

Objectives

Special points of interest:

- Pneumonia is the leading cause of infectious death in developed nations.
- It is not unusual to see a fever of 104° or 105° with pneumonia; anything over 101° usually means a fairly serious problem.

Following completion of this home study course, the learner should:

- * Possess a basic understanding of what Pneumonia is and how it affects the body
- * Be able to list several signs and symptoms of the disease
- * Explain how elderly persons may present

differently when they are afflicted

- * Know what persons are more at-risk for developing Pneumonia
- * Be able to take appropriate action if an individual exhibits signs/symptoms indicative of Pneumonia

Introduction

Pneumonia is an infection of the lungs, and can occur in anyone, but happens more often in people with poor immune systems (young children, the elderly, people on steroids like prednisone or those on cancer drugs). It also tends to occur in people who have trouble chewing or swallowing, because they can easily aspirate food or liquid into the windpipe (trachea), which sets up a favorable environment in the lungs for microorganisms to thrive. Pneumonia is the leading cause of infectious death in developed nations. It is usually caused by bacteria or viruses, but can also be the result of fungi, molds, or parasites.

The Lungs

It is helpful to understand some basic lung anatomy before discussing the actual disease process (pathophysiology). The human respiratory system takes in air through the trachea, which divides into the right bronchus and the left bronchus, each of which leads to the right and left lungs, respectively. The bronchi divide into many smaller airways, called bronchioles, within the lungs, much in the same way that tree branches grow from the trunk. The bronchioles then lead to many tiny air bags called alveoli. These are arranged in clusters which resemble grapes on the vine. They are like tiny balloons, and attached to them are millions of small blood vessels called capillaries. When we inhale, the air finds its way to the alveoli, where the capillaries pick up oxygen (which our cells need for energy) and drop off

carbon dioxide (which our cells produce as waste). Then we exhale and get rid of the carbon dioxide. The airways in the lungs produce mucous to moisten and protect them.

Microorganisms that enter the respiratory tract set off a chain of events that leads to the symptoms of pneumonia. This invasion triggers a response from the body's immune system, which is designed to identify, attack, destroy, and expel the unwelcome visitors. The presence of microorganisms and the attack upon them by the immune system produce several signs and symptoms which usually prompt us to seek medical attention. We will look at the signs and symptoms of Pneumonia in terms of its pathophysiology.

Signs and Symptoms

Microorganisms which do not belong to the body usually produce waste products which irritate and inflame tissues. This happens inside the lungs and in the tiny capillaries that serve the lungs, resulting in an inflammatory process, which, among other things, can cause blood and fluid to leak from the blood vessels into the lungs themselves. Mucous production also begins to increase in order to further protect the lining of the airways and help flush out the bacteria. White blood cells attack and destroy the bacteria, viruses, or other invaders and thus create even more debris. All of the fluid and waste builds up in the lungs and leaves less space available for air. This is not pretty; neither is it a pleasant experience for the person suffering through it. Here is what we typically notice with people afflicted with Pneumonia:

“It is not unusual for an individual with pneumonia to breathe over 25 times a minute (normal is 12-20).”

means a fairly serious problem; it is not unusual to see a fever of 104 or 105 with Pneumonia. Keep in mind that elderly persons may not exhibit much of an elevation in temperature because of a less efficient immune response.

Sweating, chills, shakes, and muscle aching.

Often these signs/symptoms accompany a fever. Sweating is the body’s attempt to cool itself in response to the temperature elevation, and the patient might experience chills and shaking as a result of the process. Muscle aching, similar to that of influenza, may also be present, because when they are fighting an infection, white blood cells release chemicals that cause temporary inflammation in the muscles and joints. This is also why breathing can become painful with pneumonia, as those same chemicals (called *cytokines*) are released into the lungs and the mus-

cles between the ribs (called *intercostals*). Pain with breathing can be quite sharp!

Difficulty breathing/shortness of breath. Inflammation in the bronchi and bronchioles causes them to become narrow, and so there is less room for air to move in and out. Also, the increase in mucous production (to help flush out the foreign agents), the fluid leaking from the tiny blood vessels, and the debris from the destroyed microorganisms all combine to fill the lungs with fluid, taking away even more space that is normally reserved for air. Breathing becomes more difficult, and you may see a person use accessory muscles in the neck and the in the ribs to assist in expanding the rib cage in order to create more space for air. This is appropriately called *labored* breathing. Taking a deep breath is not possible, and therefore breathing will become shallow. Since he or she is getting less oxygen with each breath, the body compensates by breathing faster, and it is not unusual for an individual with pneumonia to breathe over 25 times a minute (normal is 12-20).

