria, viruses, toxins, and even foreign tissues from other organisms.
      - a) Acquired active immunity occurs in two ways
        - (1) By having a disease
        - (2) Receiving a vaccination containing a modified pathogen or toxin, which stimulates production of antibodies
      - b) Acquired passive immunity – the patient receives immune serum containing antibodies produced in another animal
        - (1) Antitoxins
        - (2) Gamma globulin



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- II. White Blood Cells (WBCs)(leukocytes) p
- Having a disease
  - Vaccination
- infection. They circulate in the blood and infection has developed.
- Antitoxins
  - Gamma globulin
- A. Neutrophils
1. one of the body's main defenses against bacteria
  2. kill bacteria by actually ingesting them (this is called phagocytosis)
- B. Eosinophils – kill parasites and have a role in allergic reactions
- C. Basophils
1. function in allergic reactions. They release:
    - a) histamine – causes blood vessels to leak and attract WBCs
    - b) heparin – prevents clotting in the infected area so that the WBCs can reach the bacteria
- D. Lymphocytes – complex cells that direct the body's immune system
1. T lymphocytes (T cells) – they mature in the thymus and are responsible for cell-mediated immunity
    - a) Helper T cells – direct the rest of the immune system by releasing cytokines
    - b) Cytotoxic T cells – release chemicals that break open and kill invading organisms
    - c) Memory T cells – remain afterwards to help the immune system respond more quickly if the same organism is encountered again
    - d) Suppressor T cells – suppress the immune response so that it does not get out of control and destroy normal cells once the immune response is no longer needed
  2. B lymphocytes – responsible for humoral immunity (antibody production)
- E. Monocytes – called wandering cells until they enter a tissue where they become fixed and turn into macrophages
1. destroy old, damaged and dead cells in the body
  2. macrophages are found in the liver, spleen, lungs, lymph nodes, skin and intestine
- III. Naturally Acquired Immunity
- A. Active Immunity - Immunity may be acquired by exposure to a disease.
- B. Antigen – a substance that triggers an antibody response
1. Can be anything from bacteria to pollen; dust to drug; food to animal (usually foreign but does not have to be such as RBCs)
  2. People are born with certain antigens  
Example: depending on blood type there are certain antigen sites (ag) on the Red Blood Cells (RBCs)
  3. An antigen does not produce an allergic reaction in all people, but in hypersensitive people the presence of an ag combined with an antibody (ab) provokes the release of histamine which forms the basis for all allergic symptoms.

- C. Passive Immunity - Immunity may be acquired naturally by a fetus through the passage of antibodies from the mother through the placenta or through breast milk to a nursing infant.
1. Antibodies come from an outside source.
  2. Antibodies are temporary (antibodies will protect for up to 6 months or longer if the mother continues nursing)

#### IV. Artificially Acquired Immunity

- A. Vaccination or immunization - An agent is introduced into the body to stimulate antibody production.

1. A vaccine is given by an injection or liquid by mouth. An alternative needle-free route is the use of inhalation by aerosol and powder. Most vaccines contain a weakened or killed organism or part of the pathogen. Other vaccines use inactivated toxins. Some of the bacteria that cause disease do so by producing toxins that invade the bloodstream.
2. The body makes antibodies against the weakened or killed pathogens in the vaccine.
3. These antibodies can fight the pathogens, when it invades the body. The antibodies destroy them and the individual will not become ill. Vaccines do not cause full symptoms of the disease they are designed to pre.
4. Protective antibodies stay on guard in the individual's body to safeguard it from the real disease.
5. After exposure to a live, weakened, or dead germ, the antibodies or memory cells fight infectious diseases and usually stay in an individual's immune system for a lifetime. This protects a person from getting sick again. This protection is immunity.

