

Flu Pathogens to Pandemics
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Overview

According to the Centers for Disease Control the worst influenza pandemic on record was the Spanish Flu of 1918 and 1919. It killed approximately 20 million to 50 million people worldwide. Some 500,000 victims were from the U.S. alone. Many of these flu-related victims were young, otherwise healthy individuals. This was just one of the many pandemic flu viruses in history.
(<http://www.hhs.gov/nvpo/pandemics/flu3.htm>)

Flu Pathogens to Pandemics will be an educational unit that depicts a historical overview of the influenza virus, including the 1957 Asian Flu, the 1968 Hong Kong Flu, and the 1977 Russian Flu. This unit will not only give a historical view of the influenza viruses, but contagious diseases in general. It will allow the student to explore how really vulnerable human beings were when it came to infections, illnesses, and diseases, and how they still are today, even with major medical technological advances. I feel it is important for the students to know the history, so they can understand how and why we have a problem with this virus still today. They need to know how pandemics and epidemics start, and the phases they move in and out of.

Students should also be aware of the economic impact on the infected areas, and what that impact does to the rest of the world. Sometimes students think that plagues and epidemics exist in third-world countries, and cannot really

happen here in the United States these days. They seem to think that America has all the answers, and if they don't, someone or something will provide the answer without much concern. In other words, doctors know what to do, so why should I worry about the flu. If I get it, I'll just have it for a little while and it will go away. They seem to lack serious concern and operate under the assumption that all will be well in the end.

This unit will further allow the students to take a closer look at the history of how diseases spread, and how people were finally able to control the contamination. It is important to look into the history to find answers to the future. Students will be reminded of their hygiene responsibilities, and why this is so important in the spread of pathogens. The importance of maintaining a healthy immune system through nutrition and exercise will be one of the focal points. A healthy immune system is the key to preventing the contraction of most pathogens.

The students will be taking a critical view at different pathogens on the microscopic level; how they enter the body on a cellular level, replicate themselves, and spread to other cells. In particular the students will study the influenza virus A and its particular characteristics. This will enable them to learn about the different strains of influenza, especially influenza A. Through various diagrams and class discussions, the students will be able to become better acquainted with their body's protection agents. It is important that the students understand how they can boost their immune system's function so as to limit their exposure to the flu pathogens. Methods of treatment and ongoing influenza defense tactics will be discussed along with what most health experts are saying about the flu vaccine development.

Rationale

I chose to create this unit because there is just too much controversy surrounding the flu virus itself, and the flu vaccine. Many people are so unaware of the actual facts. There are also many myths in circulation among students, families, and communities. For instance, some people think that if you go outside without a jacket or coat on a cool day or rainy day, they will become ill with the cold or flu. Some also believe that the flu is transferred from improper house-keeping, or lack of proper hygiene. They don't realize that flu pathogens constantly circulate in the air we breathe. They also fail to realize that more people are exposed to these pathogens in the winter months because they are in close closed quarter with others carrying the virus. Some people even claim they have a cure for the flu. It usually turns out to be grandma's secret potion from long ago. This non-scientific information has been passed down from generation-to-generation and is as

infectious among communities as the flu virus itself. Like the flu virus, it spreads rapidly. Panic among the population is not uncommon. In recent years we have experienced long lines of people waiting for the flu vaccine. Panics created by shortages of the vaccine. Some people are even taking antibiotics in a desperate attempt to combat the flu virus. We all should know by now that antibiotics are for bacterial infections, period!

I feel that it is important for the students to reflect on past influenza viruses so they can more readily understand our present-day situation. History repeats itself in varying ways, so studying the past will bring new light and information to the future.

There are some very effective ways to boost the immune system so that when a person comes in contact with the flu virus their immunity can combat it effectively on a microscopic level. If it is contained on this level it will have little chance to escalate and cause a life-threatening situation. It is important for students to know that simply washing their hands eliminates many pathogen risks. Keeping their bodies well hydrated is another very important key component to ridding the body of pathogens. There are so many people walking around day-after-day in a dehydrated state. This allows pathogens to stay longer, and spread harder throughout the body.

I have discovered that many people are creatures of habit. They don't change the things in their lives that need changed until something drastic happens. The need for lifestyle changes will be introduced into the unit.

Americans are busy living an extremely stressful lifestyle. They are too busy to pay attention to their health needs. They are too busy working, driving, shopping, vacationing, etc. Yes, vacationing. Americans in recent years have disclosed that vacationing is very stressful. Instead of relaxing, and lowering their stress levels, they are overworked during their vacations. The traveling, the expense, and the mental planning of what they are going to do on vacation has doubled, and tripled their stress levels. Most people now-a-days have to rest after a vacation. This simply does not make sense. In my opinion, stress is the number one cause of immune system deficiency. Add this to the fact that people travel more now than ever before and one can begin to understand how illnesses can rapidly spread through the globe causing pandemic conditions. This will also be addressed in this unit.

