Nursing Care in Patients with Pneumonia

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Introduction

Pneumonia is a disease of the respiratory system. It presents as an inflammatory process of lung parenchyma resulting in edema of the internal lung tissue and extravasation of alveolar fluid. Drawing on its anatomically constituent components it is also called pneumonia, egg lobar pneumonia, segmental to bilateral or bronchopneumonia. In general, its etiological factors are bacteria to fungal viruses to non-infectious ones such as: inhalation of toxic gases, chemicals, smoking.

Purpose

This article consists of knowing the features of this respiratory disease, how to recognize it and how to prevent its etiological factors before the disease appears and aggravates. To treat any person / patient affected by pneumonia based on anamnesis, diagnosis, therapeutic medical treatment. Provide health care to the nursing staff by making physical assessment, possible nursing diagnoses, planning, nursing interventions, in order to reduce the time for recovery. Teach and advise patients affected by pneumonia to correctly, accurately, and appropriately apply therapies and advice on avoiding its etiological factors.

Material & Method

1.Perform the clinical signs of pneumonia and distinguish it with another respiratory disease.
2. Description and proper application of the five nursing stages to the patient.
3. Describe the correct imaging device for pneumonia.
4. Information on people, patients, when it is most commonly affected by pneumonia.

Keywords: Respiratory Disease, Pneumonia, Imaging Diagnosis, Treatment, Evaluation, Nursing Intervention Diagnosis, Positive Feedback.

Pneumonia is an infection that causes inflammation in the air sacs of one or both lungs. These sacs may become filled with fluid or pus, which can lead to symptoms such as coughing up mucus or pus, fever, chills, and difficulty breathing. Pneumonia can be triggered by various microorganisms, including bacteria, viruses, and fungi.

The severity of pneumonia can vary from mild to potentially life-threatening. It poses a greater risk to certain groups, including infants, young children, older adults (especially those over 65), and individuals with weakened immune systems or underlying health conditions. Diagnosing pneumonia typically involves reviewing the patient's medical history, conducting a physical exam, and performing diagnostic tests like a chest X-ray. These steps help determine the type and severity of the infection. [1]

Symptoms of Pneumonia

The symptoms of pneumonia can range from mild to severe, depending on factors like the type of pathogen responsible for the infection, the person's age, and their general health condition. Some of the most common symptoms include:

- Persistent cough, which may produce green, yellow, or bloody mucus
- Fever, often accompanied by sweating and chills
- Difficulty breathing or shortness of breath
- Rapid, shallow breathing
- Sharp or stabbing chest pain, especially when breathing deeply or coughing
- Fatigue, loss of appetite, and low energy levels
- Nausea and vomiting, particularly in young children
- Confusion, particularly in older adults

Symptoms may vary across different age groups. Newborns and infants may not display obvious signs of infection, but they might experience symptoms such as fever, vomiting, coughing, or appear tired, irritable, or generally unwell. In older adults or those with compromised health, symptoms may be milder or harder to recognize, and they may even experience a lower-than-usual body temperature. Confusion or mental changes are also common in older adults with pneumonia. For individuals with chronic lung diseases, pneumonia symptoms can worsen and become more severe. [2]

Causes of Pneumonia

Pneumonia can be caused by various pathogens, including bacteria, viruses, and fungi. The specific cause of pneumonia plays a significant role in determining the severity and treatment options.

Bacterial Causes

The most common type of bacterial pneumonia is **pneumococcal pneumonia**, which is caused by *Streptococcus pneumoniae*, a bacterium typically found in the upper respiratory tract. However, there are also other bacterial types that cause what is known as "atypical pneumonia," such as:

- **Mycoplasma pneumoniae**: This bacterium often affects individuals under 40, particularly those in crowded settings like schools or military barracks.
- **Chlamydophila pneumoniae**: Known for causing mild pneumonia, this bacterium is commonly associated with upper respiratory infections and circulates year-round.
- **Legionella pneumophila**: This bacterium is responsible for **Legionnaire's disease**, a severe form of pneumonia that is not spread from person to person.