#### B. Vaccines

1. Live organisms - used must be nonvirulent for humans or treated in the lab to weaken them so they are not as pathogenic to humans.
2. Attenuated - an organism that has been weakened is called.
3. Killed - vaccination with a toxoid occurs when the toxin produced by an organism is altered with heat or chemicals to render it harmless, but still allow the body to make antibodies against it.
4. Examples of Vaccines
  - a. Anthrax – a serious disease that can affect both animals and humans
    - i. Caused by the bacteria, *Bacillus Anthracis*
    - ii. Contracted from infected animals, wool, meat or hides
    - iii. Most commonly skin disease, causing skin ulcers, fever, and fatigue
    - iv. 20 % of the cases are fatal
    - v. Inhaled anthrax is more serious.
      1. initially symptoms include sore throat, fever, and muscle aches
      2. within a few days severe breathing problems develop leading to shock and may lead to meningitis
      3. frequently fatal despite antibiotic therapy
    - vi. Anthrax vaccine

1. protects against cutaneous and inhalation anthrax
  2. individuals who should be vaccinated
    - a. people 18 – 65 year olds potentially exposed to large amounts of the virus, such as laboratory workers
    - b. military personnel at risk
  3. consists of three doses
    - a. 1<sup>st</sup> three doses are given at two week intervals
    - b. three additional doses are given, one each six months after the previous dose
    - c. annual booster doses are needed for ongoing protection
    - d. may be given at the same time as other vaccines
  4. Individuals who should not receive the vaccine
    - a. anyone who has a serious allergic reaction to a previous dose of the vaccine
    - b. anyone who has recovered from cutaneous anthrax
    - c. pregnant women
  5. Risks of vaccination
    - a. soreness, redness, or itching where the shot was given
    - b. lump where the shot was given
    - c. muscle or joint aches
    - e. headaches, fatigue, chills, fever, nausea
    - f. allergic reaction
- b. DPT – Diphtheria, Tetanus, Pertussis - DTaP
- i. Diphtheria - causes a thick covering on the back of the throat, can lead to breathing problems, paralysis, heart failure and death
  - ii. Tetanus – causes painful tightening of the muscles, usually all over the body, leading to “locking” of the jaw so the victim cannot open his mouth or swallow. Tetanus leads to death in about 1 out of 10 cases. (Lockjaw)
  - iii. Pertussis (Whooping Cough) – causes coughing spells so bad that it is hard for infants to eat, drink, or breathe, it can lead to pneumonia, seizures, brain damage, death
  - iv. Children should receive 5 doses of the DtaP vaccine
  - v. Children who should not receive the DtaP
    1. children who are moderately or severely ill should wait until they are well
    2. any child who has had a life threatening allergic reaction to a previous dose
    3. any child who has suffered a brain or nervous system disease within 7 days of a previous dose

4. caution should be taken if the child has had a seizure or collapsed, cried non stop for 3 hours or more after a dose, had a fever of 105 degrees F after a dose
  5. should not be given to anyone 7 years old or older
  6. booster shot – Td – is recommended at 11 – 12 years of age and then every 10 years.
- vi. Risks of vaccination
1. fever, redness or swelling at the site, fussiness, tiredness, poor appetite, vomiting
  2. more serious – seizures, non stop crying, high fever over 105 degrees F.
  3. serious problems – serious allergic reaction, long term seizures, coma, lowered consciousness, permanent brain damage
- c. Haemophilus Influenzae, Type b (Hib) Vaccine – serious disease caused by a bacteria. Hib is spread from person to person. If the bacteria remains in the nose and throat, the individual will not get sick. If it spreads to the lungs or blood stream, the Hib can be serious. Before the Hib vaccine, Hib disease was the leading cause of bacterial meningitis among children under 5 years old in the United States. Meningitis is an infection of the brain and spinal cord coverings, which can lead to lasting brain damage and deafness. Hib disease can also cause
- i. Pneumonia, severe swelling in the throat making it hard to breathe
  - ii. Infections of the blood, joints, bones, and covering of the heart
  - iii. Death
    1. Who should get vaccinated?
      - a. Children should receive the dose at
        - i. 2 months of age
        - ii. 4 months of age
        - iii. 6 months of age
        - iv. 12 – 15 months of age
  - iv. Older children or adults with special health conditions including but not limited to
    1. sickle cell disease
    2. HIV/AIDs
    3. removal of the spleen, bone marrow transplant, or cancer treatment with drugs
- v. Who should not get the vaccine or should wait
1. Individuals who have had a life – threatening allergic reaction to a previous dose of Hib vaccine
  2. Children less that 6 weeks of age
  3. People who are moderately or severely ill at the time the shot is scheduled

