The need for microbiology assignment

The beginnings of microbiology were very crude and mostly inaccurate, but necessary. The most important invention and the single most important tool used in microbiology, was the microscope. Without the invention of the microscope we would not be where we are today. Although the first microscope was not used the same way we used them today. It was very significant to the evolution of how we understand microorganisms.

The inventor of the first microscope was Charisma Janssen (Furbisher, Freest, 1973, p.). There is still some debate surrounding Janssen creation of the microscope. His first creation was the telescope, which led him to the compound microscope. The first person to use the microscope to study microorganisms was Robert Hooked, around 1665. He was able to identify a micro fungus. He described the fungus with such precision that it was later identified as bread mold (Nester, Anderson, Roberts, Nester, 2007, p.) A few years later Antonym Von Leeuwenhoek used a similar microscope to be the first to observe bacteria. He was the first to describe what he saw in " water from pools, and tartar room his teeth, feces from a case of dysentery' (Furbisher, Freest, 1973, p. 7). Throughout history there are many more scientists who influenced the evolution of microbiology. Semisweet was one of the first physicians to use aseptic techniques, because he understood that microorganisms grew everywhere. He used chemicals to disinfect maternity wards (Furbisher, Freest, 1973).

This was a major step towards the use of aseptic techniques in the medical field. There are many who have contributed the study of microbiology, yet there are two individuals who stand out. The first is a French chemist named Louis Pasteur, who some consider the " father of modern microbiology'

(Nester et al. , 2007, p. 2). Pasteur was the first to demonstrate the growth of microbes through a series of experiments. One of his first accomplishments was disproving spontaneous generation, “ The creation of living organisms from non-living material. ” (Nester, et al. , 2007, p. 2).

This theory was thought to be true by many individuals. Through a personal experience while in the military, I managed to come across an individual who still believed this was possible. We were doing some landscaping and he told me the story of how he used grow arms with his grandfather. He actually believed that the worms Just grew out of the compost they created. He did not understand that any organism cannot be spontaneously created. This makes it easy to see how the ignorance of microbiology is still an issue today and another reason why it is so difficult to stop the spread of disease.

Regardless of other’s believed Pasteur was able to prove how bacterium was spread. With everything Pasteur accomplished some could not replicate his results. This led John Tyndale to discover that different bacteria were destroyed at different temperatures (Nester et al. , 2007). Many more experiments were done and with each experiment more discoveries were made. Ferdinand Cohn discovered bacteria that are resistant to heat. Sometime during the year 1877, Robert Koch discovered that anthrax was “ caused by Bacillus anthracic” (Nester et al. , 2007).

The significance of heat resistant endoscopes, displayed the resiliency of some bacterium. With all of these discoveries people were learning to apply this knowledge to their profession, especially in the medical field. Undoubtedly, one of the most influential individuals, who affected the use of

aseptic techniques, was Florence Nightingale. As a nursing student one of the first nurses we learn about is Nightingale. She developed the nursing techniques that we still use today. She aspired to remove disease by first preventing the risks of obtaining disease. Craven, Hiring, Jensen, 2009) Although nursing is a tremendous portion of the healthcare field, every part of healthcare is influenced by microbiology. The development of new medication and the promotion of health always come back to understanding how to treat and prevent disease. We do this with continuous research and unending need to extend life even when death may be the more humane option. Healthcare professionals must always be aware of the never-ending battle with disease. The advancement of microbiology has shifted from the original idea of discovering the unknown and become something else.

We have perverted this wonderful science into a meaner of death and destruction. The origins are humble and have become diluted. The cost of power still has its benefits. With the discovery of bacteria we have found ways to classify eukaryote and have learned ways to kill them. The best way to initially identify a specific bacterium is to use a technique we call gram staining. According to Madman (2003), a Danish Hispanic named Hans Christian Gram discovered the process of gram staining in 1883.

He did this after while studying examples of lug tissue and some speculate that it was done by accident. The process of gram staining was incredibly significant. This was the begging of the understanding of how microorganisms are structured. With this knowledge we could understand how to increase our immune system’s ability to fight these pathogens. The treatment of disease and the prevention of infection have been around for

thousands of years. The difference now, is that we understand why our treatment methods are affective against microbes.

Tucked (1999) found that people have been using molds of some type to treat infections since 1 BBC. Although the molds were crude, for instance, “ mushrooms, beer yeast, and molds” (Tucked, 1999, p. 2068) they were necessary to prevent disease. The first one to confirm with controlled experiments that fungi could be used this way was Ernest Duchesses, a French microbiologist accreted with confirmation of Penicillin glaucoma as an antibiotic (Tucked, 1999). Without this monumental discovery, many more people may have died of infectious diseases throughout history.

While Duchesses did to originally formulate the idea of antibiotics he confirmed a theory presented by Chagrin and Guiana who stated, “ that the destruction of one competing microorganism was caused by toxin (antibiotic) secreted by another” (Tucked, 1999, p. 2069). Through his experiments Duchesses proved that Penicillin glaucoma was able to destroy Escherichia coli and Salmonella typhoid. Unfortunately the world was not ready for such knowledge until 1942, when Chain, Floret and Jennings finally acknowledged and published the confirmation of the affects of P glaucoma (Tucked, 1999).

