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Living at home with MRSA methicillin-resistant Staphylococcus aureus

TURKU AMK
TURKU UNIVERSITY OF APPLIED SCIENCES

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Abstract

The motivation behind this research was to acquire information and learn various approaches to preclude Methicillin-resistant staphylococcus aureus (MRSA) from spreading, educating doctors, nurses, and patients (in Morocco) creating implementation and awareness about MRSA, but the most important purpose of this research is to educate nurses in Morocco who are in charges with bacteria diseases on how to take preventative measures of MRSA. The responsibility for patients' well-being rests with health care workers. (Fleisher, Zimmerman, Wuste & Behrens 2009, 339). The writer tried his best to discuss S.aureus from a clinical perspective and to define how methicillin-resistant S. aureus alerted his opinion of gram-positive infections in homes with C-A MRSA. The author of this thesis wants to print a booklet summarizing all the information extracted from this research.

A literature review was used in this thesis with a descriptive approach. Information was retrieved from several databases including CDC, EBSCO, Cinahl, WHO, PubMed, and Science Direct. The literature review was based on 15 articles. The findings of this literature study revealed that preventing the spread of MRSA requires patient education at home and in LTFC, public awareness, and adequate wound care techniques. Diagnosing these infections as soon as feasible aids in timely treatment, and patients are required to complete the entire treatment series (Thompson & Workman 2014.)

KEYWORDS:

Community-acquired infection (CA-MRSA), Hospital-acquired infection (HA-MRSA), MRSA Methicillin-resistant Staphylococcus aureus, education, prevention, guideline, hand hygiene, contact isolation, nursing home.

Tiivistelmä

Tämän tutkimuksen motivaationa oli hankkia tietoa ja oppia erilaisia lähestymistapoja metisilliiniresistentin staphylococcus aureuksen (MRSA) leviämisen estämiseksi ja kouluttaa lääkäreitä, sairaanhoitajia ja potilaita (Marokossa) lisäten tietoisuutta MRSA:sta. Tämän tutkimuksen tarkoituksena on kouluttaa bakteeritaudeista vastuussa olevia sairaanhoitajia Marokossa MRSA:n ennaltaehkäiseviin toimenpiteisiin. Sairaanhoitajilla on kiistaton rooli sairaala- ja yhteisöperäisten infektioiden ehkäisyssä ja potilaiden kouluttamisessa näistä infektioista (Caffery et al, 2011.)

Vastuu potilaiden hyvinvoinnista on terveydenhuoltohenkilöstöllä (Fleisher & Zimmerman & Wuste & Behrens 2009, 339). Työssä perehdytään MRSA:n aiheuttamiin ongelmiin kliinisestä näkökulmasta ja siihen, kuinka voidaan toimia kodeissa, joissa on C-A MRSA infektio. Opinnäytetyön tekijä haluaa laatia kirjasen, jossa on yhteenveto kaikesta tässä tutkimuksessa koostetusta tiedosta.

Tässä opinnäytetyössä menetelmänä on deskriptiivinen kirjallisuuskatsaus. Tietoja haettiin useista tietokannoista, kuten CDC, EBSCO, Cinahl, WHO, PubMed ja Science Direct. Luotettavan tiedon saamiseksi tietokannoista löydetyt artikkelit valittiin käyttäen kriteerejä. Kirjallisuuskatsaus perustui 15 artikkeliin.

Tämän tutkimuksen tulokset paljastivat, että MRSA:n leviämisen ehkäiseminen edellyttää potilaskoulutusta kotona ja pitkäaikaishoidon laitoksissa, yleisön tietoisuutta ja asianmukaisten haavanhoitotekniikoiden käyttöä. MRSA-infektioiden diagnosointi heti kun mahdollista auttaa oikea-aikaisessa ja oikeanlaisen hoidon valinnassa ja toteutuksessa. (Thompson & Workman 2014).

List of abbreviations

CA-MRSA- Community-acquired methicillin-resistant staphylococcus aureus (Alexander et al 2010).

CDC- Center for disease control and Prevention (CDC 2017)

FDA - United States food and drug administration (Jacobs 2014).

HAI – Hospital-acquired infections (WHO 2002)

HA-MRSA- Hospital-acquired methicillin-resistant staphylococcus aureus (Gibbons 2016).

MRSA – Methicillin-resistant Staphylococcus aureus (Jacobs 2014).

S.aureus - Staphylococcus aureus (Jacobs 2014).

WHO – World health organization (WHO 2002).

PPE- personal protective equipment

CPE- Carbapenemase-Producing Enterobacteriaceae

ESBLS- Extended-Spectrum beta-lactamases

SCC- Staphylococcus Cassette Chromosome (Jacobs 2014)

NF- Necrotizing Fasciitis (Jacobs 2014)

CLABSI- Central Catheter-Associated Bloodstream Infections (Holt 2016)

CHG- Chlorhexidine gluconate

LTCF- Long-term care facilities

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1 INTRODUCTION

The history of MRSA infection goes back to 1961 once it had been 1st delineated. Since then, the incidence and prevalence of MRSA infections are increasing dramatically across the US (Centre for disease control, 2013.) Many types or families of microbes exist in the human body and our environment. One of these families is called Staphylococcus aureus and MRSA is one of them (WHO, 2003.)

MRSA, briefly for Methicillin-Resistant/Multiple-resistant staphylococcus Aureus could be a strain of staphylococcus aureus that is proof of resistance to most commonly used antibiotics.

Currently, MRSA has been known collectively as a major pathogen that causes difficulty to treat nosocomial infection. Nosocomial infection, conjointly referred to as hospital nonheritable infection, is nowadays a world downside problem. Nosocomial infection can cause a pointy increase in medical prices, moreover, it conjointly increases patient mortality to a very significant level (Baddour, 2010; Kolendi, 2010; Kerttula, 2007.)

Staphylococcus aureus, This Staphylococcus aureus (S. aureus) lives in about a third of the population, usually in the wet areas like armpits, groin, and nose, but can be found elsewhere CDC (Centre for disease, 2017).

Hospital-acquired infections are considered to be among the most common healthcare-associated diseases in the US. This condition is regarded as one of the leading causes of death in the country due to its emergence and spread.

Some of the other common infections that can be acquired through healthcare facilities include carbapenemase-producing organisms such as E.coli and vancomycin-resistant enterococci (VRE), and Extended-spectrum beta-lactamases (ESBLs).

According to the CDC (Centre for disease, 2016.) around 1 in 20 hospitalized patients will experience a hospital-associated illness (HAI). The World Health

Organization (WHO) also states that around 8.7% of all patients worldwide have the condition at any given time.

The highest incidence of this illness is seen in the Southeast Asia and Eastern Mediterranean regions. Although methicillin-resistant staph aureus (MRSA) is not categorized by age group, it can be easily spread to children's adults, and the elderly.

The main reason why it is more common in orthopedic and acute surgery wards is due to a compromised immune system. The prevalence of MRSA in orthopedic and acute surgery wards was higher than in other facilities. It could be caused by poor hand hygiene (Jacobs, 2014.)

Most of the time it does not cause any problem, although it can, like any other microbe, cause infections. S. aureus can cause skin lesions, like pimples and boils. These microbes can lead to more serious infections if they infiltrate where they are not normally found, for example in cuts or surgical wounds. We have a whole range of antibiotics to fight this family of microbes that sometimes-called MSSA, or Staphylococcus aureus sensitive to methicillin (methicillin being a type of antibiotic). (Jacobs, 2014.)

Not long ago, some studies hinted at reducing HA-MRSA incidences within the US at the expense of a growing prevalence of CA-MRSA. The reportable incidence of MRSA-related hospitalizations ranges from 11.5% to 60% (Centre for disease control 2016.)