- vi. Risks of vaccination
    1. Redness, warmth, swelling where the shot was given
  - vii. Fever over 101 degrees F.
  - viii. Serious allergic reaction including breathing difficulty, hoarseness or wheezing, hives, paleness, weakness, a fast heart beat, or dizziness within a few minutes to a few hours after the shot
- d. Hepatitis A vaccine – Hepatitis A is a serious liver disease caused by the hepatitis A virus (HAV). HAV is found in the stool of persons with hepatitis A. It is usually spread by close personal contact and sometimes by eating food or drinking water contaminated with HAV. Hepatitis A can cause a mild flu like illness, jaundice (yellow skin or eyes), and severe stomach pains and diarrhea
- i. Who should get vaccinated?
    1. Individuals 2 years of age and older traveling or working in countries with high rates of hepatitis A, such as those located in Central or South America, the Caribbean, Mexico, Asia (except Japan), Africa, and southern or eastern Europe. The vaccine series should be started at least one month before traveling.
    2. Individuals who live in communities that have prolonged outbreaks of hepatitis A.
    3. Individuals who live in communities with high rates of hepatitis A: for example, American Indian, Alaska Native, and Pacific Islander communities and some religious communities.
    4. Men who have sex with men.
    5. Individuals who use street drugs.
    6. Individuals with chronic liver disease.
    7. Individuals receiving clotting factor concentrates.
  - ii. The vaccine should be given in two doses at least 2 months apart, it may be given at the same time as other vaccines.
  - iii. Who should not get the vaccine?
    1. Individuals who have had a serious allergic reaction to a previous dose of the vaccine.
    2. Individuals who are moderately or severely ill at the time the vaccine is scheduled should wait.
  - iv. Risks of vaccination
    1. soreness at the sight, headache, loss of appetite, tiredness
    2. serious allergic reaction
- e. Hepatitis B vaccine – Hepatitis B is a serious disease. The hepatitis B virus (HBV) can cause short term (acute) illness that leads to  
Loss of appetite  
Tiredness

Pain in muscles, joints, and stomach  
Diarrhea and vomiting  
Jaundice (yellow skin or eyes)

It can also cause long term (chronic) illness that leads to  
liver damage (cirrhosis)  
liver cancer  
death

About 1.25 million people in the U. S. have chronic HBV infection. Each year it is estimated that:

80, 000 people , mostly young adults, get infected with HBV

More than 11, 000 people have to stay in the hospital because of Hepatitis B.

4,000 – 5,000 people die from hepatitis B.

Hepatitis B vaccine can prevent hepatitis B. It is the first anti – cancer vaccine because it can prevent a form of liver cancer.

Hepatitis B is spread through contact with the blood and body fluids of an infected person. A person can get infected in several ways, such as:

By having unprotected sex with an infected person

By sharing needles when injecting illegal drugs

By being stuck with a needle used on the job

During birth when the virus passes from an infected mother to her baby.

About 1/3 of people who are infected with hepatitis B in the United States don't know how they got it.

i. Who should get the vaccine?

1. Everyone 18 years of age and younger

2. Adults over 18 who are at risk

a. People who have more than one sex partner in 6 months

b. Men who have sex with other men

c. Sex contacts of infected people

d. People who inject illegal drugs

e. Health care and public safety workers who might be exposed to infected blood or body fluids

f. Household contacts of persons with chronic HBV infection

g. Hemodialysis patients

ii. Individuals should get 3 doses of hepatitis B vaccine

1. the second dose must be given at least 1 month after the first dose

2. the third dose must be given at least 2 months after the second dose and at least 4 months after the first

3. the third dose should not be given to infants

- under 6 months of age
      - 4. the vaccine may be given at the same time as other vaccines
    - iii. Who should not get the vaccine?
      - 1. individuals who have had a life threatening allergic reaction to baker's yeast or a previous dose of the vaccine
      - 2. individuals who are moderately or severely ill at the time the shot is scheduled should wait
    - iv. Risks
      - 1. soreness where the shot was given, lasting a day or two
      - 2. mild to moderate fever
      - 3. serious allergic reaction
  - f. Influenza vaccine – Influenza is caused by a virus that spreads from infected persons to the nose or throat of others. The “influenza season” in the U.S. is from November through April each year. Influenza can cause fever, cough, chills, sore throat, headache, and muscle aches. People of any age can get influenza. Most people are ill with influenza for only a few days, but some get much sicker and need to be hospitalized. Influenza causes thousands of deaths each year, mostly among the elderly. Influenza viruses change often. Therefore, influenza vaccine is updated each year to make sure it is as effective as possible. Protection develops about 2 weeks after getting the shot and may last up to a year.
    - i. Who should get the influenza vaccine?
      - 1. Individuals 50 years of age or older.
      - 2. residents of long term care facilities housing persons with chronic medical conditions
      - 3. anyone who has a serious long term health problem with
        - a. heart disease
        - b. lung disease
        - c. asthma
        - d. kidney disease
        - e. metabolic disease such as diabetes
        - f. anemia, and other blood disorders
      - 4. anyone whose immune system is weakened because of
        - a. HIV/Aids or other diseases that affect the immune system
        - b. Long term treatment with drugs such as steroids
        - c. Cancer treatment with x-rays or drugs
      - 5. anyone 6 months to 18 years of age on long –term aspirin treatment