There are small, inexpensive, non-stressful ways to reduce the chance for illness. This unit will enable the students to look to the little things for controlling the spread of the flu virus. Being informed about these small, but critical things

will make all the difference between maintaining a breeding ground for illness, and maintaining a healthy illness-free lifestyle.

What We Should Know About Pathogens

Pathogens have existed since the beginning of time. They are microorganisms that cause disease. Some pathogens caused the death of animals while others caused the demise of humans. Sometimes only a few species were affected in isolated areas, but other times as pathogens were able to spread, vast areas and regions of populations were literally whipped out. Pathogens were not only responsible for the mortality of populations, but most often left the survivors in a long-term recovery stage. This not only affected the people in the immediate infected area, but other surrounding areas that depended upon them for trade goods and economic survival.

Communicable disease was not really studied until the 1800s. A study in London England showed that the most serious cases of disease usually existed in the highly populated, over-crowded parts of the city. This was also the dirtiest part of the city. Garbage and other debris were thrown into the streets and nearby waterways where it ended up being pumped back into that part of the city again. Even with this information from the study, city officials were not keen on spending the money to do what was necessary to alleviate the problem. It took the deaths of thousands of residents in this area for officials to act.

Upon cleaning up the environment the cases of diseases lessened, but this did not explain what caused the disease in the first place. Fear-filled questions arose each time illness fell upon a community. What is this sickness? Where did it come from? Why are only certain people affected? Who will be next? Panic would spread among groups of people and cause certain people who coughed a little because of throat irritation to be put out of housing and public places. This caused a “no one was safe and everyone was under suspicion,” type of atmosphere.

According to historians, as scientists searched for answers, it was noted that in the 1600s a Dutchman named Anton van Leeuwenhoek had studied some of these diseases under a microscope. He found these disease agents to be on or around almost everything he viewed under the scope. He concluded that these agents must be everywhere in the environment. It was not until later that the term microorganisms, was given to describe these agents. Because of the lack of technology and transportation at this time, ideas and theories were not readily shared among prominent scientists like they are today, and it took hundreds of years for any kind of advancements.

It was not until the late 1800s that a man named Louis Pasteur made the connection between what Van Leeuwenhoek in the 1600s saw under the microscope and diseases. It was not until almost twenty years later that Dr. Robert Koch discovered that a certain microorganism had to be present every time a certain disease was discovered in an animal. Thus the term “infection” developed and was used along with this theory among most medical doctors and scientists. (Tierno, 2001)

If history has given us one thing it is a sordid account of the different epidemic and pandemic outbreaks of various diseases. Whether the historical recorders knew what to call the diseases or not, they left detailed descriptions of them that enabled each subsequent generation to acquire new solutions to the problem.

One would be inclined to think that the danger of plagues and pestilence is long gone, but this is not the case. Although technology has served us well in the twenty-first century, the ever-increasing population, affordable rapid transportation, bacterial resistance to antibiotics, and changing weather patterns have all caused health officials to stay alarmed about the threat of diseases. And let us not forget that old pestilences bore new strains.

Much like the conditions that existed in London in the 1800s, overcrowding, and ignorance is still a problem in the United States. Despite the numerous health bulletins put out by the various health organizations, in various media, some populations are still apprehensive about health care. Health care itself has been under the microscopic view of the government for years. It seems that certain people have adequate access while others are limited to its access or have none at all. Shortages in vaccines are also a major concern.

Strategies

I will begin the unit with a pretest. This gives me a view of where the student is in his/her knowledge of pathogens and the flu virus. This also allows me to see who can follow test directions without any major problems. The pretest will be composed of twenty general true/false questions. The instructor will then collect all tests and grade them. At the close of the unit, the students will be retested with the same questions to see what improvement they make in their overall score.

A word wall will be developed during this unit so that the students become familiar with words associated with the unit. The word wall will can be located on the chalk board or a bulletin board for the students to view. This will increase their health literacy and spelling skills. Many games can be developed from word walls.

Students learn in varying ways, so a bit of creative expression and entertainment will be in order for this unit. Creating hand puppets of pathogens and immune system characters is amusing and fun for the whole class. Since it is up to the individual student to create his/her version of their character, there will be much variation.

Some of our students are great at recognizing and tracing the steps of a computer virus. They are up-to-date on the latest anti-virus programs offered. They take better care of protecting their computers from viruses than they do protecting themselves from viruses. Having them trace a computer virus and compare it with tracing a human virus would increase their awareness of their own health and safety and the health and safety of their family and friends. It's also an interesting class activity to do.

An informational pamphlet is a creative way to get the students to educate their family and friends about the influenza virus. This is an opportunity for them to spread what they have learned in the classroom to others. This will not only increase their health literacy skills, but enhance their creative skills as they incorporate their learning into a teaching tool for the community. These pamphlets can then be displayed in the hallway outside the classroom for others to read.

Overall Objectives

1. The student will be able to increase their health literacy through library research.
2. The student will gain knowledgeable sense of how the body works on the microscopic level.
3. The student will gain a new found respect for his/her health status.
4. The student will be able to relate the information from this unit to friends, family, and community members.
5. The student will be able to explain the flu vaccine and the importance of getting immunized each year.
6. Using the computer, the students will be able to create a pamphlet depicting flu virus and vaccine information.

