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Global Health Report – Community Acquired Methicillin-Resistant *Staphylococcus aureus*

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Abstract

Staphylococcus infections are a global issue that can seriously impact the health of the communities. The presence of staphylococcus infections have traditionally been observed within the healthcare settings. Although, recently there has been an increase on the diagnosis of staphylococcus infections throughout the community. The development of this community acquired epidemic may be due to the lack of the public's education involving the infection, the empirical prescribing of antibiotics by healthcare providers, and the patient's misuse or misunderstanding of antibiotics. The purpose of this paper is to provide insight on community acquired methicillin-resistant staphylococcus (CA-MRSA), its impact on the global community, and how the community health nurse can help provide awareness on CA-MRSA.

Keywords: Staphylococcus infections; Community; Acquired; Methicillin-resistant; Staphylococcus

Introduction

Methicillin resistant *Staphylococcus aureus* is a type of bacteria that can cause infections in the bloodstream, on the skin and soft tissue, surgical wounds, and possibly the urinary tract [1]. Over the past few decades MRSA has been viewed as a nosocomial infection that is generally obtained in a health care setting. The majority of the patient's that were diagnosed with MRSA typically had previous co-morbidities [2]. The United States experienced its first outbreak of MRSA in Boston [3]. It wasn't until the new millennium that the CDC gave definition to Community Acquired Methicillin-Resistant *Staphylococcus aureus* [3]. This definition describes CA-MRSA as an infection that a person acquired as an outpatient or they were diagnosed with MRSA within forty eight hours of admission to a healthcare facility [3]. The reported cases of CA-MRSA continue to grow globally. This new strain of MRSA is making an impact on the health of communities within the United States and in other countries such as the United Kingdom. The increase of microbial resistant staph infections is affecting the pubic on a global level [4]. The development of this epidemic may be due to the lack of community education involving the infection, the empirical prescribing of antibiotics by healthcare providers, and the patient's misuse or misunderstanding of antibiotics [5]. There are many different areas of practice within the nursing profession that experience cases of CA-MRSA. In the operating room I have experienced cases that involved patients who have entered into the hospital for either first time procedures or as a result of a trauma, and they already have CA-MRSA. Furthermore the majority if these patients are unaware that they do not have a CA-MRSA diagnosis nor have they been treated to prevent further transmission of the pathogen to others.

In this paper the reader will be provided with researched information in regards to the growing epidemic of CA-MRSA. These topics will include a cross reference of the epidemic between the United States, and the United Kingdom, possible reasons for the rise in the epidemic, and preventative measures. In addition the writing will discuss the community health nurses role, ethical considerations, and provide interventions that may assist in decreasing the rise in CA-MRSA.

Global impact of CA-MRSA

A study conducted within United States in 2004-05 revealed that close to ninety percent of all staph infections that were admitted to an emergency unit already had CA-MRSA. The study also concluded that the majority of these cases admitted were patients categorized to be within the healthy and younger population [3]. The results from a similar study conducted in the UK during 2007 revealed three hundred cases of CA-MRSA, and forty percent of the cases were from the healthy and young [2]. Unlike traditional MRSA, CA-MRSA has different populations that are at risk. Findings from a US and UK study, many of these cases deal with the young and healthy populations. Within this population the UK suggests that children who are less than two years of age have an increased risk for CA-MRSA [2]. According to David and Daum, the US has also reported an increased risk for CA-MRSA in children, including those who are as young as four weeks old [3].

Contributing factors

There are many contributing factors to the increased risk of CA-MRSA. Areas of concern include but are not limited to, living conditions, athletes, illegal drug abuse, vulnerable populations, vaccines, and empirical prescribing of medication.

During the 1990's the United States recommended that children receive a vaccination to help prevent Streptococcus [6]. This vaccine, known as Prevnar [7] appeared to be coupled with the increased reports of CA-MRSA. Although studies report a minimum increase in CA-MRSA in the UK after having received the Prevnar vaccination

that may be simply as a result of the lack of availability of the vaccination in UK during the 1990's.