Viral Causes

Viruses affecting the upper respiratory tract can also lead to pneumonia. Among the most common viral causes in adults are:

- **SARS-CoV-2** (the virus responsible for COVID-19)
- **Influenza virus**

For young children, the **respiratory syncytial virus** (RSV) is a leading cause of viral pneumonia. While viral pneumonia tends to be less severe than bacterial pneumonia, it generally resolves more quickly.

Fungal Causes

Fungal pneumonia is more common in individuals with weakened immune systems or chronic health conditions. It can also affect people who are exposed to high levels of certain fungi, which may be found in contaminated soil or bird droppings. Notable fungal causes include:

- **Pneumocystis pneumonia**: Caused by *Pneumocystis jirovecii*, this severe fungal infection most often affects individuals with compromised immune systems, such as those with HIV/AIDS or those undergoing long-term immunosuppressive treatment.
- Regional fungal infections in specific areas of the U.S. that can lead to pneumonia include:
    - **Coccidioidomycosis** (Valley fever): Found in Southern California and the desert Southwest.
    - **Histoplasmosis**: Predominantly found in the Ohio and Mississippi River Valleys.
    - **Cryptococcosis**: Common throughout the U.S., particularly linked to bird droppings and contaminated soil. [3]

Pneumonia Classification

Pneumonia can be classified based on how it is acquired, with the main categories being community-acquired, hospital-acquired, healthcare-acquired, and aspiration pneumonia.

Community-Acquired Pneumonia

Community-acquired pneumonia (CAP) refers to an infection that is acquired outside of healthcare settings like hospitals, nursing homes, or outpatient clinics. It is the most common type of pneumonia and typically presents as an acute infection with symptoms that develop over hours or days.

- **Streptococcus pneumoniae** is the most frequent cause of CAP, accounting for 20% to 60% of cases.
- Other common pathogens include:
    - *Haemophilus influenzae*
    - *Staphylococcus aureus*
    - *Legionella pneumophila*
    - *Mycoplasma pneumoniae*
    - Several viruses

Hospital-Acquired Pneumonia

Hospital-acquired pneumonia (HAP) is a type of infection that develops during a hospital stay, often in patients already weakened by illness or injury. This form of pneumonia is more serious due to the patient's vulnerable state and the potential resistance of bacteria to common antibiotics, complicating treatment.

- Infections may occur through inhalation of airborne pathogens or contact with contaminated healthcare workers.
- Patients on ventilators are at particular risk, as ventilator tubes or other medical devices can provide a direct pathway for bacteria and viruses to enter the lungs.

Healthcare-Acquired Pneumonia

Healthcare-acquired pneumonia (HCAP) is similar to hospital-acquired pneumonia but occurs in healthcare settings outside of hospitals, such as outpatient clinics, nursing homes, or long-term care facilities. This type of pneumonia is especially common in patients with chronic health conditions, like chronic kidney disease.

- People with chronic kidney disease are often immunocompromised and more vulnerable to infections, particularly because of frequent healthcare interactions like dialysis.
- Proper hygiene and cleaning of medical equipment are critical, though patients undergoing dialysis or similar treatments still face an elevated risk of infection. [4]

Diagnosis

When pneumonia is suspected, your doctor will start by reviewing your medical history and conducting a physical examination. This includes listening to your lungs with a stethoscope to detect any abnormal sounds, such as bubbling or crackling, which may suggest pneumonia.

If pneumonia is likely, your doctor may recommend the following tests:

- **Blood tests:** These helps confirm the presence of an infection and may assist in identifying the organism causing it. However, pinpointing the exact germ might not always be possible.
- **Chest X-ray:** An X-ray of the chest allows your doctor to diagnose pneumonia and determine the extent and location of the infection. However, it cannot specify which type of microorganism is responsible.
- **Pulse oximetry:** This test measures the oxygen level in your blood, as pneumonia can affect your lungs' ability to transfer oxygen into the bloodstream.
- **Sputum test:** A sample of sputum (the fluid from your lungs) is collected after a deep cough and analyzed to help identify the cause of the infection.

