

Living Healthy and Practicing Prevention: Immunization

Nancy Baulis
Catherine Elementary

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Overview

The potential for a possible pandemic from bird flu prompts this multidisciplinary prevention immunization unit. Families and therefore, students, will continue to make decisions regarding immunization. By looking at the history of pandemics, possible pandemics and childhood diseases the knowledge will enable a more informed decision on immunization. For the future students and their families will learn about symptoms, the course of the infections, potential residual effects, and at times, death. Students will be able to check on their own histories of illnesses and if older family members remember illnesses such as childhood diseases. Students will do research so to better understand preexisting conditions that can weaken resistance to infection. The unit is designed for fourth and fifth grades and will last for 6 weeks with a 45 minuet lesson each week.

Rationale

There has been a lot of dialogue about children eating healthy and exercising for maintaining good health and to prevent future problems. This is very good, but immunization or the lack thereof, is another area of concern. Even though it is the law to be immunized before entering schools, some families do not stay on top of the immunization of their children. There is a potential for the children to become ill, as well as, other children and adults that they come in contact with. The potential for a pandemic from bird flu and the decision to immunize, if a vaccine is available has prompted me to develop this unit.

The children at my school come from a wide range of cultures with roots in: African, Asia, Central America, the Caribbean, and Europe. Reasons for resistance to immunization consist of financial, concerns that the vaccines may lead to other health problems, cultural and lack of true understanding of the potential to spread disease. The unit I wish to develop will start with the history of pandemics.

Pandemics

A pandemic is defined by Merriam Webster's Dictionary as "occurring over a wide biographic area and affecting an exceptionally high proportion of the population."(Green 12) An epidemic is defined as "affecting or tending to affect many individuals within a population, community, or region at the same time."(Green 12) Therefore, the difference between a pandemic and an epidemic is the amount of people affected and the area covered. (Green 12) Every realm within society will be affected when a pandemic occurs. (Green 12) The fear that will keep children from school and workers home, the necessity of quarantines will put normal life on hold. (Green 12) As the world has gotten smaller, with people able to travel long distances it has also brought the spread of viruses. (Green 12-13)

The history of pandemics can be traced back in writings to ancient Greece. (Green 13) There were recorded pandemics in 1510, 1580, 1688, 1699, 1847-48 and 1889-90. (Green 13) In the twentieth century, there were three pandemics of Type A influenza viruses: the Spanish Flu of 1918-1919, the Asian Flu of 1957 and the Hong Kong Flu of 1968. (Green 13) We now know that these pandemics were from bird viruses. (Green 13)

Spanish Flu 1918-1919

This deadly influenza was caused by a bird virus. (Green 2) As far as we know, this was the first time a virus that had infected one species changed into a virus that could infect another species. (Green 2) Unfortunately, the species was human. (Green 2) Again this was a first for humans and therefore, we did not have a natural immunity to it. (Green 2) Once the bird flu went from birds infecting birds to birds infecting people the pandemic was set.(Green 2) It is believed that droppings from infected birds mix into feed of pigs and chickens a mutation of the virus occurs and thus when these animals are eaten the virus spreads to humans. (Green 17)

The Spanish Flu symptoms were a cough or sore throat, a need to blow the nose and the body suffocating into a blue hue (heliotrope cyanosis). (Green 1 and 16) Death could come within hours to a day or two. (Green 16) Ground Zero (where it

started) can not be agreed upon by historians, but it first seemed to appear at Camp Funston in Kansas in March 1918. (Green 16-17) The troops training there were preparing to ship out to fight in France. (Green 17) Soldiers moved around Europe fighting in WWI and came home to carry the disease back to the US, after it was spread through Europe. (Green 18)