6. women who will be past the 3<sup>rd</sup> month of pregnancy during the influenza season
  7. physicians, nurses, family members, or anyone else coming into close contact with people at risk of serious influenza
  8. people who provide essential community services
  9. people traveling to the Southern hemisphere between April and September, or to the tropics at any time
  10. people living in dormitories or in other crowded conditions
  11. anyone who wants to reduce their chance of catching influenza
- ii. When should an individual get vaccinated?
    1. October or November
  - iii. Individuals who should not get the vaccine or who should wait
    1. anyone who has ever had a serious allergic reaction to eggs or a previous dose of the vaccine
    2. history of Guillain – Barre’ Syndrome
    3. anyone with a fever or who is seriously ill at the time should wait until recovered
  - iv. Risks
    1. soreness, redness, swelling at the site
    2. fever
    3. aches
    4. allergic reaction
    5. Guillain-Barre’ Syndrome (risk is 1 or 2 cases per million persons vaccinated)
- g. Lyme Disease Vaccine – Lyme Disease is caused by an infection from being bitten by an infected tick. A common sign of Lyme disease is a round, red, expanding rash 2 inches or more in diameter, which appears between 3 days and a month after the tick bite. Fever, chills, headaches, muscle and joint pain, and fatigue are also signs. If not treated promptly, arthritis, numbness or paralysis, problems with heart rhythm, and problems with memory or concentration may occur.
- i. Who should get vaccinated?
    1. people between 15 – 70 years old who live in areas where Lyme disease is a problem
    2. work or spend leisure time in wooded, brushy, or overgrown areas where ticks live
    3. travel to areas where Lyme disease is common
  - ii. Three doses are recommended
    1. first dose may be given any time but ideally in January – March
    2. second dose should be given one month after the first

3. third dose should be given twelve months after the first
- iii. Who should not get vaccinated?
  1. children younger than 15 years of age
  2. pregnant women
  3. anyone with arthritis caused by a previous case of Lyme disease which has not responded to antibiotic treatment
  4. anyone with an allergic reaction to a previous dose
  5. anyone with an immune system problem
- iv. Risks
  1. soreness, redness, swelling at the site
  2. muscle aches, joint pain, fever, chills
  3. severe allergic reaction
- h. Measles, Mumps, Rubella (MMR) Measles virus causes rash, cough, runny nose, eye irritation and fever. It can lead to ear infection, pneumonia, seizures, brain damage and death. Mumps virus causes fever, headache, and swollen glands. It can lead to deafness, meningitis, painful swelling of testicles or ovaries, and rarely, death. Rubella (German Measles) virus causes rash, mild fever, and arthritis. If a woman gets rubella while she is pregnant, she could have a miscarriage or her baby could be born with serious birth defects
  - i. Who should get vaccinated?
    1. Children should receive 2 doses of MMR, the first at 12 – 15 months of age, the second at 4 – 6 years of age.
    2. Adults – anyone 18 years or older that was born after 1956
  - ii. Who should not get vaccinated?
    1. anyone who has had a life threatening allergic reaction to gelatin, neomycin, or a previous dose of MMR
    2. People who are moderately or severely ill should wait
    3. pregnant women should wait until after birth, women should wait 3 months after getting the vaccine to get pregnant
    4. Some people should check with their doctor first
      - a. Anyone with HIV/AIDS
      - b. Being treated with drugs that affect the immune system
      - c. Has any kind of cancer
      - d. Is taking cancer treatment with x-rays or drugs
      - e. Has ever had a low platelet count
      - f. Have recently had a transfusion or were given other blood products
  - iii. Risks
    1. fever, mild rash, swelling of the glands in the cheeks