What You Should Know About Pathogens

There are six kinds of pathogens. There are millions of microorganisms living inside the human body. Some are helpful, but others are not. The harmful ones are called pathogens. They enter the body and cause illness or disease. It is

not hard for pathogens to enter the body. A pathogen can enter the body in a variety of ways. The two most common ways are direct or indirect contact.

Direct contact is done through touching, and kissing. Kissing is an intimate ritual performed in many cultures for many reasons. It is the lead behavior for showing affection from one human being towards another. In the act of kissing, two people's lips touch and a small amount of saliva is exchanged. It is usually not just performed once, but can be done time and time again without regard to pathogen exchange. During the act of kissing, varying amounts of bodily fluids are exchanged. In the bodily fluids are pathogens. As one person exchanges saliva with the other, the pathogens find a new home to replicate and infect.

Touching objects or surfaces that are infected with pathogens is another way for them to spread. Hand shaking is one of the oldest and most effective ways of spreading pathogens. It is used for greeting someone, as well as saying good-bye. It affirms friendship between two people. As with kissing hand shakes are even more common because they are not considered to be as intimate as kissing. Our hands are used for many tasks during the day. They are exposed to many surfaces as we go about our daily routines. Every time we touch an object, we pick up any pathogens that were left behind by someone else. There are literally thousands of pathogens waiting to get aboard our hands.

Another way for pathogens to spread from one person to another is by droplet infection. This can be done by sneezing, and or coughing. When a person sneezes, the air rushes from the inside of the body out of the nose and mouth at approximately 85 miles an hour. This is a reflex act, and no matter how hard a person tries, they are not able to completely stop droplets of mucous from spraying out of the nose and mouth. In this spray millions of pathogens escape to the outside of the body. Most people also cover their nose and mouth with their hands. As soon as they touch something, they transfer pathogens to that object. That is why shaking hands is one of the most common ways to spread the flu virus. That coupled with the fact that most people forget to wash their hands frequently during the day explains the rapid transfer of a pathogen.

Influenza is a very contagious virus passed from one person to another that produces symptoms such as, chills, fever, achy muscles, soar throat, coughing, fatigue, and headache. Most people who contract the flu virus have it for up to two weeks. It can lead to other illnesses such as bronchitis, or pneumonia. (Meeks et al., 1999, p. 183 shows a nice diagram for review)

The First Line of Defense, the Skin

The skin is an effective barrier against pathogens because it is non-porous. This means that pathogens cannot enter the vulnerable tissue layers below to cause infection. As long as the skin remains intact, the underlying tissues can remain disease free. Once damage occurs to the skin, the opening(s) allow millions of pathogens entrance to the body. Upon entering the body other defense mechanisms go to work. (p. 191 Meeks/Heit textbook shows nice diagram for review)

The most likely way for the flu virus to enter the body is through the nasal passages of the nose. These passages are mucous-lined. Some pathogens will be trapped in the lining, while others will filter through and travel into the respiratory tract. The same is true for the mouth. It is mucous-lined and also a source for pathogens to enter the body. Just try to imagine how many times a day a person puts their hands to their nose and mouth without ever taking notice. How many people actually carry Kleenex on their person to wipe their nasal secretions? How many people store their Kleenex in a clean environment? How many people use their Kleenex over-and-over again, place it in their pocket and contaminate their clothing? Later they put their hands in their pocket and re-infect themselves.

Immunity

The immune system is a specialized system of the body whose job is to protect it from harmful pathogens. There are two types of immunity active and passive. Active immunity when a person comes in contact with measles, for instance. The body produces antibodies that protect the person the next time he/she comes in contact with the measles again. Passive immunity is when antibodies are introduced into the body in a form of vaccine. These are powerful ways the body has of keeping viruses under control. Once a pathogen gets beyond the skin layer, it enters into the body tissues down to the microscopic, cellular level. This is where the true battle begins.

The immune system is made up of specialized cells called lymphocytes. These are white blood cells that multiply to battle the pathogen(s). There are two types, B-cells and helper T cells. Helper T-cells always signal B-cells to produce antibodies to destroy the pathogens. Other white blood cells called macrophages also destroy pathogens by engulfing and devouring the pathogen. Destroyed pathogens are swept away by the lymph system and removed by the spleen, an important organ for filtering the blood.

Another fluid of the body called mucus traps many pathogens. It lines the nasal passages and collects at the back of the throat. We swallow mucus along

with saliva down to the stomach. There the pathogens are destroyed by the gastric acids. For more information: Greenberg, Jerrold, ED.D. and Robert Gold, PH.D., Health. Florida: Holt, Rinehart and Winston, Inc., 1994. pp. 446-449.

