

Science Strand 4: Changes in the ecosystems and interactions of organisms with their environment.

CLE: 4.3 Genetic variation sorted by the natural selection process explains evidence of biological evolution.

Health Profession: Physician

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References:

Wikipedia, the free encyclopedia (2008). Methicillin-resistant Staphylococcus Aureus., Retrieved from [http://en.wikipedia.org/wiki/Methicillin-resistant Staphylococcus aureus](http://en.wikipedia.org/wiki/Methicillin-resistant_Staphylococcus_aureus). accessed from home computer, January 30, 2008

Objectives:

At the completion of this presentation, the high school student will be able to:

- 1. Identify the importance of the role of the physician and their ability to treat individuals with MRSA.**
- 2. Understand the ability of reproduction of MRSA and other bacteria in the human body.**
- 3. Understand through hand washing how MRSA can be avoided.**

Background Summary of information as Related to the Physician and the CLE.

To treat MRSA (Methicillin Resistant Staphylococcus Aureus). MRSA is a resistant variation of the common bacteria Staphylococcus aureus, often called staph. It has evolved an ability to survive treatment with penicillin, methicillin, and cephalosporin antibiotics. MRSA was discovered in the U.K. in 1961, and now found world wide

Staph is normally found on the body and in the nose in about one third of the population. If you have staph on your skin, and nose you are said to be colonized but not infected with MRSA. MRSA can be passed along to others by hand contact or by sneezing especially to those who are immune compromised or have a wound or illness. That is why it is so important to wash your hands often. Methicillin-Resistant Staphylococcus Aureus was one of the first germs to be identified as a "super germ". An MRSA infection if not treated, can be fatal.

Health field of physician related to Science CLE: A physician, also known as a medical doctor, has the responsibility to not only save the lives of the patients or clients he is treating for an illness, but to make them feel better as in the case of the scenario below. As one may recall from the background, a doctor is the only one who can give a prescription for an antibiotic to treat an illness or infection of MRSA. The state and federal government decides who gets to call themselves a physician and who does not. The government gives a doctor what is known as a state medical exam to decide if he or she is qualified to become a physician. The person taking the test must have had the proper training from a school of medicine to be able to take the

exam. They must have obtained an undergraduate degree in a science related field such as chemistry or biology, as one is able to receive in about four years at private or state government funded college or university such Missouri Western University. The student then has to apply and be accepted and attend a medical school for another 3 to 4 years, such as the one at Missouri University in Columbia, Missouri and graduate with a doctor's degree of medicine. That is why the terms doctor and physician are interchangeable in medicine. A high school student, who is thinking of becoming a physician or any other field in medicine, should have some of the following qualifications:

1. The student must be interested in and take science related classes in high school.
2. They should be able to think through or what is known as critical thinking in certain situations.
3. They should have above average grades, and should have the desire to work harder in school then they ever have before.
4. Most important, have the ability to care for others.

Scenario:

Mike, a 20 year old young man is an avid weight lifter. He can be found at the gym everyday to work out and lift weights. After a couple of hours at the gym, he decides to take a dip in the pool and then relax in the hot tub. On the way to the pool, he catches his arm on a nail that it is sticking out from the door frame and it causes a small cut. It is only a small cut and not bleeding too badly, so he heads on to the pool. After a quick dip in the pool he heads to the hot tub. While he is in the hot tub, he notices another man that has a good-size bandage on his foot and he casually asks the man what happen to his foot? The man said he stepped on a nail while running a few days ago. He removed the bandage from his foot and puts his foot in the hot tub deciding the heat would feel good. The cut on his foot was red and appeared swollen. He said he did not go to the doctor, but was taking penicillin that his daughter had not finished when she was sick a couple of weeks ago with a cold. After all an antibiotic is an antibiotic? The next day, Mike woke up with a sore throat and not feeling well. His arm was hurting, draining green drainage from the cut, and appeared swollen. He decided he should make a doctor's appointment. The doctor gave him a prescription of an antibiotic, after taking a culture of his arm. A few days later, Mike's doctor telephoned him and told him he needed to be admitted to the hospital for intravenous antibiotic treatment. He had a bacteria called MRSA. When admitted to the hospital, Mike will need to be put in contact-droplet isolation to keep the germ from spreading to other patients in the hospital. Anyone entering his room will need to wear a gown, gloves, and masks so that the germ is not spread to those that come in contact with him. How could this have happen? What went wrong in this scenario?

Activities:

Discuss as a class what changes should be made in this scenario. How is MRSA spread? How could have the outcome have been different?

Answer: 1. Mike should have not gotten into the pool and the hot tub after receiving an open wound. The man in the hot tub with Mike should have never put his foot in to the hot tub, exposing everyone around him to his germs. Germs like heat and can easily be transmitted in a heated environment as one like a hot tub, and The man should have gone to the doctor to see if that antibiotic was “right for him”. If these changes had been made, neither man would have exposed anyone else to the illness. (Explanation below).

Have the students wash their hands with orange glow soap and have the students place their hands under a black light to see the germs left on their hands. Discuss the student's reactions.

After a few students have washed their hands, have them come back into the room to show the other students their hands under black light. Germs will show up under a black light as light spots on the student's hands. Have the students discuss how the germs are left on their hands, even though the washed their hands well and may not have realize that not all germs are killed or removed even after washing. Each person is left with germs on their hands and to a healthy person; they are able to fight off their germs, even if they were exposed to them. When one gets a cold or flu, those germs are in the air and as we breathe, we inhale those germs into our lungs causing a reaction to those germs in our bodies. In MRSA, if one has a cut or abrasion on the skin the MRSA bacteria germ can be passed on and cause harm or infection to that part of the body. The physician will give a medicine called an antibiotic that is able to kill those germs in the body. Each antibiotic is designed to attack a specific kind of germ or “bug”. An “antibiotic is not an antibiotic” as in the case of the scenario. The man will not “get better” if his germ cannot be fought off by the antibiotic he is taking. If the doctor prescribes a 10 day course of antibiotics for a particular illness or infection, it is important to take all of the prescription so that our own immune or “defense system” can use the medicine to fight all of the germs and kill them so that we do not get the same infection again. A virus that enters the body cannot be killed with an antibiotic, but the body will make its own “antibodies” and fight off the virus. It will remember that particular strain of virus and one will not get it again. The student may ask then why do they get sick from the flu or a cold more than once if the body is suppose to remember the virus and they are not suppose to get it again? Answer; There are so many strains of flu and colds that are out there that each time one gets a cold or the flu, it is a different germ or “bug” and the body again has to fight it off. In a person whose immune system or their capability to fight off germs is compromised, they may not be able to fight off the germ and get the virus anyway.

Supplies needed: Dark class room, water, orange glow soap, black light.