- or neck
  - 2. seizure
  - 3. temporary pain and stiffness in joints
  - 4. temporary low platelet count
  - 5. serious allergic reaction
  - 6. deafness
  - 7. long term seizures, coma, lowered consciousness
  - 8. permanent brain damage
- i. Meningococcal Vaccine – Meningococcal disease is a serious illness caused by bacteria. It is the leading cause of bacterial meningitis in children 2 – 18 years old in the United States. Meningitis is an infection of the brain and spinal cord coverings.
  - i. Who should get the meningococcal vaccine and when?
    - 1. U.S. Military recruits
    - 2. People who might be affected during an outbreak
    - 3. anyone traveling to, or living in, a part of the world where the disease is common
    - 4. anyone who has a damaged spleen, or whose spleen has been removed
    - 5. anyone who has terminal complement component deficiency (an immune system disorder)
    - 6. some laboratory workers who are routinely exposed to the bacteria
    - 7. possibly to college students living in the dorm
    - 8. for anyone 2 years of age and over; 1 dose
    - 9. for anyone 3 months to 2 years of age who need the vaccine, 2 doses, 3 months apart
  - ii. Who should not receive the vaccine?
    - 1. had a previous serious allergic reaction to a previous dose of the vaccine
    - 2. moderately or severely ill need to wait
  - iii. Risks
    - 1. redness or pain where the shot was given
    - 2. fever
    - 3. severe allergic reaction
- j. Pneumococcal conjugate vaccine – Infection with *Streptococcus pneumoniae* bacteria can cause serious illness and death. Invasive pneumococcal disease is responsible for about 200 deaths each year among children under 5 years old. It is the leading cause of death of bacterial meningitis in the United States. Each year pneumococcal infection causes severe disease in children under five years old: over 700 cases of meningitis, 13,000 blood infections, and about 5 million ear infections. It can also lead to pneumonia, deafness, and brain damage. It is spread from person to person through close contact. The bacteria is resistant to some drugs.
  - i. Who should get it and when?

1. Children under 2 years of age
  2. children between 2 – 5 years old who have not already gotten the vaccine and are at high risk of serious pneumococcal disease including children who
    - a. have sickle cell disease
    - b. have a damaged spleen or no spleen
    - c. have HIV/AIDS
    - d. have other diseases that affect the immune system
    - e. take medications that affect the immune system
    - f. have chronic heart or lung disease
    - g. should be considered form other children at risk such as Alaska Native, American Indian, or African American descent or attend group day care
- ii. Who should not get the vaccine?
    1. children who have had a previous serious allergic reaction to the vaccine
    2. children who are moderately or severely ill should wait
  - iii. Risks
    1. redness, tenderness, swelling at the site
    2. fever over 100.4 degrees F
    3. fussiness, drowsiness, loss of appetite
    4. serious allergic reaction
- k. Pneumococcal Polysaccharide Vaccine – Pneumococcal disease kills more people in the United States each year than all other vaccine-preventable diseases combined. Pneumococcal disease can lead to pneumonia, bacteremia, and meningitis, and death. The disease is becoming more resistant to drugs. The vaccine protects against 23 types of pneumococcal bacteria.
    - i. Who should get the vaccine?
      1. All adults 65 years of age or older
      2. Anyone over 2 years of age who has a long term health problems such as heart disease, sickle cell anemia, alcoholism, leaks of cerebrospinal fluid, lung disease, diabetes, cirrhosis
      3. Anyone over 2 years of age who has a disease or condition that lowers the body's resistance to infection such as Hodgkin's disease, kidney failure, nephritic syndrome, damaged spleen or not spleen, organ transplant, lymphoma, leukemia, multiple myeloma, HIV infection, or AIDS
      4. Anyone over 2 years of age who is taking any drug or treatment that lowers the body's resistance to

infection such as long term steroids, radiation therapy, certain cancer drugs

5. Alaskan Natives and certain Native American populations

ii. Risks

1. redness and pain at the site of the vaccine
2. fever, muscle aches
3. severe allergic reaction

1. Polio Vaccine – Polio is a disease caused by a virus. It enters the body through the mouth. It can cause paralysis and death. No “wild” polio has been reported in the United States for over 20 years. The disease is still common in some parts of the world.

i. Who should get the vaccine and when?