The History of the Influenza Virus

There were many epidemics and pandemics throughout history, but none as horrific as the “Spanish Flu” of 1918 and 1919. It killed millions throughout the globe before it was brought under control. The influenza of 1918 was called the “Spanish Flu” because Spain remained neutral in WWI. People thought that the flu had originated there, but according to an article in *Scientific American*, in September of 1918, a U.S. soldier stationed in the United States went to sick call with a high fever. A few hours later and dozens of soldiers were hospitalized with high fevers and respiratory symptoms. By the end of that month nearly 13,000 new cases of the outbreak had been diagnosed. Most of those who perished were otherwise healthy. They died of lung suffocation due to fluid build-up. This particular strain of the influenza virus was particularly more severe than other influenzas of the past. The mortality rate was approximately fifty times higher. Remember that antibiotics had not been discovered at this time. This would account for the high rate of bacterial build-up in the body tissues already weakened by the flu virus.

By preserving some of the tissues of the dead soldiers from that error, scientists were able to obtain new and invaluable information about the influenza virus through genetic analysis. They found that the flu virus is a highly mutative virus. Some infective strains can start in animals and mutate to humans. This information was used to enable scientists to create a vaccine that protected people from contracting the flu. It also enabled them to discover the cellular workings of the flu virus, and identify different strains. Whenever people are exposed to a new strain of influenza, epidemics or pandemics can occur. A pandemic is more likely to occur if an influenza virus A changes dramatically to create a new virus. When it does this most people will not have immunity to the new virus, and if it spreads easily enough, a pandemic is certainly not out of the question.

The Asian influenza pandemic of 1957 through 1958 is a good example to explore. According to the encyclopedia of *Plague and Pestilence* (Kohn, 1995) a type A influenza virus started in China. As it quickly spread through that country, it mutated into a major new subtype called H2N2. It proceeded to spread to Japan, and then onto Indonesia, the Philippines, India, Australia, Pakistan, Iran, and Yemen. Other nations also became infected such as Iraq, Egypt, Sudan and other African nations. From there it traveled to South America and on into Europe, Rumania, Greece and the British Isles. Next was Scandinavia and North America. It seemed to follow the trade routes. As with many influenza epidemics and

pandemics, many people suffered complications such as pneumonia. This usually proved to be fatal.

Teacher Note: For more detailed information on months, ages, etc. pp. 7-8 of the Encyclopedia of Plague and Pestilence; bibliography available at the end of this unit.

The Hong Kong influenza of 1968 again started in China and rapidly spread globally. It was again a type A virus later identified as H3N2. It spread to the Philippines and again onto Japan where two new strains had mutated. From there it hit the California coast, most probably from U.S. troops returning from their tour in Vietnam. It ventured south to Australia, and back through Europe by trade routes. Again pneumonia was a contributing factor in the mortality rate.

Teacher Note: For more detailed information on months, ages, etc. p.132 of the Encyclopedia of Plague and Pestilence.

The Russian Influenza Pandemic of 1977 through 1978 actually started in China. This particular type of influenza was again a subtype of the type A virus. It again was traced through China, Singapore, the Philippines, but did not receive too much attention until it reached Russia. From Russia the virus quickly swept into Europe, Japan, Indochina, and Indonesia. It traveled once again across the ocean to the United States and back once again through parts of Europe. By the spring and into the summer months of 1978 Argentina, Chile, Brazil, and New Zealand were affected. Mortality varied based upon subtypes of the type A virus.

Teacher Note: For more detailed information on months, ages, etc. pp. 277-278 of the Encyclopedia of Plague and Pestilence. There are all types of other epidemic and pandemic histories as well in this encyclopedia.

There are three basic types of viruses, A, B, and C. The influenza virus that caused pandemics in the past belongs to type A. A virus cannot survive on its own. It needs a host to live on. Type A virus strains can collect in a bird's intestines, and when in contact with other viruses mutate to a whole new different strain. The bird does not necessarily show any signs or symptoms of the virus. It just carries it and infects other birds, and domestic animals.
(<http://www.hhs.gov/nvpo/pandemics/flu2.htm>)

For instance, in countries where there are open markets, there is much animal fecal material on the ground for people to step in. In this fecal material is the virus. People then carry it to various places on their shoes. It also dries and is kicked up into the air in fine particles. A person inhales the dried particles and once in the mucous lining of the nasal and throat, it enters the cells of the nasal

tissues, replicates itself, and spreads the virus to other parts of the body. These people then come in contact with other people and the epidemic is in full swing before anyone really knows what happened.

We are a global society and this means that we travel globally, and transport goods and merchandise globally. It is not hard to imagine a modern-day pandemic.

What We Need to Know About the Flu Vaccine

The flu vaccine protects the majority of people from getting severe flu symptoms when they come in contact with it. This is because deadened viral flu cells are injected into a person. The person's immune system then goes on to make antibodies to the viral material. It stores the antibodies in the immune system's memory cells. Whenever the body cells come in contact with these viral cells again, it will simply call out the specific antibodies from the memory cells and they will help to combat and destroy the virus.

