MRSA in Healthy Children

Abstract:

 Methicillin resistant *Staphylococcus aureus* (MRSA)has had an increase of infection rate worldwide. The bacteria is easily spread from person to person via mucous membranes. A study was conducted to see how many healthy children were infected with MRSA. This infection can go unnoticed and not cause major problems unless it grows in a patient. Children 2 months to 5 years were studied. These children were asked during with well child appointments to be nasally swabbed for MRSA. The study showed that the children around 2-5 months and 4-5 years were at the highest rate for MRSA. This is thought to be due to hygiene conditions. Parents who are infected can spread the infection to their infants. While siblings or children in child care can infect each other through coughing or sneezing.

Introduction:

 Antibiotics are a major factor in helping us fight infections. The first major antibiotic was discovered in the 1920s, this was penicillin. Since then different antibiotics have been developed. These can work by destroying the cell wall, or ribosomes or similar effects. Due to the misuse of antibiotics bacteria have become resistant to commonly used antibiotics. This happens from people not using the full dose of prescribed antibiotics. The bacteria is exposed to the antibiotic and the stronger strains are diluted by the antibiotics and people feel better so they do not finish their prescription. This causes those strong bacteria to build antibodies to the antibiotics and it will not be effective for that bacteria anymore. Two of the most common antibiotic bacterial strains are Methicillin Resistant Staphylococcus Aureus and Vancomycin Resistant Enterococci. Methicillin was introduced in 1959, and not much longer MRSA was observed in the United Kingdom. Methicillin Resistant Staphylococcus Aureus or MRSA has been found in the nasal cavities of healthy children.

 Children who were around 2 months and 5 years needed to have a well child visit from a physician to enroll into school or a form a daycare. During this visit the parents were asked if they would like to be tested for MRSA. The parents that approved the test had their children nasally swabbed for isolates. They were also asked to fill out a questionnaire, if they were not able to answer due to age their guardian would answer for them. The questionnaire included questions about their environmental factors. These factors included questions about their hygiene habits including hand washing and bathing practices. It also included housing factors including the number of rooms in the house along with the number of bathrooms and the number of occupants in the household. These questions went into specifics including if their children shared a room and if so if they shared a bed. They were also asked how many other children were in their daycare facility and the square foot of the facility. Other factors including if the children were currently or have previously breast fed and if they had a pneumococcus colonization. In total 3226 children were tested for MRSA. The swabs were taken from the inside of the nose with a cotton swab. The swab was placed in an appropriate transport media that kept the bacteria alive while it was transported from the medical facility to the laboratory to be tested. The transportation could only take a couple of hours or the sample could cause false results. If the sample was not tested within four hours it was considered useless. All of the samples were compared for similar bacterial identities. These identities are what was used to compare the bacterial strains.

 Nine antibiotics were tested for antimicrobial susceptibility of MRSA in this study including penicillin, clindamycin, erythromycin, doxycycline, trimethoprim/sulfamethoxazole, vancomycin, teicoplanin, linezolid, and fusidic acid, using the disk-diffusion method in accordance with the 2011 Guideline of Clinical and Laboratory Standard Institutes (Tsai). Of the 3226 children that were tested 919 had bacterial stains of Staphylococcus aureus. Of the 919 positive cases 330 tested positive for MRSA. The results showed that children 2-6 months old and greater than five years old were the highest group that tested positive for nasal MRSA. Those in the middle age groups were more likely to be found negative for MRSA in pneumococcus colonization. Children who were breast fed were also less likely to have a positive *S. aureus* colonization and thus not have MRSA.

Across the globe from 2000 to 2005 was at a strong increase cause major concern for the population. Between 2005 and 2010 the rate became steady. From 2010 to 2018 the rate began to slowly increase again. It is assumed that between 2005 and 2010 the general population had begun to start better and healthier hygiene practices. These practices not only included in the household. Schools started teaching and implementing hand washing techniques to children. Hospitals began to use gloves more often and practice better handwashing techniques. Between 2010 and 2018 even though the hygiene was improved people began to not properly use their medication causing the increase of MRSA. If a person was exposed to *S. aureus* they caused themselves to not be able to fight off the full infection.

Recent Progress:

 With the rise in MRSA scientists at John Hopkins University School of Medicine studied the immune system when exposed to MRSA. This experiment took place Febuary 5 2018. “[The] genetic sequencing data revealed that specific cells substantially multiplied after the initial infection, then moved to the infection site and provided protection against the second infection. These so called gamma delta T cells account for less than 1 percent of all the cells in the lymph node prior to infection. After infection, they accounted for more than 20 percent” (Carly). The study showed that people who have had the infection can have the infection a second time without symptoms due to the immune response. This is only beneficial to those with healthy immunities. Which can explain how healthy individuals can have MRSA without knowing about it.

Discussion:

 These results show how important hygiene and the proper use of antibiotics is. *S. aureus* is shown to be easily transmittable via mucous membranes. This includes sneezing. coughing, saliva, and other mucous membranes. Which is why it was so easy to transmit to children that were always held and close to a guardians face or ones who shared a room or a bed with a sibling or other children. A child with a stronger immune system could not show side effects of MRSA if exposed which is why it was important to test every child during their well child exam. Even though at the time they did not have any side effects the bacteria could grow and cause problems later. Guardians and other adults like ones in health care could also have a higher immune system and be infected without knowing and pass the infection on to a child who does not have as strong of an immune system. The problem with MRSA is that the immune system is already making antibodies against antibiotics. Which makes it harder to kill the bacteria and help the patient. A lot of antibiotics are made of similar substances which can cause the strain to become resistant to other antibiotics making it even more difficult to kill. This is a problem because the more antibiotics a bacteria is resistant to the harder it is to kill. This could led to the current scare of a super bug. This is a bacteria that cannot be killed by any antibiotics that are currently manufactured.

Citation Page

Carly A. Dillen. John Hopkins Medicine. “Your immune system may be able to protect against MRSA infections.” ScienceDaily. ScienceDaily, 5 February 2018. [www.sciencedaily.com/releases/2018/02/189285223559.htm](http://www.sciencedaily.com/releases/2018/02/189285223559.htm)

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