Methicillin-resistant *Staphylococcus aureus* (MRSA) is notifiable in Denmark, Finland, Iceland, Norway, and Sweden. The prevalence of MRSA in this region has been low for many years, but all five countries experience increasing numbers of new cases (Finnish Institute for Health and Welfare, Helsinki, Finland), The incidence of new MRSA cases increased in all Nordic countries with Denmark having 61.8 new cases per 100,000 inhabitants in 2016 as the highest (Infectious Disease Epidemiology & Prevention, Statens Serum Institut, Copenhagen, Denmark) An increase in the numbers of new MRSA cases and a shift toward more cases of community-acquired MRSA have been observed in

the Nordic countries (Stenhem et al., 2006; Larsen et al., 2009, Holzknecht et al., 2010; Elstrom et al., 2012; Larsson et al., 2014; Swedres-Svarm, 2016; Junnila et al., 2020.)

MRSA frequencies in Europe have remained steady for many years. It was previously recognized as a hospital pathogen (Hospital Acquired MRSA); however, it has recently been found in long-term facilities (for example, nursing homes) and communities, with no evidence of a link to any healthcare institutions (named as Community-Acquired MRSA).

The yearly MRSA case count in Finland has risen year after year, according to the National Infectious Disease Register. According to Terveyden Ja Hyvinvoinnin Laitos, there were 1274 new MRSA cases reported in 2015, and 1700 in 2016. (THL, 2017.) (Kerttula, 2007.)

Every year, over 4.2 million healthcare-associated illness cases are reported in European long-term care institutions, according to the European Centre For Disease Prevention And Control, a European Union organization. Long-term health care facilities include nursing homes, residential homes, and mixed facilities; the majority of these institutions are for elderly care. The European Centre for Disease Prevention and Control (ECDPC, 2014.)

As a nursing student in Finland, who was born and raised in Morocco, and had a summer job in the infection ward of Katriinan sairaala hospital in Vantaa, Morocco is a country that did not give much importance to the study of this virus (MRSA). ~~and m~~ Most of its doctors and nurses don't know enough about the danger and the severity of MRSA. Some of the caregivers in Morocco don't know absolutely anything about it (MRSA), the thing that prompted the writer to write those papers is that not long ago the writer was talking to a Moroccan gynecologist who did not recognize what MRSA is. Then the idea came to the writer to make research and write papers about it (MRSA) and summarize it in a booklet to introduce this disease to the doctors and nurses in Morocco.

The epidemiology of methicillin-resistant staphylococcus aureus (MRSA) in Morocco is poorly documented (Elhani et al.) studies about the nasal carriage of

H-A MRSA and C-A MRSA are scarce (Mourabit et al, 2008.) The purpose of writing those papers is to provide a booklet that collects a summary of data that will be collected by reading some specialized research on this topic.

2 THE PURPOSE AND RESEARCH QUESTIONS

The purpose of the research is to provide patients living at home, nursing home staff, hospital caregivers, and students with a comprehensive guideline/booklet in English about community-acquired methicillin-resistant staphylococcus aureus CA MRSA (Alexander et al, 2010.) prevention, control, and management.

This Clinical Guidelines/thesis aims to provide guidance and standards for improving the quality, safety, cost decrease, and effectiveness of healthcare in Morocco. The implementation of the Clinical Guideline will support the provision of evidence-based and consistent care across Moroccan healthcare services.

Research questions are:

1 What is MRSA, CA-MRSA, HA-MRSA, and what harm can be caused according to the literature?

2 How do caregivers prevent and treat MRSA at a nursing home?

3 How to educate patients about the prevention of MRSA at a nursing home?

3 LITERATURE REVIEW WITH NARRATIVE APPROACH

3.1 Literature review

This thesis was initiated and completed with a literature review with narrative approach as the research method. A literature review is a survey of scholarly sources that provides an overview of a particular topic. It generally follows a discussion of the paper's thesis statement or the study's goals or purpose. (Key, Rich, DeCristofaro, Collins, 010). A descriptive literature review identifies, selects, and critically appraises research to answer formulated questions (Dewey, A. & Drahota, A. 2016.)

This literature review will include an introduction, discussion, and summary of data collected and reviewed with the use of the descriptive approach (Gray et al 2021). The source will be articles for scholarly use, this source consists of scientific journals, textbooks, and clinical journals.

3.2 Literature search and criteria selection

The material is collected by searching the literature, processing the literature research, inclusion, and exclusion criteria.

This research makes use of the EBSCO Publishing database's electronics database. Keyword searches were carried out on databases such as Cochrane, Medline, PubMed, and Cinahl. Later, more information is sought from websites such as the European Centre for Disease Prevention and Control, Eurosurveillance, the Journal of Hospital Infection, the Nice Clinical Guideline Centre, the World Health Organization, and THL. Some of these websites were recommended by colleagues, while others were cited from previous literature references. This section seeks to find the most up-to-date information in order to keep the guidelines current.

A table will be used to show the inclusion and exclusion criteria for the article used in this thesis.

Table 1. The inclusion and exclusion criteria for articles

INCLUSION CRITERIA FOR ARTICLES	EXCLUSION CRITERIA FOR ARTiCLES
MRSA Community-acquired infection /MRSA Hospital-acquired infection / MRSA	Research Articles that are not related to MRSA infection
Data published between 2002 to 2022	Old articles than 2002 or Articles published in other languages
Articles in the English language	Article not published in English
Research articles that focus on the aim and purpose of the thesis topic	Articles without full, free, and open access to articles
Full-text article with open and free access	

3.3 Articles analysis

After gathering information and expertise about community-acquired infection/MRSA, and hospital-acquired infection/MRSA, the steps to attaining data analysis include assessing and synthesizing content from the sources that were obtained. Critical analysis of individual studies would be necessary to clearly distinguish relevant material in articles and sources.

Making relations between ideas and hypotheses from various sources to build an overall view of this topic/thesis by mapping out facts and concepts to represent current knowledge about MRSA (Gray et al, 2021.)

During the research, it was discovered that there were few professional, qualified, and trustworthy articles/studies on the topic (MRSA in nursing homes). The majority of current MRSA prevention guidelines and qualified studies are based on hospitals, with only a few guidelines and researches for long-term healthcare institutions. No qualified, reliable, practical guideline for

nursing homes has been established. MRSA description, emergence, categorization, risk factors, transmission mechanism, colonization and infection, and commonly used therapy are all covered in this thesis straightforwardly and completely. To maintain the thesis' validity, reliability, and comprehensiveness, the theoretical section is based on published books.

The thesis focused on MRSA infection control and treatment, prevention, and patient education in addition to theoretical MRSA knowledge. Because there are few reliable guidelines and studies for nursing homes, the thesis draws on the most popular and reliable guidelines for long-term care facilities (published by WHO and CDC), as well as nursing home practice and the most recent nursing home articles/studies, to propose a nursing program for nursing homes with MRSA residents, which includes admission risk assessment, resident placement, standard precautions, and contact isolation activities. In addition, the thesis emphasizes hand hygiene in a distinct part, emphasizing the importance of hand hygiene (hand washes, antiseptic hand rubbing included, surgical hand antisepsis not included) and the standard hand hygiene (hand washes, antiseptic hand rubbing included).

Furthermore, the thesis offers a few practical difficulties based on nursing home data and hypothesizes plausible causes.

4 MRSA AS THE CHALLENGE OF HEALTH, HEALTH CARE AND HOMES

Infections caused by antimicrobial-resistant organisms have increased substantially over the world in the last two decades, particularly among vulnerable high-risk populations such as patients in intensive care units (ICUs), burns units, and immunocompromised persons. This has sparked widespread worry among the general public, health officials, patients, and their relatives around the world.