After World War II we began an age of pharmacological breakthroughs. This Egan with Chain, Floret, and Jennings and their contribution of antibiotics. This included many branches of microbiology; for instance and not limited to vast areas of study including bacteriology, immunology, cellular microbiology, environmental microbiology, microbial genetics, evolutionary microbiology, food microbiology, microbial biotechnology, medical

microbiology, industrial microbiology, molecular microbiology, and many more. The branches of microbiology are still included in the study of microorganisms, but have been focused into specific fields.

The ones I will focus on are medical microbiology, bacteriology, and immunology. These three have the largest impact on my major of nursing. Nurses are on the frontline of the war against pathogenic organisms, which threaten the health of many individuals. It is important for me to know that " nurses are the largest group of healthcare professional, nurses are present in every health care setting" (Settler, Lipstick, 2003, p. X'). Nurses are everywhere and we come in contact with multitudes of people on a daily basis. The first responsibility of a nurse is the safety of our clients.

We can obtain safety by taking the precautions necessary to prevent the spread of infectious ease. The very first skills lab we are given in nursing school is hand washing. The technique for proper hand washing comes from our textbook and the chapter titled " Sepsis and Infection Control" (Craven, et al. , 2009). The technique is based years of discoveries found in microbiology. We start by removing all our rings, bracelets and watches. This is done to prevent transfer from microbes that could be living on them. Next we soak our hands under warm water.

The purpose of warm water is prevention of losing the oils essential for our skin and reduces overly dry skin from excessive and washing. During the entire process we must keep our hands at a lower position in reference to our elbows this keeps the contaminated water from affecting the rest of our arm. The application of soap begins with the palms. Next our wrists then the

back the hands the soap needs to be given time. The more time you allow the microbes are loosened and can be removed from the skin. As we continue to wash by interlacing our fingers and washing each finger individually.

Finally we end by scraping under the fingernails. The whole process can take up to two minutes. Drying our hands is even done in a way that reduces recontamination of the hands. The purpose of teaching us this technique is to prevent the spread of disease among patients. Whenever a nurse enters a patient’s room they become susceptible to anything the patient could be carrying. It becomes very important that the nurse uses the precautions set by the agency to prevent self-contamination and the spread of communicable diseases. The precautions include gloves, mask, gown, and a face shield (Craven, et al. 2009). If a patient has a recognized disease the precautions will vary between the levels of risk. A droplet precaution will always include a mask first. This is an example of the proper us e of a PEP (personal protective equipment) (Craven, et al. , 2009). A PEP is standard for maintaining infectious control. This originates with the knowledge of understanding where microbes can thrive. Sepsis technique began long before we completely understood why it was important. What they understood was that not as many patients were getting sick if chemicals were used to clean the affected areas and tools.

The problem with constant contact is an increased amount of transfer from patient to nurse and nurse to patient. In recent ears hospitals have been trying find ways to prevent hospital acquired diseases by hiring administrators to ensure the use of proper aseptic techniques among health

care employees. Thee personnel are refereed to as infection control nurses and agents. The process may sound like something new but it dates back to the time of Florence Nightingale. She knew the importance of a clean environment and also understood, “ For a patient the greatest risk of all is the risk of infection”(Mandalay, 2005).

The start of her achievement came after her influence on the Crimean War, where she dramatically reduced the death rates. She came with ways to reduce the spread of infectious disease and was praised by many who nick named these areas “ Nightingale wards”(Mandalay, 2005, p. 27). Another very important contribution was her high standards of the nurses and suggesting that they need to wash their hands as often as possible. This actually influenced these areas to require sinks (Mandalay, 2005). Preventing healthcare-associated infections has become a major concern of every healthcare facility.

According to Lo, Lee and Lieu (2013), the CDC has classified these infections into for major groups. They are “ urinary tract infection (UT’), surgical- tit infection (AS’), blood stream infection (BBS) and pneumonia (PEEN, which is usually ventilator-associated)” (Lo, et al. , peg. 1). Breaking down these common infections helps decide where the facility is doing well or poorly in terms of infection control. In the study done by Lo (2013), they were trying to find a way of detecting It’s before they occurred.

They did this by examining previous medical records and keying into specific factors that included monitoring for fevers. Fevers are the first sign of an infection because of the immune system’s response to detecting and

beginning to break down the pathogen. The next factor monitored was a urine culture. This allowed for specific identification of the bacterium casing the infection. A blood culture was also included . They did regular urinalysis, used antibiotics, and used invasive devices. These dynamic parts of the regime of specific practices allowed them closely monitor each situation.