Asian Flu 1956-1958

This virus was first seen in China in early 1956, starting from a flu virus mutation in wild ducks combining with an existing human strain. (Green 29) After spreading to Singapore in February 1957 and to Hong Kong in April, it came to America in June. (Green 29) Since we had the ability to produce a vaccine, one was developed and was available in August. (Green 29) School age children still got sick and spread to their families. (Green 29) By the end of 1957 the flu seemed to be done, but it was back in January and February 1958 attacking the elderly in the population. (Green 29) Typical flu virus does behave in this fashion seeming to be done, but then mutations can bring it back. (Green 29) Each time it strikes it can affect a different segment of the population. (Green 29) The United States lost approximately 69,800 to the Asian Flu. The world lost about one million people. (Green 29)

Hong Kong Flu 1968

Hong Kong saw a flu virus that originated in wild ducks early in 1968. (Green 29) The United States had cases in September with most fatalities occurring in the months of December 1968 to January 1969 (the usual months for death from the annual flu season). (Green 29) In the beginning this strain of the flu was most deadly to the elderly. (Green 29) This strain of virus did not mutate as much as strains had in the past. (Green 29) The death toll was not as large with 33,800 in the United States and about 700,000 through out the world. (Green 30) Those who had been alive during the 1957-1958 pandemic might have been able to develop a partial immunity to the strain. (Green 30)

Potential Pandemics

Swine Flu 1976

Swine Flu has been around as long as bird flu, but it wasn't usually spread from pigs to people. (Green 88) If a person did contact swine flu they didn't usually die. (Green 88) In February, 1976 a young soldier at Fort Dix in New Jersey did indeed die and thus a scare was started. (Green 88) The Center for Disease Control pushed for the development of a vaccine and Pres. Ford asked Congress for the \$135 million to develop the vaccine. (Green 88-89) The drug companies were able to have the vaccine ready by October 1. (Green 89) People began getting the shots until 3 elderly recipients from Pittsburgh died from heart attacks

after receiving shots. (Green 89) There was also a concern about the rare Guillain-Barre syndrome a neurological disease that can cause paralysis and death, that was appearing. (Green 89) The program for the shots was suspended. (Green 89) This episode showed how the news media and public could go from wanting the vaccine to not wanting the vaccine. (Green 90) It also showed that the drug companies could gear up quickly when the need arose. (Green 90)

Legionnaires' Disease

While the Swine Flu concern was going on another similar flu like disease broke out in Philadelphia. The American Legion was having a convention in July 1976 in Philadelphia. (Schneider 57) Even before the convention was over, attendees started to become ill with symptoms of fever, muscle aches and pneumonia. (Schneider 57) The Center for Disease Control (CDC) was called to help find the cause after 150 cases with 20 deaths occurred by early August. (Schneider 58) Ground Zero for the disease was found to be the Bellevue-Stratford Hotel. (Schneider 58) Not only did delegates stay there, but a variety of convention activities took place there. (Schneider 58) It was also determined that people who had been near the hotel and not guests or convention attendees also became ill. (Schneider 58) Therefore, it would seem that the cause was from airborne bacteria. (Schneider 58)

Epidemiologists continued to do research to find the cause, while calling in help from the CDC's biomedical scientists. (Schneider 58) Finally in January, the biomedical scientists located the bacteria that caused the epidemic, which had been named the Legionnaires' disease. (Schneider 58) The hotel had a cooling tower containing water used for air conditioning and that had the bacteria. (Schneider 58) The Legionella bacteria were inhaled from the cool air. (Schneider 58)

Since the Legionella bacteria were identified, it was linked to several other pneumonia cases in other parts of the country. (Schneider 58) There was an outbreak in 1965, in Washington D.C. that could now be called Legionnaire's. (Schneider 58) Because of the now known disease Federal air conditioning standards have been changed to include more cleaning of cooling towers. (Schneider 58)

Acute respiratory syndrome (SARS)