4.1 What is MRSA?

MRSA (methicillin-resistant Staphylococcus aureus) strains are S. aureus isolates that are resistant to beta-lactamase-resistant staphylococcal medications (floxacillin and dicloxacillin) or other beta-lactam antibiotics (cephalosporins and carbapenems) according to Evidence-based medicine recommendations (2017). MRSA is the most common infectious agent responsible for the surgical site and bone infections acquired in hospitals. A majority of community-associated MRSA infections occur on the skin, including soft tissue infections (cellulitis), impetigo, furunculosis, carbuncles, abscesses, and infected ulcers. The type and severity of infections caused by MRSA are the same as those caused by methicillin-susceptible S. Aureus. The methicillin-resistant staphylococcus aureus (MRSA) is resistant to antibiotics of the beta-lactam class, including penicillin, amoxicillin, and methicillin among others. Resistance to methicillin in S aureus occurs from the acquisition of the mecA gene that codes for a modified penicillin-binding protein (PBP2a) which confers resistance to methicillin and other semisynthetic penicillinase-resistant b lactams that is all β-lactam antibiotics. Methicillin resistance is determined by the presence of the mecA gene sequence, which is absent from susceptible strains of S aureus, but present in resistant strains. Staphylococcus cassette chromosome (SCC) mec gene configurations are very diverse, and it is the mecA gene that determines if MRSA is (HA-MRSA) hospital-acquired in origin or (CA-MRSA) community-acquired in origin. The methicillin resistance determinant, mecA, is found in all methicillin-resistant S aureus strains, making the SCCmec element SCCmec. In epidemiological studies, structural differences in SCCmec elements are used to distinguish and determine MRSA strains based on their sequences. Because HA-MRSA genetic components are too big to be integrated into a bacteriophage intermediate, no genetic material can be transferred via transduction. (Jacobs, 2014.)

MRSA is a type of staphylococcus aureus bacteria that has developed antibiotic resistance. Staphylococcus is a gram-positive bacterial genus. The genus Staphylococcus contains approximately 40 species, most of which do not affect

people or other animals. However, S.aureus is the most prevalent hospital infectious species in the staph family, and so is classed as a superbug. S. aureus is a type of bacteria that can be found on the skin or in the nose. Around 20% of healthy people have the bacterium in their anterior nares all of the time, and 60% have it on occasion. S aureus can infect the skin and cause boils, impetigo, or cellulitis if it is transmitted by direct touch or, less commonly, by airborne transmission. Staph bacteria have a superb affinity to heat and wet elements of the human body elements which include axillaries, groins, and perineum areas. More extreme infections withinside the body can unfold to the bone, blood, and lungs. "S aureus are non-spore-forming cocci that seem as golden tingled clusters while visible below a microscope" (Nazarko, 2014.) S aureus organism generally reasons on superficial pores and skin infections which can be handled with suitable antibiotics and right pores and skin care. MRSA is a bacteria that develop resistance to beta-lactam inhibitors like Methicillin. Methicillin-resistant S. aureus can be transferred directly through physical contacts, such as infected hands, or indirectly through exchanging items that carry the infection, such as droplets. Wound infections, surgical wounds, catheters, pneumonia, and sepsis are examples of nosocomial infections. (Romero and colleagues, 2006.)

Many people and healthcare workers were relieved when penicillin was discovered in the twentieth century. However, the respite did not stay long because S.aureus has developed resistance to penicillin (methicillin). At some point, oxacillin took the place of methicillin, and the results were the same. Some have proposed changing the name MRSA to ORSA, although MRSA was the most commonly used term among health professionals. (Jacobs, 2014.)

Health care staff and invasive medical devices that have been exposed to MRSA can transmit the disease to patients, according to the CDC 2017, Through direct contact with an infected or colonized person or by coming into contact with a contaminated surface that has not been adequately sanitized, MRSA can be transmitted, MRSA can spread from person to person if there is skin-to-skin contact with a wound, abrasion, cut, or boil on the person. When

touched by an infected person, surfaces outside the body can be contaminated with MRSA.

Despite the fact that antimicrobials are being created at a faster rate than ever before, MRSA remains drug-resistant. Within the Staph genus, Staphylococcus aureus is the most infectious. The bacteria can live in the bloodstream, soft tissues, pneumonia, and wound infections after surgery. (Dilnesaw and Bitew, 2016.)

4.2 HA-MRSA and CA-MRSA

HA-MRSA is short for healthcare-associated MRSA or hospital-acquired MRSA. CA-MRSA is short for community-associated/acquired MRSA.

MRSA was previously only found in hospitals and healthcare settings. Since the first MRSA strain was discovered in London in 1961, MRSA has been recorded in hospitals all over the world and has produced a few worldwide epidemics, making it the most common cause of nosocomial infection. Kilned (Kilned, 2010.)

CA-MRSA was initially detected in a community without a substantial link to hospitals or other health care facilities in the mid-1990s. Community-acquired MRSA is the name given to this new type of MRSA infection. CA-MRSA isolates were afterward extensively reported around the world. (Kolendi, 2010.)

CA-MRSA and HA-MRSA, in general, have different high-risk populations and pathogen types. CA-MRSA strains have been found in hospitals, according to recent reports. (Kolendi, 2010.)

Here is table 1 which briefly described the differences between CA-MRSA and HA-MRSA.

Table 1. Differences between CA-MRSA and HA-MRSA (Kolendi, 2010.)

Characteristic	CA-MRSA	HA-MRSA
At-risk populations	Children, athletes, prisoners, soldiers, selected ethnic populations (native American, Alaskan natives, Pacific islanders), intravenous drug users, men who have sex with men	Outbreaks are healthcare-associated* (will describe in the following chapter)
Clinical infections	Skin and soft tissue infections (furuncles, skin abscesses); post influenza necrotizing pneumonia	Pneumonia, urinary tract infections, catheter-related or bloodstream infections, surgical sites infections
Underlying conditions	None	Healthcare-associated risk factors*
Age group	younger	Older
Race/ethnicity	Non-White	White
Chloramphenicol	Usually susceptible	Frequently resistant
Clindamycin	Usually susceptible	Frequently resistant
Toxin production	More	Less

Note: SCC: staphylococcal chromosome cassette; *: Isolation of MRSA ≥ 2 days post-hospitalization; history of hospitalization; surgery; dialysis; residence in a long-term care facility; permanent indwelling catheter or percutaneous device; previous MRSA isolation.

4.3 Signs and symptoms of MRSA

MRSA is a type of staph infection. There are similar signs and symptoms of MRSA and other types of staph infections. Infection areas may be red, swollen, pus-filled, extremely painful, warm to the touch, or even a combination of these symptoms. Chills, headaches, joint pain, low blood pressure, and a rash covering most of your body are other possible symptoms. MRSA skin infections can appear everywhere on the body, although they're most frequent on the back of the neck, legs, groin, and buttocks. Fever may develop, and the infection may spread from the original site as the infection progresses. If not treated promptly once symptoms appear, the infection can grow into deep, painful abscesses that require surgical drainage or possibly subcutaneous tissue resection at the infected site. A person with pneumonia who has been infected with MRSA may feel shortness of breath, fever, and cough. These signs and symptoms demand prompt medical attention since MRSA can be an invasive infection that can affect any organ of the body or the bloodstream. Jacob (Jacob, 2014.)

4.4 Risk factors for HA/MRSA and CA/MRSA

Patient-level indicators such as previous hospitalization, recent antimicrobial therapy, indwelling vascular devices, prior invasive or surgical procedures, and hospital-level incidences are all risk factors for MRSA. Many MRSA cases in hospitals have been linked to hospital size. MRSA bacteremia infections are more common in the elderly and individuals with chronic illnesses. Gibbons (Gibbons, 2016.) Patients who have MRSA colonized when hospitalized are more susceptible to MRSA infection. "Hospital procedures like intravenous infusions, urinary catheterization, and surgery are entry points for the MRSA bacterium, allowing it to reach inside the body and potentially cause a life-threatening infection." (Nazarko, 2014.) MRSA can also be discovered on hospital bed linens, bathroom fixtures, toilet bowls, and medical equipment including stethoscopes and blood pressure cuffs. Doctors, nurses, and other

hospital workers may also have it on their hands or fingernails. 2017 (CDC). Recent hospitalization, a surgical emergency, a stay in a long-term care facility, any form of an indwelling catheter, prior antibiotic use, an immunocompromised state, or intravenous drug use are all possible risk factors (Ayliffe 1996, Kolendi, 2010.) A healthy person with unblemished skin and no cuts is less likely to get MRSA, but any direct touch with the infection can spread it. Longer stays in hospitals or care facilities, along with a weakened immune system and the use of invasive medical equipment, can increase the risk of getting MRSA. (Romero and colleagues, 2006.)