For individuals over 65, those hospitalized, or those with severe symptoms or underlying health conditions, additional tests may be recommended:

- **CT scan:** If pneumonia is not improving as expected, a chest CT scan may provide a more detailed view of your lungs.

- **Pleural fluid culture:** If there's concern about infection spreading to the pleural space (the area surrounding the lungs), a sample of pleural fluid is taken using a needle inserted between the ribs and analyzed to identify the infection type. [5]

Pneumonia Treatment

For most individuals, pneumonia is a treatable condition. However, in some cases, it can become severe, requiring hospitalization, and if left untreated, it may lead to death. The severity of pneumonia, and the corresponding treatment plan, depends on the patient's age and overall health before they fell ill.

Treatment for Healthy Adults

For young and middle-aged adults with community-acquired pneumonia who were otherwise healthy, treatment is typically done at home. The general approach involves:

- **Fever reducers** like NSAIDs, acetaminophen, or aspirin to alleviate fever.
- **Rest** to allow the body to recover.
- **Increased fluid intake** to help loosen mucus in the lungs.

If pneumonia is caused by bacteria, antibiotics tailored to the specific bacteria will be prescribed. In the case of viral pneumonia, antibiotics are not effective, so antiviral medications may be recommended instead.

Cough suppressants are generally avoided because coughing helps clear mucus from the lungs. Suppressing this reflex could make the condition worse. While young adults often feel better within a week, older adults may take several weeks to recover. It is important to fully recover before returning to normal activities to prevent recurrence.

Treatment for At-Risk Populations

Pneumonia can be especially dangerous for children under age 2, adults over 65, and individuals with chronic conditions such as heart, lung, or kidney disease, diabetes, or a weakened immune system (e.g., from chemotherapy or HIV). These individuals should seek immediate medical care and may require hospitalization. In some cases, even healthy adults with severe symptoms or ineffective antibiotic treatment may need to be hospitalized.

For those in high-risk groups, **strong antibiotics** and **oxygen therapy** are often necessary to treat the infection and maintain healthy oxygen levels in the blood. Recovery for these patients may take several weeks.

Prevention

There are several ways to reduce the risk of developing pneumonia:

- **Vaccination**: A vaccine is available to protect against Streptococcus pneumoniae bacteria, which is a common cause of pneumonia. It is recommended that children and individuals in high-risk groups receive both the pneumonia and flu vaccines. There are two types of pneumococcal vaccines:
    - The **pneumococcal conjugate vaccine (PCV)**, typically given to children.

    - The **pneumococcal polysaccharide vaccine (PPV)**, which is recommended for most adults over 65.
- **Good hygiene**: Regular handwashing is essential to prevent the spread of infections.
- **Lifestyle changes**: Avoiding smoking and maintaining proper nutrition and rest can help strengthen the immune system, making the body more resilient to infections.

Taking these preventive measures can significantly reduce the risk of pneumonia and improve overall health. [6]

Pneumonia Complications

While pneumonia can often be treated effectively, it can become life-threatening if it leads to complications. These complications may include:

- **Respiratory failure**
- **Sepsis**
- **Bacteremia** (when bacteria enter the bloodstream)
- **Lung abscesses** (pus-filled areas in the lungs)
- **Kidney failure**
- **Lung failure**
- **Heart rhythm problems**

However, these complications are not common, especially if treatment is sought early.

Septic Shock and Pneumonia

One of the most serious complications of pneumonia is **septic shock**, which can arise when bacteremia occurs. This condition is a reaction to the infection in your blood, causing a dangerous drop in blood pressure. When blood pressure drops too low, the heart struggles to pump enough blood to organs, leading to organ failure.