Another version of the flu vaccine is a nasal mist form. Weakened flu virus pathogens are placed into the nostrils of a person. As they are absorbed into the body cells, antibodies are made. Again, if and when this specific flu virus enters the body, the antibodies will be called upon to combat and destroy the virus.

If the person does not get the flu vaccine, their immune system may not have specific antibodies to help fight the flu virus. Thus the virus takes over cell after cell and spreads throughout their body leaving them with severe symptoms of the flu which could lead to death.

There has always been a safety controversy surrounding the flu vaccine. Is it safe for all people? Does it actually increase some people's chances of getting the flu? When should a person get a vaccine? Why are there shortages?

The fact of the matter is that it is more dangerous to get the flu than to get the flu vaccine. Some people do have mild reactions, but the majority of folks are just fine and protected. This protection extends throughout communities. Severe complications are very rare. Scientists continue to test vaccines to make sure that they are safe. They are always researching to make better vaccines. A person should get a flu shot in November. This is to allow the immune system to get to work making antibodies for when the flu season is in full swing. November is the best time, but a person can be vaccinated in the following months also. Without a vaccination, a person is at much higher risk of contracting the flu virus and spreading it to others.

As far as safety is concerned the flu vaccine is generally considered safe for most people. It is certainly safer than getting the flu. According to the CDC a person will occasionally experience a severe allergic reaction, but this is rare and should not deter anyone from using the vaccine.

Classroom Activities

Day One

Activity #1 Pretest of Influenza/Pathogen Knowledge

Objectives: The student will be able to:

1. become more knowledgeable about what they know and do not know about pathogens
2. increase their test-taking skills
3. use the results of this test to measure growth in knowledge by the end of the unit

Procedure

The students will take a short pretest to evaluate their general knowledge of pathogens and the influenza virus. The instructor will not give any information about the unit at this time. The instructor will collect, score, and store all pretests until the end of the unit. At that time, the students will take a post test and compare those results with their pretest results. Both pre and post test will be the same. The pretest is located in the appendix. This activity should only take ten minutes.

The students will then be asked to open their textbook to pp. 481-482 and the class will begin reading, "How to Prevent the Spread of Pathogens." It describes various types of pathogens and ways they are transmitted from person-to-person. The teacher may call on individual students. This gives the teacher an idea of reading levels within the class. There are excellent places to stop and discuss types of pathogens and begin to incorporate the immune system.

Homework can also be assigned p. 480 Objectives 1-5 from their textbook Meeks Heit Health and Wellness.

One of the objectives is to increase the students' literacy so the students should be keeping notes and definitions of words they are not familiar with, thus building a unit vocabulary.

Teacher Note: At this time the formation of a word wall somewhere in the classroom will be helpful.

Day Two and Three

The students will be asked to read pp. 182-183 and further acquaint themselves with the immune system, and also add the respiratory system. This will set the scene for when they begin reading the historical overviews of the influenza virus. This will also increase their vocabulary skills. Again there will be ample places to stop and check for understanding and class discussion. Note-taking on these two pages would be wise for future reference and understanding.

The students will then read further on pages 485 and 486. This will help them understand specific diseases such as influenza, common cold, pneumonia, etc. Again note-taking should be emphasized.

Teacher note: Body diagrams located on pages 182 & 183 for reference also. Additions to the word wall should be made.

The following activity can be started if there is enough time in the period. If not, the students can be given a copy of the activity to review for homework. That way they will be familiar with it for the following day.

Activity #2 Waging a Battle Against Pathogens

Objectives:

The students will be able to:

1. identify the virus, macrophage, helper t-cell, killer t-cell, B-cell, antibody, suppressor T-cell, and memory cell of the immune system
2. work together in group activity towards a common goal
3. increase their health literacy
4. increase their class presentation skills

Procedure

The students will be divided into groups of 3-4 depending on class size. Each group will be given a part of the immune system to portray. There are 7

parts: macrophage, helper T-cell, killer T-cell, B-cell, antibody, suppressor T-cell, memory cell.

Each group will first study their part: macrophage, helper t-cell, killer T-cell, B-cell, Antibody, suppressor T-cell, memory cell. One or more students will be chosen as the influenza virus.

Using different colored pinnies, the students will act out their part of the immune system. For instance, if their group is assigned helper T-cells, they will have red pinnies on depicting helper T-cells. Each group's pinnies should be a different color so that they are easily distinguished from one another. When all groups have donned the pinnies, they will begin to recreate the invading of a body cell by the influenza virus. The cell can be a chosen student who will wear a white pinnie. The influenza virus can be a student wearing a green pinnie.

The body cell will be standing alone in the front of the room. The green influenza viral cell will come and stand next to it to symbolize the invasion. As the invasion takes place the other immune cells will move into position to destroy the invading virus. Allow the students to figure out what each immune cells order, destination, and job is to destroy the invading virus.

Once the invading virus is destroyed, allow the students to create the bloodstream going back to normal. Have the students practice this a few times. You may even have them put dialogue to it. This activity could take up to a week for the students to prepare if dialog is added.