Young children, day-care attendees, convicts, men-men sex, HIV infection, athletes, homeless, and IV drug users, tattoo recipients, and certain ethnic populations (Native Americans, Alaskan natives, Pacific islands) are all at risk for CA-MRSA. (Manal et al., 2010; Kolendi et al., 2010).

The "MRSA residents," according to the author's experience and information from registered nurses in nursing homes (Kustaankartano ward F, Katriinansairaala in MRSA infection ward, MRSA infection ward in Hospital Mohammed 5 in Rabat Morocco), are those who became infected with MRSA and were diagnosed in hospitals. MRSA testing is rarely done in nursing homes, especially in high-risk groups. The explanation behind this remains unknown. In practice, nursing homes do not do a thorough risk assessment for MRSA.

There have been reports that livestock-associated MRSA CC398 has been identified. CC398 is usually found in pigs, poultry, and cattle, but it can also infect or colonize horses, dogs, and humans. (Cuny, 2013.)

4.5 Colonization

MRSA colonization reveals MRSA bacterium carriers who are not infected with the germs. The main reservoir locations, according to popular belief, are the anterior nares. After nasal colonization, skin infections are common. According

to studies, if a nasal carrier is treated, infections in other parts of the body usually clear themselves. When colonization is removed, the chance of infection is lowered as well. (Kolendi, 2010.) However, research shows that skin-to-skin and skin-to-fomite contact is more essential than nasal colonization in CA-MRSA infections. Studies on CA-MRSA athlete teams show that their colonization sites are greater in the axillae, inguinal, and rectum, and rarely in the nares. Their illnesses looked to have been caused by contact with damaged skin or infected objects. (Kolendi, 2010.) Pathogens of S. aureus cause skin infections and possibly septicemia. Pneumonia, urinary tract infections, sepsis, and surgical wound infections are also common HA MRSA infections. CA-MRSA, on the other hand, mainly infects the skin and soft tissues. CA-MRSA strains are mainly identified on skin or soft tissue infection sites, whereas HA-MRSA strains can usually be isolated from blood, respiratory, and urinary tract secretions. (Kolendi 2010, Ayliffe 1996.

4.6 Diagnosis

The use of molecular-based screening technologies to diagnose MRSA has become the norm in recent years. "To assess whether an S aureus infection is MRSA, clinicians use a variety of routine laboratory procedures" (Jacobs, 2014.) MRSA screening is a policy in which patients admitted to a hospital are screened to see if they have MRSA colonization (Nazarko, 2014.) Many factors affect MRSA diagnosis, including clinical presentation/symptomology, laboratory test methods (blood culture, molecular tests, or agglutination tests), and the relative strength and limitations of the tests used. Real-time PCR (polymerase chain reaction) is becoming the tool of choice to help doctors comprehend MRSA and S. aureus infections and guide patient therapy. It is generally faster and more accurate than previous approaches such as culture. (Gibbons and colleagues, 2016.)

The CDC recommends that clinicians consider MRSA in the differential diagnosis of purulent skin and soft tissue infections (SSTIs) that are compatible

with S. aureus infections (fluctuant or palpable fluid-filled cavity, yellow or white center, central point or "head," draining pus or pus that can be aspirated with needle or syringe). The presence of a "spider bite" as a presenting ailment should increase suspicion of an S. aureus infection.

The KeyPath MRSA/MSSA Blood Culture Test, a phenotypic test of cefoxitin susceptibility and resistance, was authorized by the FDA in 2011 as a rapid-detection tool. With 98.9% and 99.4% accuracy, the KeyPath test can identify between MRSA and MSSA in a blood sample within 5 hours after bacterial growth is first observed in the sample. When done correctly, the Mueller-Hinton agar plate supplemented with oxacillin, the latex agglutination test for PBP2a, and the cefoxitin disk screen test can detect MRSA. Microbiological testing for MRSA includes the cefoxitin disk test as extra verification. In recent years, molecular-based screening technologies have become the gold standard for detecting MRSA. The mecA gene is isolated using polymerase chain reaction in molecular nucleic acid amplification testing procedures (PCR). Clinical signs and laboratory tests are important in accurately diagnosing MRSA, however, the most reliable and fastest method is Real-Time PCR. (Jacobs, 2014.)

Smearing; The clinical microbiology laboratory has been asked to screen the samples for MRSA. Nasal swabbing is done by spinning a cotton swab in both nostrils and dipping it into the enrichment broth or the transportation culture tube. (2017, Vuopio.)

4.7 Complications

MRSA can cause relatively harmless colonization, but it can also cause life-threatening infections like septicemia and pneumonia. Nazarko (Nazarko, 2014). Methicillin-resistant S. aureus can cause serious bloodstream and bone infections (Romero et al, 2006). MRSA is one of the bacteria classified as "flesh-eating," however it does not eat the flesh of infected people; instead, it produces and emits toxins that damage diseased tissue. The medical illness is necrotizing fasciitis (NF), which is a severe bacterial infection of the fascia that results in

significant tissue death. NF is a rare but deadly bacterial infection caused by group A streptococcus, Klebsiella, Clostridium, E Coli, S aureus, and Aeromonas hydrohila. MRSA has been linked to the development of necrotizing fasciitis (NF). Even though MRSA is not the most prevalent cause of NF, the majority of cases are caused by group A streptococcus bacteria entering the body through a skin break. MRSA can cause pneumonia if it infects the lungs. (Jacobs, 2014).

MRSA is the most prevalent pathogen for ventilator-associated pneumonia and surgical site infections. It is the causal organism in 7.4% of central catheter-associated bloodstream infections (CLABSIs) in critical care patients (Holt, 2016.).

4.8 Treatment

Delaying treatment or detection of MRSA might result in the carrier's suffering or even death. There are a few antimicrobial medications available to treat MRSA, ranging from mild to severe invasiveness, such as the antibiotic group clindamycin, doxycycline, and tigecycline. These antibiotics, on the other hand, may induce adverse effects or have substantial contraindications. Clindamycin and gentamicin are usually effective against CA-MRSA isolates. (Thompson & Workman, 2014.)

MRSA decolonization begins with several treatment techniques soon after diagnosis. The first step is to admit the MRSA-positive patient to an MRSA (infectious disease control) unit; many hospital districts have their own MRSA infection control unit. If the requisite units are unavailable, MRSA treatment-seeking patients should be segregated from individuals who aren't colonized with the illness until negative test results are obtained. The isolation process is called contact isolation. Secondly, the decolonization process consists of a five-day series of daily whole-body washing with cyldimonium chloride, mupirocin (nasal ointment) 2 times per day, and Corsodyl mouth rinse (chlorhexidine gluconate 0.2 %, undiluted) 10 ml per day will be started. If a patient's condition worsens despite antibiotic treatment, the causal bacterium could be resistant to

the present antibiotic. Laboratory findings, particularly the white blood cell count, should be connected with the patient's clinical state. The fact that the white blood cell count has decreased does not automatically mean the antibiotic is working. Unless the illness is serious or numerous sections of the body are severely infected, antibiotics will not be started at this stage of treatment. At this stage of therapy, it's critical to pay attention to the patient's overall hygiene, such as changing the bedding daily and properly cleaning the patient's room. Following discharge and therapy, the patient is required to have a series of swab tests every three months (1st, 3rd, 6th, and 12th). The final follow-up is 12 months following discharge. To complete the treatment, all swab tests should return negative findings. Any positive results from those four tests will result in a new treatment cycle. (Kohler et al., 2012.)

To stop MRSA from spreading, the CDC advised evidence-based infection control methods. Chlorhexidine gluconate (CHG) baths have been demonstrated in multiple trials to reduce MRSA infection rates by lowering the skin's bacterial burden. CHG is a topical antiseptic that is effective against a wide range of microorganisms, both gram-positive and gram-negative. The therapeutic response of patients with bacteremia or other serious infections caused by MRSA must be evaluated. Before blood cultures confirm MRSA eradication, it may take up to a week after starting therapy with appropriate antibiotics. (Holt, 2016.)