1. Most people should get the vaccine when they are children. Children should get four doses, one at 2 months, 4 months, 6-18 months, and a booster dose at 4 – 6 years
2. Adults at higher risk should consider vaccination people traveling to areas of the world where polio is common, laboratory workers who might handle polio virus, and health care workers treating patients that could have polio

ii. Who should not get the vaccine?

1. anyone who has ever had a life threatening allergic reaction to neomycin, streptomycin or polymyxin B
2. anyone who has had a severe allergic reaction to a polio shot
3. anyone who is moderately or severely ill at the time the shot is scheduled should wait until they recover

iii. Risks

1. soreness at site
2. severe allergic reaction

- m. Rotavirus Vaccine – Rotavirus is a virus that causes severe diarrhea, often with vomiting. It usually affects babies and young children. It is the most common cause of severe diarrhea.

i. Who should get vaccinated and when?

1. The vaccine is an oral preparation.
2. Children should receive 3 doses of the vaccine, one at 2 months of age, one at 4 months of age, and one at 6 months of age.

ii. Who should not get the vaccine?

1. Babies who have passed their first birthday.
2. Babies who are 7 months or older who have not gotten at least one dose of the vaccine.
3. Babies who have had a serious allergic reaction to a previous dose of the vaccine.
4. Babies with certain diseases of the stomach or intestines

5. Babies with ongoing diarrhea
6. Babies who are unable to fight serious infections because of HIV/AIDS, or any other disease that affects the immune system
7. treatment with drugs such as long term steroids
8. any kind of cancer
9. cancer treatment with x-rays or drugs
10. babies that are moderately or severely ill at the time the vaccine is scheduled should wait until they recover

iii. Risks

1. mild to moderate fever
2. poor appetite, tiredness, fussiness
3. severe allergic reaction

n. Smallpox - The last natural case of smallpox occurred in 1977, and in 1980, the World Health Organization declared the global eradication of smallpox and recommended that all countries cease vaccination. Because there are concerns that the smallpox virus could be used as a bioterrorism weapon, the CDC has developed a plan. The plan will coordinate CDC, state, and local public health activities should a smallpox outbreak occur, and it will help health officials define and control the outbreak. This plan includes indications for vaccination, contraindications for vaccination, risks, sites, personnel, facilities, etc.

i. Who should be vaccinated during a smallpox emergency?

1. persons who were exposed to the initial release of the virus
2. persons who had face to face, household, or close proximity contact with a confirmed or suspected smallpox patient after the patient developed fever and until all scabs have separated
3. personnel selected for the direct medical or public health evaluation, care, or transportation of confirmed, probable, or suspected smallpox cases
4. laboratory personnel selected for the collection or processing of clinical specimens from confirmed, probable, or suspected smallpox cases
5. other persons with increased likelihood of contact with infectious materials from a smallpox patient such as laundry or medical waste handlers for a facility where smallpox

- patients are admitted
6. other groups whose unhindered function is deemed essential to the support of response activities and who are not otherwise involved in patient – care activities but who have a reasonable probability of contact with smallpox patients or infectious material( selected law enforcement, emergency response, or military personnel)
  7. consideration of vaccination of all individuals present in the hospital during the time a case was presented and not isolated in an appropriate manner in a room with ventilation separate from other areas of the hospital
- ii. Contraindications for Vaccination of Non-contacts during a smallpox emergency – Persons with certain medical conditions are known to have a higher risk of developing severe complications following vaccinations. These include:
1. Persons with diseases or conditions which cause immunodeficiency, such as HIV, AIDS, leukemia, lymphoma, malignancy, radiation, chemotherapy
  2. persons with serious, life threatening allergies to the antibiotics polymyxin B, streptomycin, tetracycline, or neomycin
  3. persons who have ever been diagnosed with eczema
  4. women who are pregnant
  5. persons with other acute or chronic skin conditions such as atopic dermatitis, burns, impetigo, shingles should not be vaccinated until the condition resolves
- iii. Risks
1. tenderness, redness, swelling and a lesion at the site (evidence of successful vaccination)
  2. fever, enlarged, tender lymph nodes in the axilla of the vaccinated arm
  3. primary (major) reaction – site becomes red and pruritic, vesicle is formed, it becomes umbilicated and pustular. The red areola has enlarged, the pustule begins to dry, the redness subsides and the lesion becomes crusted. By the end of the 3<sup>rd</sup> week after vaccination, the scab falls off leaving a

