

CHAPTER 5 *Meningitis*

Meningitis is an inflammation of the meninges, which are the membranes that protect the brain and spinal cord.

Viral, or aseptic, meningitis is the most common form of meningitis and commonly resolves without treatment. Fungal meningitis is common in clients who have AIDS. Bacterial (or septic) meningitis is a contagious infection with a high mortality rate. The prognosis depends on how quickly care is initiated.

There are three vaccines for different pathogens that cause bacterial meningitis. One is available for high-risk populations, such as residential college students.

HEALTH PROMOTION AND DISEASE PREVENTION

Haemophilus influenzae type b (Hib) vaccine

Ensure infants receive vaccine for bacterial meningitis on schedule. A series of four doses is recommended beginning at 2 months of age, with the final dose at 12 to 15 months.

Pneumococcal polysaccharide vaccine (PPSV)

Though primarily intended to prevent respiratory infection, this immunization also decreases the risk for CNS infections. Vaccinate adults who are immunocompromised, have a chronic disease, smoke cigarettes, or live in a long-term care facility. Follow CDC guidelines for reimmunization. Give one dose to adults older than 65 who have not previously been immunized nor have history of disease.

Meningococcal vaccine (MCV4) (Neisseria meningitidis)

Ensure that adolescents receive the vaccine on schedule and prior to living in a residential setting in college. Individuals in other communal living conditions (e.g., military) also should be immunized. An initial dose is recommended for healthy children between the ages of 11 to 12, with a booster administered at age 16.

ASSESSMENT

RISK FACTORS

Viral meningitis

- Viral illnesses such as the mumps, measles, herpes, and arboviruses (West Nile).
- There is no vaccine against viral meningitis.

Fungal meningitis: Fulminant fungal-based infection of the sinuses are from the organism *Cryptococcus neoformans*.

Bacterial meningitis: Bacterial-based infections, such as otitis media, pneumonia, or sinusitis, in which the infectious micro-organism is *Neisseria meningitidis*, *Streptococcus pneumoniae*, or *Haemophilus influenzae*

Immunosuppression

Direct contamination of spinal fluid

Invasive procedures, skull fracture, or penetrating wound.

Environment: Overcrowded living conditions.

EXPECTED FINDINGS

SUBJECTIVE DATA

- Excruciating, constant headache
- Nuchal rigidity (stiff neck)
- Photophobia (sensitivity to light)

OBJECTIVE DATA: Physical Assessment Findings

- Fever and chills
- Nausea and vomiting
- Altered level of consciousness (confusion, disorientation, lethargy, difficulty arousing, coma)
- Positive Kernig's sign (resistance and pain with extension of the client's leg from a flexed position)
- Positive Brudzinski's sign (flexion of the knees and hips occurring with deliberate flexion of the client's neck)
- Hyperactive deep tendon reflexes
- Tachycardia
- Seizures
- Red macular rash (meningococcal meningitis)
- Restlessness, irritability

LABORATORY TESTS

- **Urine, throat, nose, and blood culture and sensitivity:** Perform culture and sensitivity of various body fluids to identify possible infectious bacteria and an appropriate broad-spectrum antibiotic. Not definitive for meningitis but can guide initial selection of antimicrobial.
- **CBC:** Elevated WBC count

DIAGNOSTIC PROCEDURES

Cerebrospinal fluid (CSF) analysis

- CSF analysis is the most definitive diagnostic procedure. CSF is collected during a lumbar puncture performed by the provider.
- Results indicative of meningitis
 - Appearance of CSF: cloudy (bacterial) or clear (viral)
 - Elevated WBC
 - Elevated protein
 - Decreased glucose (bacterial)
 - Elevated CSF pressure
- Counterimmunoelectrophoresis (CIE) can be done on CSF to determine whether the infectious agent is viral or protozoa. This diagnostic study is also indicated if the client received antibiotics before CSF was collected.

CT scan and MRI: A CT scan or an MRI can be performed to identify increased intracranial pressure (ICP) and/or an abscess.