Glycopeptides, vancomycin, and teicoplanin, sometimes in combination with rifampicin, are the mainstay treatment for severe CA-MRSA/ HA-MRSA infections. The European Medicines Agency has approved the use of daptomycin for complex skin and soft tissue infections in which MRSA is suspected since it has shown to be as effective as vancomycin in treating MRSA infections. (Kolendi, 2010.)

4.9 Wound Care

Patient-related factors, wound-related factors, healthcare practitioner expertise, resources, and treatment factors all have an impact on wound healing. Milne (Milne, 2017.)

MRSA-caused wounds may be initially red or infected, It may then progress to an open, inflammatory skin region. It may seem like an abscess, painful, and swollen in some cases. Pus drains from the abscess when it is sliced open or spontaneously bursts apart. Fever and illness may occur if the infection is severe or has the potential to spread into the bloodstream (bacteremia). (Thompson & Workman, 2014). Infected wounds provide ideal conditions for germs to thrive. Because MRSA and surgical wounds are directly proportional, wound care can be handled in accordance with therapy and prevention when nursing interventions are employed to help lessen the spread of CA-MRSA/HA-MRSA. MRSA skin infection can be spread through physical contact, such as lesions when there is an opening in the tissue (Jacobs, 2014.)

Many wound care guidelines now emphasize the importance of considering a variety of therapies. Exudate clearance, proper hydration, and tissue protection are just a few of them. These guidelines apply to the treatment of MRSA-infected wounds as well. For decades, medical honey has been used to treat a variety of wounds. Although comb honey has antimicrobial qualities, it is crucial to remember that medical honey is subjected to filtration, radiation, and a set of hygienic tests. "Manuka honey, which is made by honeybees eating nectar from the New Zealand flowering plant Leptospermum scoparium, has been proven to be the most effective in treating MRSA because it retains its antibacterial activity while being free of hydrogen peroxide. (Jacobs, 2014.) Polyhexal wound foam dressing also exhibited antibacterial capabilities against MRSA, limiting bacterial growth in other parts of the wound while maintaining adequate moisture levels. Because MRSA reproduces at an exponential pace, Polyhexal foam dressing helps to keep the exponential rates in check. On the other hand, a polyhexal foam dressing could be applied to an infected site to prevent infection and the spread of new colonies. Foam dressings could also be used in

conjunction with silver-based antimicrobial treatments, as silver possesses antibacterial properties. However, there is only a little research on its application. Exudates cleared out quite easily from the wound due to silver's ionization property to water, which is a well-known property of silver-coated dressings. (2009, WOUNDS.)

Image 1infected wound (source: CDC image of MRSA wounds in public domain)

The photograph depicted a cutaneous abscess on the foot post packing (front view), which had been caused by methicillin-resistant *Staphylococcus aureus* bacteria, referred to by the acronym MRSA.

5 MRSA INFECTION CONTROL

Residents, workers, visitors, and relatives are all at risk of contracting MRSA if an effective infection control policy is in place. The goal of infection control is to keep MRSA from spreading from healthcare staff to patients and residents. All members of the healthcare team are responsible for preventing infection, and they must follow the rules provided. (Office of Public Health, 2008; Coia, 2006.)

5.1 Admission to LTCF

Long-term care facilities, or LTCFs, include nursing homes, rehabilitation centers, inpatient psychiatric facilities, and long-term chronic care hospitals. If the LTCF is able to address the resident's medical needs, it should not refuse to admit an MRSA colonized or infected resident. Visitors and new personnel should be given some symbols by LTCF to indicate that the resident is under contact isolation. The emblem can be a picture or phrase that is placed on the room's door without invading the resident's privacy. (APIC, 2009. Office of Public Health 2008.)

MRSA risk assessment is necessary to determine the amount of risk in a particular facility or at home and to limit the danger of MRSA transmission. There is still no specific or detailed MRSA risk assessment table available today. The risk assessment should theoretically contain the resident's factors as well as statistics about MRSA prevalence in various facilities, communities, states, and countries. (APIC, 2009.)

Big data, on the other hand, is yet unavailable, but individual factors can be collected: Disease severity; aging; underlying diseases (diabetes, kidney disease, vascular disease, immune system disorder, dialysis); Prior systemic antibiotic treatment; previous hospital or clinic experiences; IV treatment or drug use; broken skin (pressure ulcers, surgical wounds); permanent indwelling catheter or percutaneous device; previous MRSA colonized or infected history (APIC, 2009.)

Furthermore, proper room organization is critical in preventing MRSA transmission: here are some basic principles described and advocated by the Office of Public Health: If possible, an MRSA colonized or infected individual should be assigned a private room. An MRSA resident can, if necessary, share a room with another SCC colonized or infected resident, or at least, share a room with another resident who has unbroken skin and no "tubes" (low MRSA risk). Residents with MRSA colonization or infection should not be housed with

residents who have another antibiotic-resistant organism, such as another SCC MRSA or an ESBL (Office of Public Health, 2008.)

5.2 Standard precaution

A method consisting of a succession of infection prevention procedures is known as a standard precaution. The plan includes the most important aspects of universal precautions and body substance isolation. It is predicated on the belief that patients' blood, body fluids, secretions, and excretions (excluding sweat) are all contagious and must be segregated, regardless of whether there is significant blood contamination or whether patients' broken skin or mucous membranes will be in touch. (APIC, 2009.)

The purpose of standard precaution is to prevent infection transmission in the facility, benefiting all participants, including employees, residents, relatives, and visitors. "Standard Precaution protects residents by ensuring that contaminated hands and equipment are washed and/or disinfected prior to use," or, to put it another way, standard precaution protects residents from medical treatment and nursing. Standard precaution, on the other hand, "protects facility employees by ensuring that personal protective equipment (PPE) is always accessible when contact with blood or body fluids is anticipated," or to put it another way, standard precaution protects staff against infection sources. (APIC, 2009.)

Staff must perform standard precautions whenever they are exposed to residents' blood, all body fluids (sputum, urine, feces; sweat is not included), broken skin, or mucous membranes (APIC, 2009.)

An example of a standard precaution is hand hygiene, personal protective equipment, management of contaminated equipment and environments, and proper injection practices (APIC, 2009.)

In the parts that follow, proper hand hygiene and treatment of contaminated equipment and the surroundings will be emphasized. Gloves, masks, gowns,

and eyewear are examples of personal protective equipment (PPE). Before exiting the resident's room, PPE should be removed. To avoid the risk of unnecessarily contaminating the environment, employees should be taught how to properly remove and put on PPE (Image 1). Following the removal of PPE, hand hygiene should be undertaken. (World Health Organization, 2008; APIC, 2009.)

Image 2. How to Put on and Remove PPE (WHO 2008)

Hands: There are two options for hand disinfection. Between resident encounters, waterless hand disinfection should be undertaken, with the disinfectant containing at least 60% alcohol. Hands should be washed with soap and running water if they are filthy or if they have been exposed to bodily fluids. (U.S. Department of Health and Human Services, Office of Public Health, 2008.)

Gloves: When working with bodily fluids, broken skin, or mucous membranes, disposable gloves must be worn. The task demands determine whether sterile or non-sterile gloves are used. To avoid unwanted contamination, pay close attention to how much you touch things. Hands should be kept away from one's face while wearing gloves. Broken gloves should be thrown away. (APIC, 2009. Office of Public Health, 2008.)

Masks, Eye protection, or Face shields: These are to be used when expose to potential splashing body fluids or blood (Office of Public Health, 2008.)

Gowns: Gowns are to be worn to protect the garments of workers from contamination, such as during bathing or contact isolation. Before leaving the resident's room, the gown should be removed and disposed of. (APIC, 2009. Office of Public Health, 2008.)