Because of the public health practices of surveillance and quarantine SARS did not become a pandemic in 2003. (Schneider 147) The disease first broke out in southern China in November 2002. (Schneider 147) China did not report the infections until it was reported to the World Health Organization (WHO) in March 2003. (Schneider 147) WHO issued a global warning and a travel advisory. (Schneider 147) WHO had been contacted by a doctor who was an infectious

disease specialist working in Vietnam, who noted a patient who had arrived from Hong Kong was ill from a different form of pneumonia. (Schneider 147) Epidemiologic study showed that the ground zero was a hotel in southern China. (Schneider 147) Travelers then continued their journeys and carried the disease with them to other countries. (Schneider 147) WHO declared that SARS had been contained, in July, 2003. (Schneider 147) The disease had infected 8,439 people in thirty countries and killed 812 people. (Schneider 147) A virus was identified, but lab tests could not diagnose the illness, until weeks after a patient had shown symptoms. (Schneider 148) There is still no drug to combat the SARS virus, and the only course of action is intensive respiratory therapy during a long hospitalization. (Schneider 148)

H5N1 Bird Flu 2003 to Present

The Spanish Flu of 1918 was an H1N1 virus. (Green 42) An influenza A virus has two parts that can change. (Green 42) H is the hemagglutinin and the N neuraminidase. (Green 42) The changes are referred to as antigenic shifts. (Green 42) The shifts will be a change in the protein and the virus will be different than the previous strain and a new vaccine will be needed. (Green) In 1957 there was a shift to H2N2 and in 1968 the virus was H3N2. (Green)

So far the H5N1 virus has not been transmitted from person to person. (Green 48) The people who contracted the virus were bird handlers. (Green 48) The concern is that the virus could mutate after entering an animal and then be able to jump to humans.

In December of 2003 through February 2004 outbreaks of H5N1 occurred in Vietnam, Thailand, Korea, Japan, Cambodia, Laos, Indonesia and, China. (Green 68) Unfortunately over 100 million chickens either died or were killed to prevent the spread of the virus. (Green 68) There were also several human deaths during this time. (Green 68) We know that the world is getting smaller due to air travel, which is of concern with human spread of any virus. But migrating birds could carry the H5N1 bird flu to birds in the United States. In 2004 an outbreak of H7N3 in Canada caused two poultry workers to become ill and 17 million chickens were slaughtered to stop the spread of the virus. (Green 70) Also in 2004 there was a strain of H5N2 found in Texas and Pennsylvania and again large numbers of chickens were destroyed to prevent the spread. (Green 71) There were no human cases reported. (Green 71)

At this time there are four known anti-viral drugs Tamiflu and Relenza, N inhibitors and Symmetrel and Flumadine M-2 protein inhibitors. (Green 139)

Virus

A virus has a geometric shape that comes from the chemical and protein within its design. (Green 34) A virus is tiny that anywhere from thousands to millions could fit on a head of a pin. (Green 34) The outer shell of the hollow virus, is inert, but it is what allows it to persist and be able to infect as a germ. (Green 34) Because of the shell's molecular structure it is able to enter a host and avoid the immune system. (Green 34) The virus can then attach itself to a cell within the host and transfer its genome into that cell. (Green 34) Viruses are not living organisms. A virus needs a living organism a host to replicate its self. (Green 34-35) Viruses have used all forms of life from a one cell organism to plants to humans. (Green 35) When a virus causes injury to the host it is a germ. (Green 35) Some viruses have been so deadly to their host that in the end they have caused their own extinction. (Green 35) Viruses need a steady supply of life forms to be able to continue to exist. (Green 35)

Influenza, or the flu, is a respiratory virus. (Green 39) The virus attaches its self to the epithelial cells of the respiratory mucous membranes in our trachea and bronchial tubes. (Green 39) The virus spreads by an infected person's cough, sneeze or runny nose. (Green 39) If an infected person touches a door knob, the virus can live and infect more people. (Green 39) An infected person may not have symptoms for a day and then for five days after they become ill, can continue to spread the virus. (Green 39)

There are three classifications of influenza virus. (Green 40) Type B only infects people and is the usual cause of seasonal flu. (Green 40) Type C can infect both swine and people, but usually the sickness is not that severe. (Green 40) Type A is the virus that affects both people and animals and is the cause of pandemics. (Green 40) The world concern now is the potential avian flu H5N1 a type A virus.