Other areas of medication concerns deal with the administration, consumption, and disposal of antibiotics. The practice of empirical antibiotic treatment may help to increase the ability of a person to recovery faster than waiting for a definite diagnosis. Although, broad spectrum antibiotic prescribing can lead to negative results such as CA-MRSA. A review listed in the Oxford Journal mentions an example of CA-MRSA that caused the death of several pediatric patients. The patients were being treated with cephalosporins, and it is possible that no considerations were given to the idea that the cause of the infections may have been MRSA. A research study conducted at Texas's children's hospital over approximately a six month period in 2000 showed evidence that eleven percent of cases were CA-MRSA and were resistant to erythromycin [8].

According to the CDC up to fifty percent of antibiotics prescribed in acute care settings within the US are not needed [9]. The over prescribing of antibiotics may be a result of an ethical dilemma. Often times physicians may feel as though a parent of a patient or the patient themselves are expecting to be prescribed an antibiotic. When this occurs the physician may feel the need to fulfill the patient's expectations. Researchers have found that sixty percent of the time patients were prescribed antibiotics it was based on the physician's perspicacity of the patient's expectations [10]. However, the patient may not have needed nor benefited from an antibiotic. The physician's intentions are good in that he or she wants the patient to feel as though they have received proper care. Although prescribing antibiotics without evidence that the patient may benefit from the medication can result in the increased risk for CA-MRSA.

External factors that affect the risk for CA-MRSA include the proper disposal of antibiotics. A study noted by the NIH reported that in 2009 a survey conducted by Dean A Seehusen and John Edwards showed results of less than half of the individual's surveyed returned unused antibiotics to the pharmacy. The majority (fifty percent) flushed the unused medications down the toilet [11]. If antibiotics are flushed down the toilet there is an increased chance that they will appear in the water treatment systems. After time the abundance of disposed antibiotics in the water treatment system can lead to antibiotic resistant infections such as CA-MRSA [11].

The empirical prescribing in livestock throughout many countries has shown to also be a culprit in the spread of CA-MRSA. A European study found that empirical antibiotic prescribing in pigs may have caused an increase in diagnosis of MRSA within the livestock. As a result humans in contact with the pigs were being diagnosed with CA-MRSA. The Neverland's reported that more than twenty percent of their pig farmers were positive for MRSA [12]. The FDA reported that farmers will add antibiotics to the livestock's food and water to help increase the animal's weight. The empirical prescribing in the livestock is an issue, although again the empirical prescribing within the pig farming population needs to be addressed to prevent the spread of antibiotic resistant staph infections amongst the communities' population [12]. In 2011 a study conducted in the US was published by Johns Hopkins that explained how manure produced by livestock that are given antibiotics showed evidence of antibiotic resistant organisms. In addition the study showed that more than ten percent of the people within the study were diagnosed with CA-MRSA as a result of the manure used in field fertilizers [13]. The risk of becoming infected is increased simply by living in close proximately to these farms.

In 2005 Canadian researchers conducted a study on fifteen individuals that were diagnosed with skin and soft tissue infections. Of the fifteen, seven of the infections cultured positive for CA-MRSA. Another similarity of the seven individuals was their involvement with drug abuse [14]. The Journal of Microbiology suggested in a 2006 publication that intravenous drug abuser could be a "major reservoir for the transmission of CA-MRSA" [15]. In addition, the spread of CA-MRSA amongst intravenous drug users may be a risk factor as a result of poor or delayed personal healthcare. Intravenous drug users are more likely go to an emergency unit to care for an aliment once the issue is no longer tolerable. Intravenous drug users commonly seek treatment for soft tissue infections [16]. A correctional facility in Los Angeles reported that a large percentage of the facilities inmates who are intravenous drug users also were diagnosed with CA-MRSA. The cultures taken from several of the inmates were from skin abrasions that were originally misdiagnosed as spider bites [17].

The environment in which a person resides may also have an increased risk for CA-MRSA. Crowed living environments such as homeless shelters, and correctional facilities can pose as risk factors CA-MRSA. Within these close vicinity environments the infection can be transmitted as a result of skin to skin contact, poor hygiene, warm temperatures, and personal item sharing [18].

A lack of resources such as healthcare, housing, personal belongings coupled with addiction and substance abuse puts the homeless population at an increased risk for exposure to CA-MRSA. The homeless tend to share or use others items out of necessity, and they may not have available supplies to care for a wound [19]. Conceivably, the lack of resources within the homeless population could increase their susceptibility to CA-MRSA.