Cough. One of the most notable signs of Pneumonia or any other respiratory problem, coughing is one of the ways in which the human body fights a lung abnormality. It may begin as a dry, hacky cough, but usually progresses to what we call a *productive* cough (meaning that a person can spit out the contents coming up from the lungs). Coughing expels those nasty invaders from the lungs and helps to clear the airways of the excess mucous and debris from the battle. When someone with a lung infection coughs up phlegm (also called sputum), it can appear green, yellow, or brown, and there may even be tinges of blood from damaged capillaries. It may often smell foul from the toxins it contains.

Wheezing, crackling, and gurgling noises. Air moving through a smaller-diameter tube tends to produce a higher-pitched noise than air moving through a tube with a larger diameter. This is why people with Pneumonia and other respiratory prob-

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Signs and Symptoms *(continued from page 2)*

lems often make *wheezing* noises when they breathe or cough. It comes from fluid occupying spaces where air should be, and the bronchi and bronchioles being narrowed from inflammation. Remember the grape clusters (alveoli)? Sometimes they get closed up completely, and during breathing or coughing they may suddenly snap open. This makes a “crackling” noise called *rales*, not unlike what happens when we pour milk on Rice Krispies. Along with these may be a wet, gurgling or rattling noise called *rhonchi*. Usually a stethoscope is necessary to hear any of these types of noises, but sometimes they are loud enough to hear without one.

Changes in skin color. Someone with Pneumonia is not receiving enough oxygenated blood, and it shows in the skin. Often the person may be pale, and there may be cyanosis (a bluish color) of the lips and/or under the fingernails. Persons with a darker brown complexion may present with a yellow-brown hue. Those of African-American descent may appear with an ashen gray color.

Weakness and fatigue. The body needs oxygen for all of its cells to carry out their jobs. Without enough oxygen, they struggle. In addition, most of the body’s available energy is tied up fighting a disease. It is common for someone with Pneumonia to sleep most of the day.

Loss of appetite, nausea, vomiting. The body cannot afford to use any energy digesting food right

now. Not being hungry conserves more energy. Toxins from the bacteria or viruses may cause upset stomach and vomiting, which helps the body get rid of them.

Confusion. Lack of oxygen hampers the brain’s ability to do its job. A person with Pneumonia may be confused and disoriented. Fatigue impairs one’s concentration also.

A note of importance regarding elderly persons: The immune system of an elderly person usually is not as capable or efficient as it was when that person was younger. Consequently, older people may not exhibit the typical signs and symptoms of Pneumonia. Their temperature may be normal, and they may not sweat, cough, or complain. Often, the only things you may see will be confusion, fatigue, and perhaps more falls. Since the changes in this population may be more subtle, observation becomes more crucial!

A note of importance regarding persons with IDD: People with Intellectual or Developmental Disabilities often do not communicate their needs verbally, so be alert for changes in behavior. Someone with IDD who is ill may isolate himself or herself, may have more difficulty accomplishing tasks, may refuse to participate in activities or to eat, and may act aggressively toward self or others. When these types of things occur, it is more often than not a case of some kind of medical problem that is driving the change.

Risk Factors

Although anyone can contract Pneumonia, certain persons carry a greater risk. As a provider of care, it is important to know who these people are. As you will see, one person may fit into several of these categories simultaneously, thus increasing his or her risk.

- Young children and elderly persons. The children’s immune systems are not yet fully developed; those of the elderly are declining.