Vaccines

As with other contagious diseases it is recommended that certain segments of the population get vaccinated. (1) The vaccine should be given yearly for those who are susceptible. (1) The vaccine is a two fold method of trying to protect the person from the disease as well as trying to curb the spread of the virus. (1) For anyone who has had the flu, the illness can cause fever, sore throat, chills, fatigue, cough, headache and muscle aches. (1) Pneumonia can be triggered by the flu and be major concern for people with heart or breathing conditions. (1) A high fever and seizures can occur in children. (1) The death rate is about 36,000 in the United States, with the elderly the most affected. (1)

Influenza vaccine can protect against influenza. (1) The vaccine comes in two types. (1) The first type is inactivated vaccine or "Flu Shot", which is given by injection and used in the United States for many years. (1) In 2003, a live but

weaker vaccine was licensed, which is administrated by spraying into the nostrils. (1) Because the viruses keep changing, the vaccines need to be updated yearly. (1) Some concern is that inactivated influenza vaccine has a preservative called thimerosal, which contains mercury. (1) A report from the Institute of Medicine in 2004 said that following research, there was no link with developmental problems in children. (1) There is thimerosal-free vaccine available. (1) The elderly and those with respiratory conditions should consider getting flu vaccine. (1)

Childhood Diseases, for which we currently have vaccines

Smallpox

Smallpox can be traced back to the time of Christ and was spread in the air and through contact. (Schneider 150) This deadly disease led to the idea of vaccination. (Schneider 150) It was observed that people who did not die from the virus did not get the disease again, thus they must be immune. (Schneider 150) So by giving a person a small amount of the virus, it could protect the person from getting smallpox. (Schneider 150) Even though this practice was not without risk, George Washington had his army inoculated. (Schneider 150) In 1796, immunization became safer when the British physician Edward Jenner realized that milkmaids seemed to be immune to smallpox. (Schneider 150) He was able to prove that a vaccine with cowpox matter, which did not harm humans, gave immunity to smallpox. (Schneider 150)

Smallpox was eliminated in the United States, by 1958 as well as in other industrialized countries. (Schneider 150) The United States and Soviet Union joined forces with WHO to start a program to eliminate smallpox in underdeveloped nations. (Schneider 150) The program ran from 1967 to 1977, and for all practical purposes smallpox was eliminated. (Schneider 150) The smallpox virus is now kept in two locations. (Schneider 150) The first location is the Center for Disease Control and Prevention, the second is a Russian laboratory. (Schneider 150) The virus is being held for possible future research. (Schneider 151)

Polio

The poliovirus or poliomyelitis is an infectious viral disease. (Schneider 151) This disease could be eradicated if all the countries of the world cooperated with immunization. (Schneider 151) Since polio has been stopped in the Western hemisphere WHO has been working to stop polio in other parts of the world. (Schneider 151) There has been resistance in some countries especially Nigeria where it was claimed that the vaccine had been contaminated to cause AIDS. (Schneider 151) By July of 2004, Nigeria did start again to give the oral polio vaccine. (Schneider 151) Polio is a disease that can have paralysis of voluntary