Linens: While individual linens can be handled, all linens in the facility must be treated as if they were potentially infected. If the linen is wet (due to water, pee, or faces), place it in a plastic bag. The traditional concept of "isolation linen," which meant collecting and handling linen separately based on the diagnosis of the resident, was no longer used. (U.S. Department of Health and Human Services, Office of Public Health, 2008.)

Respiratory etiquette: To prevent respiratory secretions, cover the mouth and nose with a tissue while coughing or sneezing, according to the "2007 guideline for isolation precaution." After coming into contact with secretions, wash your hands. (APIC, 2009.)

5.3 Contact isolation

The most common way for MRSA to spread is through contact. As previously stated, contact-borne spread involves both direct and indirect transfer. Infections produced by direct contact with contaminated skin or bodily fluids are known as direct transmission. Indirect transmission occurs when a person comes into contact with a contaminated object or environment, such as the

hands of a caregiver. When there are MRSA reservoirs in a facility, contact isolation is an important additional measure. (APIC, 2009.)

MRSA infection and colonization are on the rise in non-acute healthcare settings, including nursing homes, according to data. In these settings, patient management differs from that in hospitals; the danger of invasive infection is reduced, but the environment and activities are more complicated. (National clinical effectiveness committee, 2013.) (Kolendi, 2010.)

As previously stated, MRSA is disseminated primarily through direct or indirect contact; airborne transmission is rare but has occurred due to droplets. "Droplets ejected during coughing, sneezing, or talking by an MRSA-infected or colonized resident may carry MRSA," "respiratory drops can expose individuals and environmental surfaces within three feet of the coughing person to an infectious agent in the droplets." When working within three feet of an MRSA-infected resident with respiratory illnesses, personnel should wear a mask. (APIC, 2009.)

LCT facilities should develop MRSA management policies on the basis of the following factors, the facility's MRSA risk assessment and surveillance, evidence-based practice guidance, and state regulations. (APIC, 2009.)

Before contacting an MRSA resident, non-sterile disposal gloves should be worn. If the gloves become filthy, they should be removed before leaving the resident's room or contacting a clean object. After removing gloves and performing hand hygiene, make sure your hands do not come into contact with any possibly contaminated items. (U.S. Department of Health and Human Services, Office of Public Health, 2008.)

Hand washing and hand disinfection: As previously stated, hand washing should be done with soap and running water, and hand disinfection should be done with a disinfectant containing at least 60% alcohol. Before exiting the room, take care not to touch any environmental surfaces. (U.S. Department of Health and Human Services, Office of Public Health, 2008.)

Gowns: Disposable gowns should be worn whenever there is physical contact with MRSA residents, such as when showering, washing in the morning, changing diapers, or changing wound dressings. A gown should be worn before entering or immediately leaving an MRSA-infected resident's room and should be removed and discarded before leaving the room. (U.S. Department of Health and Human Services, Office of Public Health, 2008.)

Masks: Masks should be worn to avoid being exposed to splashing body fluid, such as from an uncontrollable cough. If only the ties and straps are touched, the mask and facial protection can be safely removed. When working within three feet of an MRSA-infected resident with respiratory illnesses, a mask should be worn. (APIC, 2009, Office of Public Health, 2008.)

According to the 2008 LTCF guidance, "dedicate the use of personal, noncritical medical equipment, such as thermometers and blood pressure devices, to the resident with MRSA whenever possible." "If common equipment must be used, it must be disinfected between residents using a facility-approved product." (APIC, 2009. Office of Public Health, 2008.)

Cleaning and disinfecting the environment: The contaminated environment of MRSA residents should be cleansed and disinfected regularly, at least daily. Close environments (bed rails, over-bed tables, bed tables, etc.) and often touched things (door knobs, toilet, walker, etc.) are examples of contaminated environments. (Office of Public Health, 2008.) (APIC, 2009.)

Before Leaving Your Room: If an MRSA-infected resident has issues controlling secretions, such as uncontrollable coughing, make sure that mobility and transportation are limited; nonetheless, try to limit the number of times they leave their room. When an MRSA-infected patient must leave his or her room, make careful to wash hands, change into clean clothes, and cover wounds safely. If an MRSA-infected resident requires transportation, such as to another department or to see a doctor, attention should be made not only to hand cleanliness, clean clothes, and well-covered wounds but also to avoiding contact with potentially contaminated surfaces and wearing adequate PPE. (APIC, 2009.)

Residents in nursing homes should be treated and respected as if they were at home. It is not necessary to prohibit participation in social activities. MRSA-colonized or infected resistants can participate in activities as long as all colonized or infected body locations (excluding nares) are securely covered and they practice excellent hygiene and hand washing. An MRSA nasal contaminated resident does not need to wear a mask when going outside or participating in activities as long as he or she can cover their nose and mouth when coughing or sneezing.

When coughing or sneezing, residents with MRSA colonization in sputum don't need to wear masks if they can cover their lips and nares with a tissue. If they have uncontrollable coughing sg, such as pneumonia or bronchitis, they must wear a mask if they attend to go outside. Hand washing is critical for those residents, particularly after coughing or sneezing. It is the nurses' job to teach or assist residents who lack sufficient understanding or capacity to undertake proper hand washing or hand hygiene. (U.S. Department of Health and Human Services, Office of Public Health, 2008.)

5.4 Environmental and Equipment Cleaning and Disinfection

MRSA prevalence and risk factors in nursing homes have yet to be defined and proven. MRSA, on the other hand, has been shown to survive 1-56 days in ordinary hospital materials, such as a plastic patient chart, laminated table top, and a cloth drape, according to hospital-based studies. (APIC, 2009)

MRSA risk factors have yet to be proven in nursing homes, but the following elements may increase the importance of environmental factors in MRSA transmission: Nursing home residents survive longer than hospital patients; periods of stay in nursing homes are recorded in months or years, whereas hospital stays are measured in days or weeks. Rarely a separate room (unproven); residents are allowed to move about the department; Contamination risks are numerous and difficult to assess and manage. (APIC, 2009.) A study (3/26 in ICU) found substantial evidence that patients can acquire MRSA from a polluted environment. MRSA was isolated in every

environmental sample, according to the same study. MRSA was isolated from 73 percent of MRSA-infected residents' rooms and 69 percent of MRSA-colonized residents' rooms in separate research. Both investigations revealed that MRSA-infected or colonized people’s mediate environment would become contaminated and a source of transmission. (APIC, 2009.)

As a result, an adequate environmental cleaning and disinfection plan is a critical component of the infection prevention process. The cleaning of patients' care areas is usually delegated to skilled environmental professionals in most healthcare facilities. Specific care workers should be clearly assigned if trained environmental staff is not available. (APIC, 2009.)

If a resident is on contact isolation, cleaning and disinfection should be done often. "Bed rails, light switches, over-bed tables, bedside commodes, bathroom fixtures in the resident's room, doorknobs, any equipment in the immediate area of the resident, and any equipment that is multi-use between residents are examples of areas that require more frequent, effective cleaning and disinfection. (APIC, 2009.)

During the evaluation of environmental control quality, an appropriate monitor would be beneficial. A standardized environmental cleaning checklist can serve as a tool for quality assurance while also serving as a guide for new employees. (APIC,2009.)

5.5 Terminal Cleaning and Disinfection

The room, cubicle, and bedside equipment of patients on Transmission-based Precautions are cleaned using the same procedures used for patients on Standard Precautions, unless the infecting microorganism(s) and level of environmental contamination indicate special cleaning, according to the concept of terminal cleaning. For certain pathogens, particularly Enterococci, which can survive inanimate environments for long periods, adequate disinfection of bedside equipment and environmental surfaces (i.e., bedrails, bedside tables,

carts, commodes, doorknobs, faucet handles) is recommended in addition to thorough cleaning. (APIC, 2009.)

Furthermore, even though it has not been precisely described or shown, curtains, particularly privacy curtains, that surround MRSA residents' beds are likely to be contaminated and become a source of infection and should be handled with caution. (APIC, 2009.)