- Persons on immunosuppressive therapy. These people take drugs that prevent the immune system from working properly. This would include persons treated for cancer with chemotherapy and those who take corticosteroids like Prednisone.
- Persons with HIV and/or AIDS. In these cases, a virus directly attacks the immune system, thus compromising one’s ability to fight any disease.
- Persons who have dysphagia (this includes people with neurological diseases such as Parkinson’s,

Risk Factors *(continued from Page 3)*

- ALS, Dementia, and those recovering from a stroke/CVA). People who have swallowing trouble often aspirate, meaning they inhale food or liquid down the trachea (windpipe) and into the lungs. They often cough, sputter, get tears in their eyes, turn red, or have a wet-sounding voice. Some people “silently aspirate,” meaning food/liquid goes into the lungs, but they don’t have any of the typical symptoms. Someone with Down Syndrome may have difficulty swallowing because the contours of the nasal passages and palate are structured a bit differently.
- Those with a diagnosis of reflux disease (GERD). Acid and other stomach contents regurgitate back up into the mouth and throat, and there is a risk of inhaling them into the lungs.
 - Persons with feeding tubes. The nourishment (usually liquid) and medications go directly into the stomach or intestines, and as with GERD, the contents can regurgitate. This is why after a feeding, the person needs to sit upright for at least an hour. In addition, the head of the bed needs to be elevated, and there will probably be a physician’s order indicating this.

If you care for a person who is treated for recurrent bouts of pneumonia, there is a good chance that he or she is having problems with swallowing. Please ask the PCP to order a swallowing evaluation.

What To Do

Untreated pneumonia can lead to death. Anyone with some combination of the aforementioned signs/symptoms needs to see a physician immediately! Call 911 and have that person transported to the nearest ER. The sooner a person with pneumonia is treated, the quicker the recovery. Document all the information, (including vital signs if you can get them), and report them to the EMTs and to the emergency room personnel. The more details you provide, the better it is for the health care team and for the patient.

Diagnosing Pneumonia

Please make sure you bring all the pertinent documentation with you to the emergency room (medication list and allergies, history and physical, journal notes about the current signs and symptoms). The individual will be examined physically, including a check of vital signs and listening to lung sounds. The ER physician will most likely want a sputum specimen, which involves coughing phlegm into a small, plastic container for a culture and sensitivity test (this affords an opportunity to find out what microorganisms are present and which antibiotics or antiviral medicines will work best). A complete blood count (CBC) will be ordered (large numbers of white blood cells indicate an infection), and if there is a suspicion that the infection has spread from the lungs to the bloodstream, blood cultures will be drawn also. The physician will order a chest x-ray and/or a CT scan of the chest in order to examine the status of the lungs; areas of fluid build-up can be seen. There are cases in which the doctor may want to aspirate fluid from the lungs with a needle. An IV may be started to administer fluids (especially if the individual’s intake has been poor) and antibiotics. Depending on the frailty of the patient and the severity of the illness, the doctor may wish to have him or her admitted to the hospital. This would be a good opportunity to voice your concerns about swallowing difficulties if the individual has any, because a swallowing evaluation could be conducted during the hospital stay.

Treatment

If the cause of pneumonia is bacterial, antibiotics will be prescribed (examples include Amoxicillin, Zithromax, and Keflex). *It is very important to make sure the individual takes every dose until the prescription is finished.* Sometimes people want to stop taking an antibiotic because they feel better and see no need to take any more. This is dangerous because there may still be bacteria in the body, and stopping the antibiotic too soon will allow them to multiply and cause a relapse. Please report any adverse effects of the medication to the PCP; the most common ones from antibiotics are nausea, vomiting, and diarrhea. If Viral

Pneumonia is diagnosed, an antiviral medication (Tamiflu and Zovirax are examples) may be prescribed.

The doctor will most likely also order something like Tylenol for headache and/or fever, cough medicine as needed, and encourage the patient to get plenty of rest and drink fluids. A follow-up visit with the PCP will also be ordered. Remember that it may take several weeks to recover from Pneumonia, especially for older or frail persons. If the individual does not seem to be improving or worsens, please notify the physician or call 911.

Preventing Pneumonia

The best way to prevent Pneumonia (and prevent spreading anything else) is frequent handwashing! Wash your wrists, palms, backs of the hands, between fingers, and under the nails. It should take about 20 seconds to do a thorough job. If you do not have soap, alcohol-based hand sanitizer is the next-best thing (it will kill 99% of germs). Place enough to cover a 50-cent piece in the palm of your hand and continue rubbing it over all surfaces of your hands until they are dry. Hands should be washed before and after eating, before and after direct care of an individual, after using the bathroom, after smoking, and any time you notice they are soiled. Encourage your individuals to wash their hands frequently as well.

Cover your nose and mouth with the inside part of your elbow when you cough or sneeze.

Pay close attention to your individuals when they are eating; sometimes the signs of swallowing difficulty are subtle.