Lung Pneumonia Complications

Pneumonia can cause complications that specifically affect the lungs, such as **lung abscesses**, **pleural effusion**, and **respiratory failure**.

- **Lung Abscesses**: These are pockets of pus that form in the lungs. They are more likely to develop in individuals who:
    - Have a history of gum disease
    - Have bacteremia
    - Have a weakened immune system
    - Misuse alcohol
- **Pleural Effusion**: The pleura are two layers of tissue surrounding your lungs. If pneumonia is left untreated, inflammation of the pleura can occur, causing sharp chest pain when breathing in. If the inflammation worsens, fluid can accumulate between the layers, leading to a condition called pleural effusion.
- **Respiratory Failure**: In severe cases of pneumonia, fluid can fill the lungs, preventing them from transferring enough oxygen into the blood or removing carbon dioxide from the blood. This condition is critical because organs depend on oxygen to function. Hospitalized patients or those with weakened immune systems, the

elderly, or individuals with a history of alcoholism are at greater risk of respiratory failure.

Kidney Pneumonia Complications

Pneumonia can also affect kidney function, potentially leading to **acute kidney injury** or even **kidney failure**.

- **Kidney Failure**: This can occur when bacteremia or septic shock impairs blood flow to the kidneys. Although this is a rare complication of pneumonia, it can be life-threatening if the kidneys are not receiving adequate blood supply. The risk of kidney failure is higher for hospitalized patients or those with additional medical conditions.

Heart Pneumonia Complications

Pneumonia can also affect the heart, particularly in older adults, causing complications like **heart attack**, **irregular heartbeat**, and **heart failure**.

- **Heart Failure**: Studies show that 30% of individuals hospitalized for pneumonia will develop heart-related complications, such as heart failure, within 10 years of being discharged. Several factors can contribute to these complications, including bacteria entering the heart, the stress of the illness triggering heart problems, or insufficient oxygen reaching the organs. The risk of heart complications is higher in the elderly, hospitalized patients, or individuals with pre-existing heart conditions. [7]

Pneumonia Prevention

To reduce the risk of pneumonia and the germs that cause it, follow these steps:

- Wash your hands thoroughly and frequently.
- Avoid contact with sick individuals, and stay home if you're feeling ill.
- When you need to cough or sneeze, do so into a tissue, your sleeve, or your elbow.
- Regularly clean frequently touched surfaces in your home or workplace.
- Don't smoke, and avoid exposure to secondhand smoke.
- Follow your treatment plan for any chronic conditions, such as asthma, heart disease, or diabetes.
- Get vaccinated against pneumonia and the flu.
- Support your immune system by exercising, eating nutritious foods, and getting sufficient rest.

Pneumonia Vaccine

There are two types of vaccines that protect against *Streptococcus pneumoniae*, the leading cause of bacterial pneumonia. These vaccines are recommended for:

- People aged 50 and older
- Individuals with chronic health conditions or weakened immune systems

- Smokers
- All children under 5 years old, as well as children aged 5 through 18 with certain risk factors [8]

Nursing Care for Pneumonia

Nursing Management

- **Obtain blood work and check cultures**: Collect and analyze blood samples to help identify the infecting organism.
- **Hydrate the patient**: Ensure proper hydration to help loosen mucus and prevent dehydration.
- **Administer antibiotics as ordered**: Provide the appropriate antibiotics based on the identified pathogen (for bacterial pneumonia).
- **Keep the patient comfortable and warm**: Help the patient maintain comfort by regulating their environment and body temperature.
- **Perform suction as required**: Use suction to clear the airway if the patient has excessive mucus or difficulty breathing.
- **Measure intake and output (I&O)**: Track fluid intake and output to ensure proper hydration and prevent fluid imbalances.
- **Manage pain and cough**: Administer pain medications as needed and manage cough to ensure it helps clear the lungs effectively.
- **Promote nutrition**: Encourage appropriate nutrition to support the immune system and overall recovery.
- **Administer oxygen as needed**: Provide supplemental oxygen if the patient's oxygen levels are low.
- **Provide rest**: Ensure the patient gets adequate rest to promote healing and recovery.
- **Teach patient hand washing**: Educate the patient on the importance of frequent hand washing to prevent the spread of infection.