Teacher Note: A picture and description of the immune body cells can be found in Greenberg, Jerrold, ED.D. and Robert Gold, PH.D., Health. Florida: Holt, Rinehart and Winston, Inc., 1994. (textbook, Chapter 21, page 448)

Pennies are sleeveless shirt-like pieces of cloth that tie at a person's hips. They can be borrowed from the P.E. department or easily made. Scarves, hats, or other objects can be substituted to differentiate the different components.

Day Four and Five

Now that the students have a good idea of contagious pathogens and the working of the immune system, they can begin to read an article of specific information on the 1918 influenza virus pandemic, "Capturing a Killer Flu Virus" written by Jeffrey K. Taubenberger, Ann H. Reid and Thomas G. Fanning. This is an excellent article from Scientific America 2005 depicting the 1918 Flu Virus and its global atrocities. It is eight pages long, and filled with descriptions of times and places, signs and symptoms, picturesque views of viral replication, and virus

mutating information. It also includes a Flu Family Tree. I found this to be an excellent article that will probably take two days to read and reflex with the students. Some concepts can also be demonstrated on the chalkboard. Homework would be to have the students define any word that they were not familiar with and review the various concepts in the article.

Teacher Note: Continue building the word wall.

Day Six and Seven

In this day and age of the computer, most students are very well acquainted with computer viruses. The following activity can be most interesting to further the students' knowledge of the spread of a virus.

Activity #3 Computer Virus Vs Human Virus Charting

Objective:

The student will be able to:

1. compare and contrast a computer virus and a human virus
2. increase their research skills
3. increase their group dynamics skills

Procedure

Since computer viruses are similar to human viruses have the students in groups of 3-4 students. Each group will research computer books magazines, and articles to compare the spread of a computer virus. They will also describe how human viruses are spread. They will then make a chart comparing the computer virus and the human virus and report their findings to the class. These charts should be visually stimulating to promote learning. It will be up to the teacher as to the type of chart expected, poster board, power point, chalk board drawings, etc.

Teacher Note: It would be best if students took a period in the library to research computer viruses, and then to put that information together with the human virus information and present chart to the class; two days. This activity can be found in Greenberg, Jerrold, ED.D. and Robert Gold, PH.D., Health. Florida: Holt, Rinehart and Winston, Inc., 1994.) Chapter 21 pp.447-448) Computer virus information can be found at the following web sites.

http://www.hindustantimes.com/news/6691_471049,001600380003.htm
<http://www.udel.edu/topics/virus/v-infect.htm>
<http://www.udel.edu/topics/virus/v-whatism.htm>
<http://www.udel.edu/topics/virus/v-remove.htm>
<http://www.udel.edu/topics/virus/v-protec.htm>
http://en.wikipedia.org/wiki/Computer_virus

Human virus information is already available at Taubenberger, Jeffery K., Reid, Ann H., and Fanning Thomas G. "Capturing a Killer Flu Virus." Scientific American January 2005: 62-71.

Day Eight

Students should finish any reporting from the previous day.

Now that the students have a good idea of contagious pathogens and the working of the immune system, they can begin to read brief overviews about different influenza viruses throughout history. The teacher will ask the students to read "Recent flu outbreak mild compared to past pandemics." article located at <http://www.cnn.com/2003/HEALTH/12/10/flu.history/> and <http://www.hhs.gov/nvpo/pandemics/flu3.htm>. These readings will introduce them to a historical record of different flu viruses. There will be plenty of places to stop for questions and class discussion. As time permits the following game can be introduced to provide emphasis and recognition of unit words.

Activity #4 Word Wall Game

Objectives:

The students will be able to:

1. increase their logical thinking skills
2. increase their health literacy
3. increase their communications skills with others
4. increase their strategy skills for a successful outcome
5. gain a better understanding of different pathogens/diseases

Procedure

Choose one student to sit in the front of the classroom with a term from the unit word wall in mind. Choose three or four other students from the class to be interviewers. The interviewers will take turns asking questions of the targeted

student. If the targeted student answers “yes” the interviewer is allowed to ask another question. When the targeted student answers “no” to a question, the next interviewer has a chance to question him/her. The game continues until one of the interviewers guesses the targeted student’s word.

Teacher Note: This activity can be used for review on a daily basis or a review at the end of a chapter or unit. You may use words from the word vocabulary at the end of this unit.

Day Nine

Activity #5 Creating a Flu Shot Informational Pamphlet

Objectives

The students will be able to:

1. increase their computer technology skills
2. increase vaccine importance and awareness
3. increase their health literacy

Procedure

The students will go to the school library. They will log onto the computers in Microsoft Word. On the left side of the screen will be a list of items to do. They will click on pamphlet. The next screen will give explicit step-by-step directions of how to create an informational pamphlet. The students simply have to follow these directions and in no time at all they will have created an informative pamphlet they will be proud of. The teacher will act as supervisor, guiding, and directing those who get lost or confused along the way.

Teacher Note: This should only take the students one day to complete.