- permanent scar that at first is pink in color but eventually becomes flesh colored.
4. a delayed type of skin sensitivity consisting of erythema only within 24 – 48 hours may occur, this type of reaction indicates the person should be revaccinated.
  5. inadvertent inoculation of another site by the individual, this is done usually by hand from the site of the inoculation to another site like the face, nose, mouth, or genitalia
  6. generalized vaccinia – blood borne dissemination of the vaccinia virus, usually characterized by a rash
  7. eczema vaccinatum – skin lesions in a person with a history of eczema
  8. progressive vaccinia – underlying immune deficiencies, can be fatal
- o. Tetanus and Diphtheria vaccine (Td) – Tetanus (lockjaw) is caused by a germ that enters the body through a cut or a wound. Diphtheria spreads when germs pass from an infected person to the nose or throat of others.
- i. Who should be vaccinated?
    1. people 7 years of age and older
    2. people who have not gotten at least 3 doses of any DTP, DtaP, or DT during their lifetime
    3. every 10 years all through life
  - ii. Who should not get vaccinated?
    1. anyone who has had an allergic reaction to a previous dose
  - iii. Risks
    1. soreness, redness, swelling at the site
    2. serious allergic reaction
    3. deep, aching pain and muscle wasting in upper arms
- p. Varicella (chickenpox) vaccine – The chickenpox virus can spread from person to person through the air, or by contact with fluid from the chickenpox blisters. It causes a rash, itching, fever, and tiredness. It can lead to severe skin infections, scars, pneumonia, brain damage, or death. A person who has had chickenpox can get a painful rash – herpes zoster (shingles) years later.
- i. Who should get the vaccination?
    1. children should get one dose between the ages of 12 and 18 months
    2. or at any age if they have never had the chickenpox

3. people who do not get the vaccine until 13 years of age or older should get 2 doses, 4 – 8 weeks apart
  - ii. Who should not get the vaccine or should wait?
    1. people who have had a life threatening allergic reaction to gelatin, neomycin, or a previous dose of the vaccine
    2. people who are moderately or severely ill should wait
    3. pregnant women should wait until after birth, women should not get pregnant for 1 month after getting the vaccine
    4. people with HIV/AIDS, immune system problems, taking any drugs that affect the immune system, have cancer, or taking chemotherapy or x-ray therapy for cancer should check with their doctor before receiving the vaccine
    5. people who recently had a blood transfusion should check with their doctor
  - iii. Risks
    1. soreness and swelling at the site
    2. fever
    3. rash
    4. seizure
    5. pneumonia
    6. severe allergic reaction
    7. severe brain reaction, low blood count
5. Immunity may or may not be life-long with vaccines. To help keep the antibody levels high enough to keep you protected you sometimes need to have “booster shots”.

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## ACTIVITIES

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- I. Investigate the history of a particular type of vaccine and the ramifications if the vaccine were not invented. Present this to the class using your choice of media.
- II. Design a community awareness pamphlet on vaccination schedules. Include why vaccinations are necessary for all age groups.
- III. Prepare a timeline showing the history of vaccinations. (Include the scientist responsible for the development of each)
- IV. Prepare a timeline showing the schedule of vaccinations across the lifespan.
- V. Research and debate, using HOSA Event Guidelines, the ethical issues recently encountered with the mandatory vaccination of military personnel.

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## MATERIALS / RESOURCES

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## **HOSA Event Guidelines**

<http://www.tdh.gov>

<http://www.nih.gov>

<http://www.cdc.gov>

<http://www.cdc.gov/nip/vaccine/vac-chart-public.htm>

<http://www.cdc.gov/nip/publications/vis>

Recommended Childhood Immunization Schedule

<http://www.kcom.edu/faculty/chamberlain/Website/immunize.htm>

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### ASSESSMENT

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## **HOSA Event Guidelines**

### **Project Rubric**

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### ACCOMMODATIONS

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For reinforcement, the student will create a chart of the different types of vaccines available and give examples for each class

For enrichment, the student will pick a destination for a trip to a third world country and research the required vaccinations. Determine the diseases the vaccinations will prevent and the percentage of occurrence.

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### REFLECTIONS

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