PATIENT-CENTERED CARE

NURSING CARE

- Isolate the client as soon as meningitis is suspected.
- Maintain isolation precautions per hospital policy.
 - The nurse should initiate droplet precautions, which require a private room. Continue droplet precautions until antibiotics have been administered for 24 hr and oral and nasal secretions are no longer infectious. Clients who have bacterial meningitis might need to remain on droplet precautions continuously. **Qs**
 - Standard precautions are implemented for all clients who have meningitis.
- Implement fever-reduction measures, such as a cooling blanket, if necessary.
- Report meningococcal infections to the public health department.
- Decrease environmental stimuli.
- Provide a quiet environment.
- Minimize exposure to bright light (natural and electric).
- Maintain bed rest with the head of the bed elevated to 30°.
- Monitor for increased ICP.
- Tell the client to avoid coughing and sneezing, which increase ICP.
- Maintain client safety, such as seizure precautions. **Qs**
- Replace fluid and electrolytes as indicated by laboratory values.
- Older adult clients are at an increased risk for secondary complications, such as pneumonia. **Q**

MEDICATIONS

- **Ceftriaxone or cefotaxime in combination with vancomycin:** Antibiotics given until culture and sensitivity results are available. Effective for bacterial infections.
- **Phenytoin:** Anticonvulsants given if ICP increases or client experiences a seizure.
- **Acetaminophen, ibuprofen:** Analgesics for headache and/or fever. Nonopioid to avoid masking changes in the level of consciousness.
- **Ciprofloxacin, rifampin, or ceftriaxone:** Prophylactic antibiotics given to individuals in close contact with the client.

COMPLICATIONS

Increased ICP

Meningitis can cause ICP to increase, possibly to the point of brain herniation.

NURSING ACTIONS

- Monitor for indications of increasing ICP (decreased level of consciousness, pupillary changes, impaired extraocular movements).
- Provide interventions to reduce ICP (positioning with head of the bed elevation at 30° and avoidance of coughing and straining). **Qs**
- Mannitol can be administered via IV.

SIADH

SIADH can be a complication of meningitis due to abnormal stimulation to the hypothalamic area of the brain, causing excess secretion of antidiuretic hormone (vasopressin).

NURSING ACTIONS

- Monitor for manifestations (dilute blood, concentrated urine).
- Provide interventions, such as the administration of demeclocycline and restriction of fluid.
- Monitor the client's weight daily.

Septic emboli

- Septic emboli can form during meningitis and travel to other parts of the body, particularly the hands, but can occur in the feet as well.
- Development of gangrene can necessitate an amputation.
- Septic emboli can lead to disseminated intravascular coagulation or stroke.

NURSING ACTIONS

- Monitor circulatory status of extremities and coagulation studies.
- Report any alterations immediately to the provider.

Application Exercises

1. A nurse is assessing a client who reports severe headache and a stiff neck. The nurse's assessment reveals positive Kernig's and Brudzinski's signs. Which of the following actions should the nurse perform first?
 - A. Administer antibiotics.
 - B. Implement droplet precautions.
 - C. Initiate IV access.
 - D. Decrease bright lights.
2. A nurse is assessing for the presence of Brudzinski's sign in a client who has suspected meningitis. Which of the following actions should the nurse take when performing this technique? (Select all that apply.)
 - A. Place client in supine position.
 - B. Flex client's hip and knee.
 - C. Place hands behind the client's neck.
 - D. Bend client's head toward chest.
 - E. Straighten the client's flexed leg at the knee.
3. A nurse is planning care for a client who has meningitis and is at risk for increased intracranial pressure (ICP). Which of the following actions should the nurse plan to take? (Select all that apply.)
 - A. Implement seizure precautions.
 - B. Perform neurological checks four times a day.
 - C. Administer morphine for the report of neck and generalized pain.
 - D. Turn off room lights and television.
 - E. Monitor for impaired extraocular movements.
 - F. Encourage the client to cough frequently.
4. A nurse is reviewing the use of the meningococcal vaccine (MCV4) for the prevention of meningitis with a newly licensed nurse. Which of the following information should the nurse include?
 - A. The vaccine is indicated to reduce the risk of respiratory infection.
 - B. The vaccine is administered in a series of four doses.
 - C. The vaccine is recommended for adolescents before starting college.
 - D. The vaccine is initially given at 2 months of age.
5. A nurse is planning care for a client who has bacterial meningitis. Which of the following actions should the nurse include in the plan of care? (Select all that apply.)
 - A. Monitor for bradycardia.
 - B. Provide an emesis basin at the bedside.
 - C. Administer antipyretic medication.
 - D. Perform a skin assessment.
 - E. Keep the head of the bed flat.

PRACTICE Active Learning Scenario

A nurse is reviewing the plan of care for a client who has bacterial meningitis. Use the ATI Active Learning Template: System Disorder to complete this item.