Overall the study done by Lo and others (2013) proved that early detection of urinary tract infections was possible using electronic medical records and vigilant practices. The significance of this study shows that healthcare-associated infections are preventable. Although it may never each one hundred percent prevention, we can apply these practices and educate those in direct contact with the effected. The idea of exposing the patient to multiple tests can also increase the risk of infection. Craven and others (2009) mention a therapeutic regimen as the multiple factor that increases this risk.

They suggest that exposure to such equipment like, urinary catheters, feeding tubes, and ventilators will actually increase the risk of infection. Mojave (2006) states, “ Sterile wounds heal faster than those that are infected. ” (p. 39). This increases the use of antibiotics in all healthcare situations. Antibiotics are extremely helpful when dealing with most pathogens encountered by humans. When they were first introduced on a massive scale antibiotics were praised for abolishing many diseases. The problem now is that many of those easily treated diseases are becoming resistant to the same antibiotics.

The presence of antibiotic resistant bacteria occurred very shortly after antibiotics were introduced in 1945 (Tucked, 1999). Furbisher and Freest (1973) only briefly mention a drug resistance in their book, containing over 600 pages of information tilted Microbiology in Health and Disease. They recognize the concern and suggest hat it will be important in the future. According to Craven and others (2009), multiword-resistant organisms (Moods) have significantly increased in occurrence. The diseases included but are not limited to tuberculosis, interconnect, Staphylococcus reassures and other bacteria.

In a study done by Woolworth and Law (2012), multiword resistance arise " when bacteria simultaneously acquire resistance to a broad spectrum of structurally dissimilar compounds to which they have not previously been exposed" (peg. 1334). They proceed to investigate the development of multiword transporters and conclude with possibility of creating protein crystals deed to map data on multiword transporters. The destruction of bacteria brings challenges of its own to overcome. Patients can become septic as a result of widespread microbial tissue destruction.

This combined with the release of antitoxins can result in a multitude of complications. The condition associated with septic is systemic inflammatory response syndrome (SIRS) and can be accompanied by high fevers, tachycardia, hypertension, and leukocytes (Craven, et al. , 2009, p. 359). Craven (2009) also refers to individuals, as susceptible hosts are people who may have a lowered immune response. These patients are often seen as high risk ND are given primary concerns when considering infection control.

One of the most serious and unusually common diseases infiltrating our care facilities is Colostomies difficult.

It is better known as C-dif. An interesting fact quoted in Craven (2009) is that C-dif accounts for about 17% of all Has. This is only a small portion of the 1. 7 million cases of Has in the United Sates each year. The largest contributors are It's, which account for 61% of all hospital-acquired infections. The incidence of Has has risen so much that regulatory agencies have been constructed to help reduce the appearance of these drug resistant diseases. It is actually required by law to report an infectious disease to these regulatory agencies. A major agency used worldwide is the CDC.

The CDC publishes guidelines and statistics about the spread and potential of drug-resistant diseases. This is extremely helpful for tracking diseases and understanding what to be on the lookout for. The other agency also involved in supplying guidelines and publishing evidence based rhetoric is the Joint Commission. They actually set the rules and guidelines that need to met in order to gain accreditation (Craven, et al. , 2009). Another agency involved in the healthcare field is there to protect the workers. The Occupational Safety and Health Administration or (OSHA) engages in administering the guidelines of worker safety.

Without these agencies there would not be as much infection control a there is today. Although some agencies may be caught in the bureaucratic autocracies where many government departments find themselves, it is still necessary to follow the guidelines established. Much like the guidelines we follow when developing microbiology. Without microbiology and the study of

microorganisms we would not have the abilities or face the problems corrosively affecting our world today. For example, with he discovery of antibiotics there are now multiword-resistant infections. These infections are continually mutating and becoming even harder to treat.

There is now the threat of baptisteries, a thought that even I find myself dreading. The potential of baptisteries is almost limitless and congruently almost undetectable if done correctly. The driving force behind microbiology has not been to destroy; yet we see the affects of baptisteries in Iraq and Vietnam veterans. No one can predict where the study of microbiology we lead us. There still many significant discoveries in the field of microbiology that have translated into amazing results. We have increased our life expectancy exponentially over the past few centuries and are climbing towards the limit of the human body.

In conclusion, microbiology could be the most important part of science that is studied today. In the future we will continue to see advancements, which will both improve and hinder the human race. There are many things that microbiology has given us that include the benefits of a bacteria free environment. Another benefit is the answers into why cancerous cells spread and how we can interrupt the formation of these cells. Although I did not mention many facts about cancer there are very few f us who have not experienced the death of cancer.

In 2010 the CDC (2013), published that 574, 743 people dies of cancer in the United States. Microbiology may hold the answers on how we can cure cancer from all humanity. The CDC (2013) also reported that 50, 097 people

died of Influenza and Pneumonia in 2010. It is the 9th leading cause of death in the U. S. The flu kills more people than some are willing to admit and is constantly evolving in a way that requires a different vaccine every year. The point is, that I may never discover a new microorganism or develop a new cure for a disease. The most important knowledge I can gain is how to defend against the spread of disease.

As a nurse preventing contamination will be my most important objective.