5.6 Conflict between Nursing Principle and Environment

Nursing homes are special care facilities where people live as if they were in their own homes, with nurses providing the necessary support during daily care but also allowing residents to "live a normal life" to the extent possible. Residents can choose their own lives and interests, making it impossible for nurses to care for them in a "healthy to infect" order (WHO, 2012.) Trying to keep a severe Alzheimer's patient away from an MRSA patient may be impossible. It is challenging to maintain proper nourishment for a resident with a poor appetite (WHO, 2012.) A large proportion of practical nurses lack the theoretical knowledge of MRSA that is required, such as risk assessment, MRSA resident placement, suitable PPE removal procedure, poor hand hygiene compliance, inability/awareness to recognize new infections, and so on. Lack of concern, overwork, a shortage of permanent personnel (a severe problem in most private and/or public nursing facilities), and being temporary workers (free regular continuing education is only available to permanent workers)

Hundreds of papers and tens of books were assessed during the elimination process. Some of the articles and books were out of date and needed to be replaced. As a result, 319 correctly related studies were presented. There were 23 completely cited articles and abstracts available out of 319 total publications. Some of the responses were not well-connected to the subject.

6 PREVENTIONS OF MRSA

No other healthcare practitioner spends as much time face to face with patients as nurses, who come into close contact with bodily fluids and undertake intimate operations. The amount of time spent with a patient is determined by the practice area (nursing homes and hospitals) and the severity of the patient's needs. To protect nurses and their patients against diseases spread by body fluids, standard precautions apply to contact with blood and other body fluids, secretions and excretions, non-intact skin, and mucous membranes.

Nurses are taught these techniques in accordance with the three types of transmission-based precautions: airborne precautions, droplet precautions, and contact precautions.

The importance of hand washing in avoiding infections, as well as barrier protection, are among the conventional precautions (gloves, gowns, etc.) the correct management of potentially infectious waste materials, and the safe disposal of sharps (Stirling et al, 2004.)

It is everyone's job to keep MRSA at bay. Furthermore, healthcare workers, their families, and friends all play an important role in preventing MRSA from spreading. MRSA can be prevented by practicing proper hand hygiene and following internationally known wound care procedures. (Thompson & Workman, 2014.)

A virus, bacteria, parasite, or another pathogen, as well as a vulnerable host and a favorable environment, are required for infectious disease transmission. Age, gender, socioeconomic level, and lifestyle choices are among the host characteristics that determine a person's susceptibility. Climate, sanitation, the presence of vectors, and elevation are all factors that influence susceptibility. (Stirling and colleagues, 2004.)

Before beginning any operations, nursing interventions medical procedures, make sure to clean your hands with soap, water, and an alcohol-based hand

disinfectant. In addition, before and after interaction with any patient, medical professionals should apply an alcohol-based hand disinfectant.

If a patient has been diagnosed with MRSA, it is ideal to allocate them to a single room with a bathroom, while two MRSA patients may share a hospital room in some situations. It is critical to treat MRSA patients with dignity and empathy when treating them. However, before entering the infected patient's room, healthcare providers must remember to take precautions such as hand cleaning, and running gloves, masks, and gowns. When leaving the room, the above-mentioned garments should be removed, and the hand hygiene procedure should be followed according to hospital rules. Visitors and immediate family members should dress in the same manner as the staff. (World Health Organization, 2012.) MRSA patients should stay in their rooms to avoid spreading the illness to other patients with weakened immune systems. They may, however, be transferred to different treatment or testing units as needed. While transferring MRSA-infected patients to other units, it is critical to give a confidential oral and written medical history that includes the patient's illnesses. (CDC, 2017.)

It's critical to educate patients on how to prevent MRSA from spreading to others. MRSA can spread to others if you don't wash your hands. Except for Clostridium difficile-associated diarrhea, hand washing is preferred, but alcohol-based gel hand sanitizers are equally beneficial.

To prevent the bacteria from spreading, patients should cover all draining wounds. Because patients typically have some form of long-term venous access, such as a peripherally implanted central catheter, they and their families should be educated on correct catheter care and aseptic technique before, during, and after each antibiotic delivery. Patients should be informed about the signs and symptoms of infection at the catheter site, as well as how to contact their healthcare practitioner if an infection occurs.

Patients and caregivers who assist with wound dressing changes must wear gloves and immediately wash their hands afterward. The patient's family should be reminded not to share personal or hygiene products with him or her.

Nurses should promote frequent disinfection of surfaces with disinfectant products that the MRSA-infected patient has come into contact with. For 10 minutes, the cleaning agent must be in contact with the contaminated surface. Clothes and linens should be washed on a regular basis. Clothing and bed linens should be cleansed daily if wound drainage is present. Patients with active MRSA infections should also refrain from participating in contact sports and exercising at public facilities such as gyms until their health care practitioner has cleared them. (Holt, 2006.)

MRSA eradication strategies are followed in many hospitals, therefore regular MRSA screening tests are performed on every patient admitted to a hospital, particularly in ICU wards. Swabs are obtained from the mucus in the nose and the groin. When the measure is implemented, the prevalence, transmission, and infection to another patient may decrease. (Thompson & Workman, 2014.)

6.1 Standard hand hygiene

The World Health Organization (WHO) and the Centers For Disease Control And Prevention (CDC) produce the most authoritative hand clothes and linens should be washed on a regular basis. Clothing and bed linens should be cleansed daily if wound drainage is present.

The five moments of hand hygiene, according to a WHO guideline, are: before touching a patient/resident, before a procedure, after a procedure or danger of exposure to body fluids, after patient contact, and after contact with patient surroundings. Palm to palm, between fingers, back of hands, the base of thumbs, back of fingers, fingernails, and wrists are the seven essential aspects of hand hygiene. Waterless hand disinfection and hand washing with soap and running water are the two options for daily nursing. Between resident

encounters, waterless hand hygiene with alcohol/hand rub (disinfectant must contain at least 60% alcohol) should be conducted. When hands are filthy, after dealing with body fluid-exposed jobs, and after using the restroom, hand cleaning with soap and running water is recommended (Office of Public Health, 2008, APIC, 2009, WHO, 2009.)

Image 4. Steps of Hand Disinfection / Handrub (WHO 2009)

6.2 The Importance of Hand Hygiene

Hand hygiene is the cornerstone of any infection control program, and it plays a critical role in preventing infection transmission and outbreaks. (APIC, 2009.)

It is the responsibility of personnel to maintain the implementation of good hand hygiene, according to the "CDC guideline for hand hygiene in healthcare settings, b2002": All ranks of healthcare workers are included; Request that guests wash their hands before entering and leaving a resident's or patient's room; When there's a chance you'll be exposed to blood or bodily fluids, put on the right protective gear. After a procedure, when going from a dirty location to a cleaner one, and before caring for another patient/resident, remove gloves. After removing gloves, before and after interaction with a patient/resident, and before and after contact with the patient's surroundings, do hand hygiene. (APIC, 2009.)

It has been proven that good resident compliance with hand hygiene can significantly reduce MRSA transmission. When tenants' hands are contaminated by other residents or the environment, resident hand hygiene should be emphasized. (Apic, 2009.)

It's possible that visitors don't have the necessary information and awareness about hand cleanliness. Hand hygiene signs and images should be plentiful, apparent, and straightforward in all sectors. (APIC, 2009).

6.3 Compliance with Hand Hygiene in Nursing Homes

A qualified literature review published in 2015 looked at 56 studies on the topic of hand hygiene in nursing homes and found that the effectiveness of hand hygiene in nursing homes has yet to be adequately demonstrated, and hand hygiene compliance remains poor. The same article also stated that, despite the fact that the number and quality of research are improving, only 25% of randomized studies found a good result for hand hygiene intervention, implying that additional evidence is still needed. (Hocine et al., 2015).

Another observational practice study, titled "the impact of isolation on healthcare worker contact and compliance with infection control practices in nursing homes," was published in 2018 and had trained researchers to observe healthcare workers in nursing homes to assess staff compliance with PPE and hand hygiene while caring for residents in contact isolation. The study lasted 15 months, 999 hours, and a total of 4325 visits were recorded. As a result, "for residents in isolation, compliance was 34% for gowns and 58 percent for gloves, and for health care personnel, compliance was 45 percent versus 44 percent on admission and 66 percent versus 55 percent on exit for isolation and non-isolation rooms," according to the study. As a result, compliance with gowns and gloves is poor, as is compliance with hand hygiene. (2018, Pineles.)