Talk with the PCP about vaccinations for pneumonia. He or she may recommend them, particularly if the individual is older or has a poorly functioning immune system.

Remember how important your role is—more than anyone else in the entire healthcare chain, you have the largest impact and can make the biggest difference!

Sources:

www.lung.org/lung-disease/pneumonia, 7/27/15
www.checkpneumoniasymptoms.com, 7/27/15

PneumoniaTest

Name: _____

Role/Title: _____

Agency: _____

Date: _____

Please provide contact information (email address, fax number, or mailing address) where you would like your certificate to be sent:

You must submit your completed test, with at least a score of 80%, to receive **1 hour** of training credit for this course.

- * To submit via fax, please fax the test and evaluation to 814-728-8887. Please fax only the test and evaluation, not the entire training packet.
- * To submit via email, please send an email to HCQUNW@MilestonePA.org. Please put "Pneumonia Test" in the subject line, and the numbers 1—5 along with your answers, in the body of the email, OR scan the test and evaluations pages and email as attachments.
- * To submit via mail, send the test and evaluation pages to Milestone HCQU NW, 247 Hospital Drive, Warren PA 16365.

1. Lungs

- A. Contain airways called bronchi and bronchioles which lead to tiny air sacs called alveoli
 - B. Are highly vascular and serve as a station where blood picks up oxygen and leaves carbon dioxide
 - C. Produce mucous to line the airways and sweep foreign invaders out
 - D. All of the above
 - E. None of the above
2. Which of the following are signs and symptoms of Pneumonia?
- A. Rash over the torso and insomnia
 - B. Sudden onset of vision loss and severe headache
 - C. Cough, fever, weakness, fatigue, trouble breathing and pale skin color
 - D. Auditory hallucinations and delusions of grandeur
3. The best way to prevent Pneumonia, or any other infectious disease, from spreading, is
- A. Frequent handwashing
 - B. Using All-Tempe-Cheer in the laundry
 - C. Doubling up on Vitamin C
 - D. Saying morning and evening prayers
4. Shirley is in the emergency room because of a fever of 104 degrees, difficulty breathing, and a moist cough. She is coughing up blood-tinged, greenish-yellow sputum. The doctor most likely will order
- A. A chest x-ray, blood work, and a culture/sensitivity test for the sputum
 - B. MRI of the brain
 - C. A myelogram of the lumbar spine
 - D. Urinalysis and kidney function tests
5. True or False: People taking prednisone or chemotherapy have an increased risk of getting Pneumonia
- True False

Home Study Evaluation

Training Title: Pneumonia Date: _____

- | | |
|--|--|
| <input type="checkbox"/> Direct Support Professional | <input type="checkbox"/> Provider Administrator/
Supervisor |
| <input type="checkbox"/> Program Specialist | <input type="checkbox"/> Provider Clinical Staff |
| <input type="checkbox"/> Consumer/Self-Advocate | <input type="checkbox"/> Family Member |
| <input type="checkbox"/> Support Coordinator | <input type="checkbox"/> Support Coordinator
Supervisor |
| <input type="checkbox"/> PCH Staff/Administrator | <input type="checkbox"/> County MH/MR/IDD |
| <input type="checkbox"/> FLP/LSP | <input type="checkbox"/> Other (please list): _____ |

Please circle your PRIMARY reason for completing this home-study training:

It's mandatory interested in subject matter need training hours convenience

Please circle the best response to each question.

5 = Strongly Agree 4 = Agree 3 = Undecided 2 = Disagree **1 = Strongly**

- | | | | | | |
|---|---|---|---|---|---|
| 1. As a result of this training, I have increased my knowledge. | 5 | 4 | 3 | 2 | 1 |
| 2. I learned something I can use in my own situation. | 5 | 4 | 3 | 2 | 1 |
| 3. This training provided needed information. | 5 | 4 | 3 | 2 | 1 |
| 4. The training material was helpful and effective. | 5 | 4 | 3 | 2 | 1 |
| 5. Overall, I am satisfied with this training. | 5 | 4 | 3 | 2 | 1 |
| 6. I am glad I completed this training. | 5 | 4 | 3 | 2 | 1 |

Suggestions for improvement: _____

Additional information I feel should have been included in this training: _____

I would like to see these topics/conditions developed into home-study trainings: _____