Athletes who share sporting equipment or are in close contact with one another are at an increased risk for CA-MRSA. Research has shown as increase of athletes diagnosed with CA-MRSA since 1983 within the US and Canada [20]. Although all athletes are at risk for CA-MRSA, those who have the most contact with another's skin seem to have the highest risk [20].

Interventions

In 2014 the CDC developed the Antimicrobial Stewardship program and recommended that hospital begin to use this program to help improve the usage of antibiotics [21]. To help in addressing empirical prescribing of antibiotics antimicrobial stewardship programs have been developed in hospitals and in community healthcare settings. The goal of the stewardship program is to work in conjugation with healthcare providers in making sure patients are getting the correct medication, and for the correct amount of time. In addition the stewardship monitors antibiotic misuse such as a broad spectrum antibiotics that were prescribed for community acquired infections, or educating the community on the importance of not taking antibiotic's that were not prescribed for them directly [22].

In 1995 the CDC developed a program specifically directed toward the correct usage and administration of antibiotics. The CDC'S Get Smart program provides education material and training services for healthcare providers and patients. The program also works closely with health insurance companies who assist in providing patients with necessary information on the appropriate use of antibiotics [21].

The FDA's consumer report page states that they are working with food producing corporations such as the faming industries to

implement alternative measures in enhancing their livestock other than the use of antibiotics [23].

In helping to prevent the occurrence of CA-MRSA in athletes the CDC has listed several preventative measures on its website. The site explains that any sporting equipment that comes in contact with other players should be cleaned and disinfected. The suggested disinfectants are that those registered by the Environmental Protection agency will help to eliminate MRSA from athletic equipment [24]. The CDC also stresses the importance of hand washing, proper hygiene, and covering any open wounds [24].

Community health nurses role

A primary goal of the CHN is to educate. Education should be implemented within the public, health care institutions, schools, and at a global level.

In today's age of the World Wide Web we as CHN'S have the ability to research, and share information about CA-MRSA globally. The Global Health Council encourages membership and involvement in the global health community. The CHN's involvement and membership within the Global Health Council could provide a valuable tool in spreading awareness on CA-MRSA throughout the one hundred and fifty countries that the organization is present in [25].

Involvement in the state's community Stewardship program would give the CHN the opportunity to help in prevention of overprescribing of antibiotics. In addition through the Stewardship program the CHN could reach the physicians, nurses, and other healthcare workers and provide awareness to CA-MRSA. The CHN could act as an advocate for the community by educating healthcare workers on the risk factors and possible causes of CA-MRSA.

The CHN's attendance at community meetings could allow the nurse an opportunity to educate the public on CA-MRSA. The Center for Disease Control's website offers education pamphlets and posters that the CHN could share and distribute to the community to help prevent the spread of CA-MRSA. Examples of this information include fact sheets, general prevention, and additional informational posters for the public and health care professionals. The CDC also provides electronic cards that the CHN could send to the community members and healthcare workers on the awareness of staph skin infections [26]. The CHN could collect information by electronically distributing the CDC electronic cards and asking questions such as if the recipient is experiencing or has experienced any of the symptoms of a staph infection. The total responses could help the CHN initiate a type of surveillance to recognize if there is risk for the epidemic within the community. The findings from such surveillance could provide the CHN with critical information helpful in protecting the health of the public [27,28].

Educating the community about dealing with a common cold, sore throat, or a cough could help decrease the incidences of inappropriate antibiotic prescribing that may result in a decrease in community acquired MRSA. In addition the community should be made aware of other areas that can help decrease the risk of CA-MRSA such as trying to purchase antibiotic free meats and paying close attention to any unusual illnesses especially if living in close proximately to a farming or food industry. Through the development of organizations, and collaboration with the local churches, schools, and community health centers the CHN can deliver educational information on protection and preventative measures.

Conclusion

In conclusion the rise in CA-MRSA is evident and needs to be addressed. The community health nurse can provide a positive impact on the local and global community to help prevent or decrease the occurrences of CA- MRSA. Through education, awareness, and prevention the community health nurse represents a valuable resource in promoting public health and decreasing the occurrences of CA-MRSA.

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