Have a sample pamphlet ready for the students to view. The students can start with this web site: <http://www.who.int/crs/disease/influenza/en/>

Day Ten

Activity #6 Exercise – Exercise – Exercise

Knowledgeable of the importance of a healthy body to maintain a healthy immune system, the students can end the unit with a physical performance. This activity should be fun and stress the importance of exercise.

Objectives:

The students will be able to:

1. increase the effectiveness of their immune system by starting a daily exercise routine or increasing their daily exercise routine
2. encourage others to begin exercising to enhance their immune system's effectiveness
3. learn little ways of exercising during their school day
4. teach their friends and family members about exercise and immunity

Procedure

The teacher will give the students three to five minutes to think of an exercise that a person can do sitting at their desk, or standing at their desk that is not very disruptive, but very effective. The student should also be able to explain/demonstrate how to do the exercise, and how it would increase their immune system's effectiveness. Each student will then demonstrate their exercise. When the last student is finished, discuss some strategies for increasing exercising before school and after school to maintain a healthy immune system. Introduce the concept of walking briskly as a starting point. Emphasize that carrying school books increases a person's muscle mass and burns more fat calories. This activity should only take half the period depending upon the number of students in each class. The other half of the class period can be used for the post-test.

Teacher Note: A valuable resource may be the book, Move to Lose, by Chris Freytag. For more information you want to use: Freytag, Chris Move to Lose. New York: Avery, 2004. This book was valuable for simple exercises that can be done in the privacy of your home or at school or the workplace.

The following are the content standards developed by the Pittsburgh Public Schools in accordance with the State of Pennsylvania Department of Education for the Health and Physical Education subject area. The highlighted standards in particular, were accomplished in this unit.

Health, Safety and Physical Education Standards

1. All students develop knowledge of injury prevention and treatment, and the ability to respond appropriately in emergency situations.
2. All students recognize and demonstrate the ability to apply various dietary guidelines to meet nutritional needs at various stages of life.
3. All students demonstrate their knowledge of the benefits associated with physical fitness and good personal health habits, including health promotion and disease prevention.
4. All students identify the advantages of avoiding, and develop the skills to avoid tobacco, alcohol, and substance abuse.
5. All students demonstrate individual development in motor fitness and physical fitness, including aerobic fitness and skills in lifetime sports and outdoor activities to promote lifelong physical activity.
6. All students demonstrate leadership skills and the ability to work cooperatively in team sports or other developmentally appropriate group activities.
7. All students demonstrate an understanding of the part good mental health plays in leading successful lives and of the practices and resources that support personal health needs.

Unit Vocabulary

active immunity – resistance to disease due to the presence of antibodies

antibodies – special protein formed by the body to help combat disease

antiviral drugs – a substance that combats viruses

CDC - Centers for Disease Control

communicable diseases – a disease spread from one living thing another to

consequence – the end result of a situation

contagious – something that spreads easily from one person to another

disease – is an illness caused by a pathogen

diagnosis – to identify the cause of disease

epidemic – the regional spreading of a certain disease

epidemiologist – person who studies diseases

host – a species in which to replicate and cultivate

immune system – system of the body that combats and removes harmful

pathogens from the blood

immunity – the body's resistance to disease

incubation – period of time when the body shows no signs or symptoms of disease

infectious – can be spread from one living thing to another

influenza – an infectious viral disease that attacks the body, especially the

respiratory tract

microorganisms – living cells that are not seen by the naked eye

mortality rate – death rate
mutate – when a virus evolves and changes genes to accommodate other species
pandemic – the global spreading of a disease
passive immunity – introducing antibodies into a person’s bloodstream
pathogens – germs that cause disease
pneumonia – a disease infecting the lungs
protection – something that guards against disease
replicate – the ability of a cell to copy itself
respiratory – breathing; lungs
strains - chemical make up of a cell
symptoms – having signs or visible awareness of a disease
transmission – sending from one object to another
vaccination – the process of immunizing a person against a disease
vaccine – substance that contains dead or weakened pathogens that are introduced into the body to give more immunity
virulent – being viral in nature
WHO - World Health Organization

Bibliography

Davies, Pete. The Devil’s Flu. New York: Henry Holt, 2000.

This book was valuable for its insight into the different types of influenza and how they were spread.

Freytag, Chris Move to Lose. New York: Avery, 2004.

This book was valuable for simple exercises that can be done in the privacy of your home or at school or the workplace.

Giblin, James C. When Plague Strikes. New York: HarperCollins, 1995.

This text was valuable for information about pathogens and plagues.

Greenberg, Jerrold, ED.D. and Robert Gold, PH.D., Health. Florida: Holt, Rinehart and Winston, Inc., 1994.

This textbook helped in developing the “Waging a Battle Against Influenza” and Computer Virus Vs. Human Virus classroom activity.

Kohn, George C. Encyclopedia of Plague and Pestilence. New York: 1995 ed.

This text assisted in the writing of the history of various influenzas.

Levy, Elinor and Mark Fischetti. The New Killer Diseases. New York: Crown Publishers, 2003.