Nursing diagnoses

- Impaired gas exchange related to capillary changes in the alveolar membrane, affecting oxygen transfer.

- Airway clearance ineffective related to increased tracheobronchial secretions.

- Acute pain related to the effects of inflammation and pleural irritation.

- Impaired thermoregulation (hyperthermia) associated with increased metabolic processes and dehydration.

- Deficient fluid volume related to fluid loss or inadequate intake.

- Disturbed sleep pattern related to pain, difficulty breathing, and discomfort. [9]

Conclusions

Pneumonia remains a significant respiratory threat, with its severity varying based on factors such as age, underlying health conditions, and the type of pathogen involved. While most cases can be treated effectively, early detection and intervention are crucial to avoid complications, especially for high-risk populations like the elderly, children, and those with compromised immune systems. Preventive measures, including vaccination, good hygiene practices, and proper management of chronic conditions, play a vital role in reducing the incidence of pneumonia. By recognizing the symptoms early, seeking appropriate medical care, and adhering to prescribed treatments, the chances of a successful recovery can be significantly improved.

Effective nursing care for pneumonia involves a comprehensive approach aimed at supporting the patient's recovery and preventing complications. By managing symptoms, administering appropriate treatments, and promoting comfort, nurses play a crucial role in the patient's healing process. Addressing nursing diagnoses, such as gas exchange issues and fluid imbalances, further enhances recovery and ensures that patients receive the best possible care throughout their treatment.

Refrences

1. Pneumonia. National Heart, Lung, and Blood Institute. http://www.nhlbi.nih.gov/health/health-topics/topics/pnu. Accessed April 15, 2016.
2. American Lung Association Scientific and Medical Editorial Review Panel, December 11, 2024: https://www.lung.org/lung-health-diseases/lung-disease-lookup/pneumonia/what-causes-pneumonia
3. American Lung Association Scientific and Medical Editorial Review Panel, December 11, 2024: https://www.lung.org/lung-health-diseases/lung-disease-lookup/pneumonia/what-causes-pneumonia
4. Ph.D. Susan Chow, Reviewed by M.Sc. Benedette Cuffari, Pneumonia Classification - News Medical Life Sciences (Updated May 22, 2021): https://www.news-medical.net/health/Pneumonia-Classification.aspx
5. Mayo Foundation for Medical Education and Research (MFMER) - Pneumonia Diagnoses and Treatment (Updated June 13, 2020): https://www.mayoclinic.org/diseases-conditions/pneumonia/diagnosis-treatment/drc-20354210
6. Ph.D. Susan Chow, Reviewed by Sophia Coveney (B.Sc. Biology and Psychology) - Pneumonia Treatment - News Medical Life Sciences (Updated Jul 20, 2023): https://www.news-medical.net/health/Pneumonia-Treatment.aspx
7. Frances Gatta, Kate Rope, Amy Gopal, Medically Reviewed by Poonam Sachdev, MD - WebMD - What Are the Complications of Pneumonia? (May 14, 2024): https://www.webmd.com/lung/complications-pneumonia
8. Sylvia Davis, Medically Reviewed by Poonam Sachdev, MD - WebMD -

Pneumonia: What to Know (November 14, 2024): https://www.webmd.com/lung/understanding-pneumonia-basics

9. Saud Bin Abdul Sattar; Andrew D. Nguyen; Sandeep Sharma; Asheley Headley - Bacterial Pneumonia (Nursing) - National Center for Biotechnology Information (Updated February 26, 2024): https://www.ncbi.nlm.nih.gov/books/NBK568697/