muscles. (2, vol. 9, 560) The largest number of cases in the United States was reported from 1942-1953, in 1950 there were 33,344 cases. (2, vol. 9, 560) The two types of vaccine are the live Sabin which is given orally and the inactivated or killed Salk which is given by injection. (2, vol. 9, 560) It is thought that the polio virus enters the person through the throat. (2, vol. 9, 560) It is then taken into the blood and lymphatics and spread throughout the person and finally the central nervous system. (2, vol. 9, 560) The most usual symptoms are mild headache, fever, sore throat, nausea, vomiting, diarrhea, restlessness and drowsiness. (2, vol. 9, 560) In mild cases more than 80 percent recover and no paralysis occurs. (2, vol. 9, 560) If the severe cases the person becomes irritable and develops pain in the back, limbs, muscle tenderness and stiff neck. (2, vol. 9, 560) The paralysis can be temporary or permanent depending on the severity of the case. (2, vol. 9, 560) Breathing is affected by respiratory polio and a person may need help to breath by using an iron lung or pressure ventilator. (2, vol. 9, 560-561) Bulbar polio effects swallowing and talking and the person needs to keep the throat clear of secretions. (2, vol. 9, 560)

Measles

Measles, a viral disease that could be eradicated, can have a person left with permanent brain and nerve damage. (Schneider 151) In 1963 a vaccine was able to reduce the number of cases from over 400,000 in 1962 to that of 1,497 in 1983. (Schneider 151) New outbreaks in high school and college students showed that it was necessary to give a booster in older children that had been immunized as babies. (Schneider 151) Another problem with trying to eradicate measles is that many poor in large cities don't get immunized until they are ready to start school and are required to be immunized. (Schneider 151)

Measles is the most contagious right before the eruption of the rash and eases as the rash fades. (2, vol. 7, 990) Symptoms are fever, redness and watery eyes, very runny nose and congestion of the mucous membranes of the nose and throat. (2, vol. 7, 990) Before the rash appears the mucous membranes of the mouth develop Koplik spots, bluish-white specks surrounded by bright red areas. (2, vol.7, 990) The best treatment is complete bed rest and protect the eyes. (2, vol.7, 990)

Whooping cough

Whooping cough is a highly contagious disease that in its usual form causes coughing spasms with a "whoop" at the end. (2, vol. 12, 300) This respiratory illness also causes the patient to emit a clear, sticky mucus and sometimes vomiting. (2, vol.12, 301) The first description came in 1578, but was probably around long before that time. (2, vol.12, 301) In 1906 at the Pasteur Institute French bacteriologist were able to isolate the bacteria that caused the disease. (2, vol.12, 301) Today the vaccine is usually administrated to children under six with other vaccines for tetanus, poliomyelitis and diphtheria toxoids. (2, vol.12, 3001)

Chickenpox

Chickenpox is mostly known for the eruption of blisters in the skin.(2, vol.3, 199)
The usual patient is between 2 and 6 years of age, but any person could contract the disease. (2, vol. 3, 199) The person should rest in bed and kept from scratching the blisters. (2, vol.3, 200) When there is a reactivation of the virus, it is usually in the form of shingles. (2, vol.3, 200) In 1995 a vaccine was approved in the United States. (2, vol.3, 200)

Objectives

I want the students to learn about infectious diseases, so they can help their families make decisions on immunization. I want them to protect themselves and families and to stay healthy. I want them to learn how disease is spread and that immunization is a protection against disease.

I want them to learn that health care providers need to immunize and wear protective clothing to protect them and not to spread disease. While doing research they will learn the history of diseases that family members may have contracted. Students will also learn how vaccines can help prevent the spread of diseases.

Strategies

Before beginning research the students will brainstorm with the teacher using KWL (what you know, what you want to know, and what you want to learn). Skills of doing research on the internet and using encyclopedias as well as other sources, newspapers and interviews will be developed. The students will need to interview family members (parents, grandparents, great grandparents) for a more personal connection to diseases. The students will also check their own immunization information.

Classroom Activities

There are four fourth grade classes and four fifth grade classes. Each group would participate in all of the 45 minute lessons. Because some children are new to our country, they may not be able to interview face to face older family members, so they may need to write letters.

Lesson One

Objective: To introduce the unit and to show the reason why immunization is important.