This book was valuable for its information about how viruses mutate and cause the epidemics and pandemics.

Meeks, Linda. Heit, Philip, and Randy Page. Health and Wellness. Ohio: Meek Heit Publishing Company, 1999.

This textbook is valuable for its use in my classroom. It is our health textbook from which the students will be reading at times.

Tierno, Philip M. The Secret Life of Germs. New York: Simon & Schuster Inc., 2001. This book was valuable for information about the spreading of germs.

Walker, Pam and Elaine Wood. The Immune System. California: Lucent Books, 2003.

The book was valuable for its information on the immune system and its functioning.

Internet Resources

The following Internet sites were valuable for their general and specific information.

www.cnn.com Available as of April 23, 2005.

This web site was valuable for cold and flu information. It also has a cold/influenza quiz for people to take.

www.cdc.gov Available as of April 23, 2005.

This web site was used for information about measures people could use to prevent getting the flu.

www.who.org Available as of April 23, 2005.

This web site was valuable for information on any general health topic. It gives the students a place to start when planning their “Flu Shot” informational pamphlet.

<http://www.hhs.gov/nvpo/pandemics/index.html> Available as of April 23, 2005.

This web site was instrumental for its general information about the different flu throughout history. It gave quick overviews of various influenzas.

Health: Recent flu outbreak mild compared to past pandemics

<http://www.cnn.com/2003/HEALTH/12/10/flu.history/> Available as of April 23, 2005.

This web site was valuable for class reading about the historical overview of different flu viruses throughout history.

National Vaccine Program Office: Pandemics and Pandemic Scars in the 20th Century

<http://www.hhs.gov/nvpo/pandemics/flu3.htm>. Available as of April 23, 2005. This web site was valuable for class reading about the historical overview of different flu viruses throughout history.

Magazine Resources

Taubenberger, Jeffery K., Reid, Ann H., and Fanning Thomas G. "Capturing a Killer Flu Virus." *Scientific American* January 2005: 62-71.

Name _____ Period _____ Date _____

Pathogen/Flu Pretest

Put a T for true or F for false in the space provided to indicate whether the statement is true or false.

1. ____ A pathogen is a genetic trait passed on to a child from its parent.
2. ____ The flu is a bacterial pathogen that can be spread from person-to-person by shaking hands.
3. ____ Immunization protects the body from disease.
4. ____ The flu vaccine is powerful enough to protect the body from STDs.
5. ____ The flu virus is not especially threatening to the elderly or newborns.
6. ____ The flu virus can be spread from person-to-person through the air.
7. ____ The flu virus can lead to pneumonia.
8. ____ Flu viruses never change which makes it easier for pathologists to create a vaccine.
9. ____ The flu virus is curable.
10. ____ Flu viruses are released into the air when a person coughs or sneezes.
11. ____ An infected person is most contagious during the last 3 days of the flu.
12. ____ Washing the hands once a day is the best way to protect yourself from the flu virus.
13. ____ You always know when a person is infected with the flu virus because they cough and sneeze a lot.
14. ____ Being exposed to cold weather, such as being outside without a jacket will cause you to get the flu.
15. ____ Most people recover from the flu in about a week or two.
16. ____ Insects such as the mosquito can spread the flu virus because they ingest people's blood.
17. ____ A virus is the smallest of all pathogens.
18. ____ How a virus is spread is unknown.
19. ____ The flu virus always spread slowly.
20. ____ The flu virus is not a communicable virus.

Written Grading Rubric

Focus/Purpose/Content/Organization Style/Work/Choice

Accomplishment of the Task

- 4 Sophisticated arrangement of the content. The main point(s) is made about the specific topic sentences were well constructed. The grammar/spelling/punctuation is all correct.
- 3 Clear arrangement of content/logical order/functional use of a variety of words/correct sentence structure/functional level of grammar/little if any spelling errors
- 2 Inconsistent arrangement of content. The focus may be unclear. There is generic word choice and limited control of sentence structure. The response may only partially fulfill the task.
- 1 There is little evidence of logical focus. The student used minimal word choice and sentence structure and had severely limited content. The response did not fulfill the task.

4 = A Advanced 3 = B Proficient 2 = C Basic 1 = D Below Basic

Physical Activity Grading Rubric

This rubric has four levels.

The **fourth level** is equivalent to an “A”. On this level the student participated in all of the activity to the fullest on a sophisticated level. They accomplished the physical tasks on a sophisticated level and in a timely manner by cooperating with the instructor.

The **third level** is equivalent to a “B”. On this level the student participated in the activity in a clear manner. Their arrangement and presentation of skills was proficient, but not necessarily sophisticated.

The **second level** is equivalent to a “C”. On this level the student participated in the activity with some difficulty. They were unable to complete the physical activity without some degree of inconsistency, or hesitancy. They performed at an average, but not a clear, concise, proficient level.

The **first level** is equivalent to a “**D**”. On this level the student did not seem follow the directions of the activity. They were unable to complete the physical task without great difficulty. They performed below basic proficiency.