7 PATIENT EDUCATION

Skin infections, as well as the signs and symptoms to look for, as well as preventive measures, must be educated to health care staff and patients no matter whether they are at home, in a nursing home, or in LTCF. Hand cleaning, wearing gloves, and decontaminating linens and surfaces are all standard steps to take. Patients should also be taught proper hygiene methods, such as how to wash their hands. Because MRSA is spread through direct physical contact with human hands, it's critical to demonstrate proper hand washing techniques. Following the CDC's recommendation of at least 20 seconds spent washing hands, the demonstration can be repeated by the patient, which will allow the healthcare provider to correct any errors made by the patient.

Patients should be taught not to share personal goods (razors, toothbrushes, or towels) with friends and family members, as well as how to cover wounds and sanitize equipment with an antibacterial washing agent between usage. All of the components that contribute to infection reduction and prevention are covered skin lesions. Patients and their families should be informed about the risk factors for MRSA as well as how to detect the signs and symptoms of

MRSA, such as redness, swelling, tenderness, pain, fever, and pus, so that prompt medical attention and treatment can be sought as soon as these signs are noticed. (Romero and colleagues, 2006.)

Patient education is an important factor to consider when treating MRSA infections. Nurses should educate patients and caregivers/family members about standard precautions, which are evidence-based guidelines for patient management in hospital facilities, in order to reduce the spread and transmission of MRSA. During hospital visits, family members should wear personal protective equipment (gloves, gowns, or masks) to reduce the spread of MRSA through person-to-person contact. (Noble, 2009.)

Preventative patient education should include proper hand hygiene (washing hands with soap and water; antibacterial/alcohol-based hand sanitizers are preferred), skin hygiene (washing with water and covering wounds or non-intact skin with bandages and wound dressings to avoid exposure to bacteria), and pain management. It is critical to maintaining one's health, which includes adequate eating, exercise, quitting smoking, and maintaining a healthy immune system by avoiding stress and relaxing.

Effective patient and family education should include verbal explanations of important MRSA information to increase their awareness of the infection, the reason for contact isolation to reduce anxiety about isolation in patients and their families, standard precaution, and the reason for personal protective equipment (PPE), as well as demonstrations of the standard precaution and how to wear personal protective equipment to patients' families during their stay. The use of CDC videos and brochures, hand washing posters, and MRSA leaflets can boost compliance to successful infection prevention and MRSA management techniques, reducing MRSA bacterium transmission dramatically. (Romero and colleagues, 2006.)

8 ETHICS AND RELIABILITY

When preparing and conducting certain research, there were several ethical issues to take into consideration. Plagiarism is prevented by ethics in general, and intellectual anonymity is maintained (Tenk, 2009.) Since this bachelor thesis will be completed by a literature review with a systematic approach, no interviews, observations, or questionnaires will be included in the data collection process. Any data that will be used in this BA thesis, will be cited as a reference according to the referencing guidelines of Turku University of Applied Sciences. This thesis, like every other thesis, has its own set of limitations. One of the disadvantages of this thesis was the lack of new articles on CA-MRSA, whereas there were numerous and more recent studies on HA-MRSA.

9 CONCLUSIONS

The following conclusion has been reached in order to stop the spread of CA-MRSA and HA-MRSA.

In-home care, homes, and hospitals, healthcare workers frequently come into touch with patients; therefore, thorough adherence to recommended safeguards is required. One cannot emphasize enough how important it is to practice good hand hygiene when treating CA AND HA infections and caring for MRSA-infected patients in order to prevent the spread of the infection to staff members and other healthy patients.

When coming into contact with contaminated surfaces and bodily fluids, gloves should be used, especially before and after making contact with patients. Another area that requires careful attention is wound care. Gloves should be changed frequently, and eye protection should be worn if droplets from the wound are possible.

The healthcare professional must inform patients and family members about safety measures and proper hand hygiene practices to stop the spread of MRSA in-home can-homecare’s.

The responsibility of healthcare professionals to effectively inform patients and families, particularly about accurate adherence to the antibiotic regimen, prompt identification of signs and symptoms, and asepsis during wound care and skin infections, promotes awareness and gives them the crucial information and knowledge they need to stop the spread of MRSA.

In order to stop the spread of MRSA into the community, patient and family education must continue after patients are discharged from the hospital.

The population as well as healthcare facilities like hospitals and long-term care facilities are at risk due to MRSA's ongoing development and presence.

As already said, hospitals serve as the foundation for the majority of MRSA management and preventive guidelines. MRSA regulations for long-term care homes have grown in recent years. However, there is currently a lack of trustworthy MRSA guidelines or nursing homes.

Compared to hospitals, nursing homes have a more complex atmosphere. Treatment of disease is the hospital's primary goal. In contrast, nursing homes provide support to maintain a good quality of life, well-being, and good life while still "being alive." as a result, social activities are significantly more prevalent in hospitals. Autonomy rights in particular are respected and safeguarded to a higher degree.

Nursing homes, however, do not strictly separate those for the elderly or those with impairments. The underlying disorders that affect nursing home residents vary, and the majority of them experience mental illnesses or physical disease symptoms concurrently. All of these things make it difficult to develop MRSA control in nursing homes.

In addition, there is still a colossal lack of MRSA research in nursing homes, particularly in the areas of MRSA risk assessment implementation, environment management, and worker compliance monitoring. These variables combined made it difficult to prevent MRSA.

This guide explicitly stated that MRSA residents had the right to engage in social events if they can maintain excellent hygiene. On the other hand, to ensure the employee's work is done correctly and safely, this guidance emphasized the significance of hand hygiene and the use of PPE.

10 DISCUSSIONS

The goal of this study was to understand more about Methicillin-resistant Staphylococcus aureus (MRSA) and how to prevent it from spreading. Nurses play a critical role in limiting the spread of community-acquired (CA-MRSA) infections and raising awareness about them. The study highlighted CA-significant MRSA consequences. In addition, the thesis covers the various ways in which the infection spreads as well as several approaches for preventing MRSA infection transmission. While dealing with the effects of MRSA, it's also necessary to consider the holistic approach to nursing care, which includes the emotional, social, and psychological aspects of the patient's life.

While this study was advancing our understanding as future nurses, we saw the importance of MRSA and the future issues that may arise if proper attention is not made to antibiotic abuse in nursing home care and non-septic hand hygiene. It is critical to correctly diagnose CA-MRSA in high-risk patients admitted to hospitals; early antibiotic susceptibility testing and blood culture screening should be performed to rule out the likelihood of contracting MRSA, particularly in patients undergoing surgical operations.

The first step in eliminating CA-MRSA and HA-MRSA for healthcare professionals and hospital facilities including nursing homes is to adhere rigidly to hand hygiene and surface/equipment decontamination measures (Jacobs, 2014.) "Control measures for hospital facilities include detecting patient lesions, isolating or cohorting infected patients, healing wounds with impermeable bandages, treating staff and patient carriers with antibiotics, and better hygiene." (Stirling et al, 2004.)

Fighting its spread should include treating and preventing any Community-acquired infection or hospital-acquired infection. Many hospitals and nursing homes have contributed their personnel and material resources to MRSA causes for this reason. Contrarily, inadequate patient education and inaccurate information on MRSA may result in prejudice and ignorance in society (Nazarko, 2014.)

Healthcare facilities as well as the general health public faced significant challenges as a result of the MRSA pandemic. There is no denying the patient's experience of stigma. The majority of stigmas result from ignorance and a loss of respect and dignity. Nurses should also try to uplift patients' spirits by encouraging them to adhere to the treatment plan and by protecting others. There should be more research done on CA-MRSA, as well as more research done on the psychological health of MRSA patients. (Skyman et al, 2017.)

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