Activities: Students will fill out a survey on what they know about diseases and their own immunization records. Students will take the survey home to start interviewing parents, grandparents and great grandparents. Students will start to do research on infectious diseases including childhood diseases.

Lesson Two

Objective: To have the students learn how they and their families fit into the range of suggested immunization guidelines.

Activities: Students will review the guidelines and see how their records match or don't. Discuss reasons for not getting immunized (money, fear, cultural). The students will do research on pandemics in small groups and report to class.

Lesson Three

Objective: To have students learn about bird flu and how it could compare with past pandemics. What they could or could not do to protect themselves.

Activities: Have the students form small groups and plan to be medical personal, a family, neighbors, teachers and how could bird flue spread or not spread from group to group.

Bibliography

Green, Jeffrey, Dr., *The Bird Flu Pandemic: Can it Happen? Will it Happen? How to Protect Yourself and Your Family If It Does*, New York, Thomas Dunne Books, 2006. Introduction and chapters 1, 2 and 5

Schneider, Mary-Jane, Second Edition, *Introduction to Public Health*, Sudbury, Jones and Bartlett Publishers, 2006 Chapters 4 and 9

1. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Immunization and Respiratory Diseases, Vaccine Information "Vaccine Information Statement" Inactivated Influenza Vaccine (6/30/06).
2. The New Encyclopedia Britannica, 15th Edition, Chicago, 2002 Volumes 3, 7, 9, and 12

Annotated Bibliography for Teachers

Green, Jeffrey, Dr., *The Bird Flu Pandemic: Can it Happen? Will it Happen? How to Protect Yourself and Your Family If It Does*, New York, Thomas Dunne Books, 2006. The research on pandemics came from this entry. Anyone interested in the topic of a potential Bird Flu Pandemic must read this book. It is an easy read and will inform you on all the various aspects of this topic.

Schneider, Mary-Jane, Second Edition, *Introduction to Public Health*, Sudbury, Jones and Bartlett Publishers, 2006. The research for both the potential pandemics and childhood diseases came from this book. The various concerns in the field of Public Health are addressed in this entry. Anyone who wants more information on Public Health should own this book. It would be a great resource as questions arose.

Articles:

Recommended Immunization Schedule for Persons Aged 0-18 in the US, 2007 from Morbidity and Mortality Weekly Report Center for Disease Control and Prevention. This should be studied and sections presented to students as needed and based on grade/age level.

Efficacy of inactivated and cold-adapted vaccines against influenza infection, 1985-1990: the pediatric experience, *The Pediatric Infectious Disease Journal* 2001. Interesting and for my knowledge

Various articles and snippets from the Phila. Inquirer Newspaper. These are current and on going almost weekly. Articles appear noting items of interest on the topic both in the United States and world wide.

Annotated Bibliography for Students

Aronson, Virginia, *The Influenza Pandemic of 1918*, Philadelphia: Chelsea House Publishers, 2000. A good history with actual pictures and some drawings for the student to learn about the 1918 pandemic. It addresses the three waves that happened during the pandemic. The last chapter discusses viruses then and now. Useful for fourth and fifth grades, as well as the teacher, who might not have time to read an in depth volume.

Asher, Dana, *Epidemiologists, Life Tracking Deadly Diseases*, New York, The Rosen Publishing Group, 2003. Explains the career and how the epidemiologist does the research. The book also details various government agencies that need

epidemiologists. Fourth and fifth grade students will learn how important the profession is to combating diseases.

Barnard, Bryn, *Outbreak, Plagues That Changed History*, New York, Crown Publishers, 2005. Starts with microbes in the body, then Black Death or plague, Smallpox, Yellow Fever, Cholera, Tuberculosis, Spanish Flu, and AIDS describing the disease, how it spread and treatment. Fourth and fifth graders will learn about the diseases that caused the research to be able to develop vaccines.