ALTERATION IN HEALTH (DIAGNOSIS):
Define bacterial meningitis.

MEDICATIONS: Identify three medications, their actions, and the reason for administration.

COMPLICATIONS: Describe two complications of meningitis.

Application Exercises Key

1. A. The nurse should administer antibiotics to stop the micro-organisms from multiplying, but this is not the priority action.
B. **CORRECT:** When using the urgent vs. nonurgent approach to care, the nurse determines the priority action is to initiate droplet precautions when meningitis is suspected to prevent spread of the disease to others.
C. The nurse should initiate IV access to allow IV medication and fluid administration, but this is not the priority action.
D. The nurse should decrease bright lights because of the client's sensitivity to light, but this is not the priority action.
N NCLEX® Connection: Safety and Infection Control, Standard Precautions/Transmission-Based Precautions/Surgical Asepsis
2. A. **CORRECT:** The nurse should place the client in supine position when assessing for Brudzinski's sign.
B. The nurse should flex the client's hip and knee when assessing for Kernig's sign.
C. **CORRECT:** The nurse should place her hands behind the client's neck when assessing for Brudzinski's sign, in order to flex the client's neck.
D. **CORRECT:** The nurse should bend the client's head toward the chest when assessing for Brudzinski's sign.
E. The nurse should straighten the client's flexed leg at the knee when assessing for Kernig's sign.
N NCLEX® Connection: Reduction of Risk Potential, Diagnostic Tests
3. A. **CORRECT:** The client is at risk for seizures due to possible increased ICP. Therefore, the nurse should implement seizure precautions to reduce the client's risk for injury.
B. The nurse should perform neurological checks at least every 2 hr for a client who is at risk for increased ICP.
C. The nurse should avoid administering opioids to a client who is at risk for increased ICP. Opioids can mask changes in the client's level of consciousness.
D. **CORRECT:** The nurse should turn off room lights and the television because they can increase neuron stimulation and cause a seizure when a client is at risk for increased ICP.
E. **CORRECT:** The nurse should monitor for impaired extraocular movements because this finding can indicate increased ICP.
F. The nurse should instruct the client to avoid coughing because this action can cause increased ICP.
N NCLEX® Connection: Physiological Adaptation, Alterations in Body Systems
4. A. The pneumococcal vaccine is primarily indicated to reduce the risk of respiratory infection. However, it also reduces the risk of CNS infection.
B. The HIB vaccine is administered to infants in a series of four doses.
C. **CORRECT:** The nurse should identify that the meningococcal vaccine is recommended for adolescents prior to starting college due to the increased risk for infection in communal living facilities.
D. The initial dose of the HIB vaccine is recommended for infants at 2 months of age.
N NCLEX® Connection: Safety and Infection Control, Standard Precautions/Transmission-Based Precautions/Surgical Asepsis
5. A. The nurse should plan to monitor for tachycardia when a client has meningitis.
B. **CORRECT:** The nurse should provide an emesis basin at the bedside because the client who has meningitis can have nausea and vomiting.
C. **CORRECT:** The nurse should plan to administer antipyretic medication for fever to a client who has meningitis.
D. **CORRECT:** The nurse should perform a skin assessment to determine whether the client has a red macular rash associated with meningococcal meningitis.
E. The nurse should elevate the head of the client's bed 30° to promote venous drainage from the head and prevent increased ICP.
N NCLEX® Connection: Physiological Adaptation, Illness Management

PRACTICE Answer

Using the ATI Active Learning Template: System Disorder

ALTERATION IN HEALTH (DIAGNOSIS): Bacterial meningitis is a bacterial infection that causes an inflammation of the meninges, the membranes that protect the brain and spinal cord.

MEDICATIONS

- Ceftriaxone with vancomycin: antibiotics administered to treat the infection.
- Acetaminophen: an antipyretic used to treat a fever.
- Phenytoin: an anticonvulsant given to prevent the client from experiencing a seizure when at risk of ICP.

COMPLICATIONS

- Increased ICP, which can lead to seizures, coma, and death.
- Syndrome of inappropriate antidiuretic hormone (SIADH), which is due to pressure from inflammation abnormally stimulating the hypothalamus, causing increased secretion of antidiuretic hormone (vasopressin).
- Septic emboli can occur as a result of meningitis. This complication can lead to disseminated intravascular coagulation, stroke, or gangrene.

N NCLEX® Connection: Physiological Adaptation, Illness Management