Brunelle, Lynn; Grave, Marc, *Viruses*, Milwaukee, Gareth Stevens Publishing, 2004. The volume has colorful graphics that explain viruses and background information on ancient viruses. The book continues with viruses the students will be more familiar with and the development of vaccines. Appropriate for grades third to fifth.

Derkins, Susie, *Epidemics, Deadly Diseases Throughout History, Legionnaire's Disease*, New York, The Rosen Publishing Group, Inc., 2002. A volume that explains every aspect from the first occurrence in 1976 to an outbreak in 2001, with descriptions of symptoms, treatment and prevention. Students from grades third to fifth will find the book useful for research.

Draper, Allison Stark, *Epidemics, Deadly Diseases Throughout History, Polio*, New York, The Rosen Publishing Group, Inc. 2001. As with the volume on Legionnaire's Disease the student can learn everything about polio they would need to know. Again the book will be good for grades third to fifth.

Goldsmith, Connie, *Invisible Invaders, Dangerous Infectious Diseases*, Minneapolis, Twenty-First Century Books, 2006. The book discusses the aspect of the world being smaller as a concern with the spread of diseases. It also looks at bacterial, viral diseases and other viruses. In addition to discussing parasites and prions it takes a look at the future for the world's health. Good pictures and drawings for grades four and five.

Gordon, Sharon, *Chickenpox*, New York, Children's Press, 2002. This small picture book more for grades K-1, would still be useful. The pictures and writing explain the disease.

Nardo, Don, *Vaccines*, San Diego, Lucent Books, Inc., 2002. Good for fourth and fifth grades, the history, development and effect on diseases of vaccines. It also discusses challenges and future research.

Nye, Bill, *Germ*s, New York, Hyperion Books for Children, 2005. This colorful book with experiments to explain the various concepts of viruses, bacteria, vaccination, and antibiotics will be very interesting for grades third to fifth.

Stakianos, Jeffrey N., *Deadly Diseases and Epidemics, Avian Flu*, New York, Chelsea House Publishers, 2006. Fifth graders will find everything they need to know about avian flu. Included in this book is the background information from 1918 pandemic, the molecular structure, the crossing of species, H5N1 and what is potential in the future for the virus.

Yount, Lisa, editor, *Antibiotics*, Detroit, Greenhaven Press, 2005. This volume is a collection of articles on before antibiotics, discoveries, wide use, resistance and alternatives. The fifth grader will use for research to learn more about antibiotics.

Resources

http://www.immunizationinfo.org/immunization_science

www.cdc.gov/germstopper/home_work_school.htm

www.cdc.gov/flu/protect/habits.htm

www.cdc.gov/flu/about/qa/coldflu.htm

http://www.nwhc.usgs.gov/research/avian_influenza/avian_influenza.html

<http://www.mayoclinic.com/health/bird-flu/DS00566>

<http://www.cdc.gov/flu/school/>

<http://www.bt.cdc.gov/>

<http://www.dhhs.gov/kids/>

<http://www.who.int/topics/en/>

Appendices

The Philadelphia standards that align with the Pennsylvania State Standards.

Grade Four Science

3.1.4 Unifying Themes

E. Recognize change in natural and physical systems.

3.2.4 Inquiry and Design

B. Describe objects in the world using the five senses.

3.3.4 Biological Sciences.

D. Identify changes in living things over time.

3.8.4 Science, Technology and Human Endeavors

C. Know the pros and cons of possible solutions to scientific and technological problems in society.

Grade Five Science

3.1.4 Unifying Themes

C. Identify patterns as repeated processes or recurring elements in science and technology.

3.6.7 Technology Education

A. Explain biotechnologies that relate to related technologies of propagating, growing, maintaining, adopting, treating and converting.

3.8.7 Science, technology and Human Endeavors

A. Explain how sciences and technologies are limited in their effects and influences on society.

C. Identify the pros and cons of applying technological and scientific Solutions to address problems and the effect upon society.