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# Difference in Knowledge of MRSA Regarding Sophomore and Senior Baccalaureate Nursing Students

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Difference in Knowledge of MRSA Regarding Sophomore and Senior Baccalaureate

Nursing Students

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Department of Nursing

**Honors Research Project**

Submitted to

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## **Abstract**

### **Background**

The risk of infection by antibiotic resistant organisms is a common problem in hospital settings. Methicillin-resistant Staphylococcus Aureus (MRSA) is the most common type of resistant bacteria that can have serious consequences or even lead to death. Nurses' knowledge of how to prevent and treat this problem is essential for patient safety. The purpose of this study is to determine the differences in level of knowledge of MRSA in sophomore and senior level baccalaureate nursing students.

### **Methods**

This descriptive, comparative study will examine differences in knowledge of MRSA between sophomore and senior baccalaureate nursing students and determine if relationships exist between the knowledge scores and participant.

### **Findings**

The mean MRSA knowledge scores were the same between both groups at 43% correct. The demographic variables showed a weak positive correlation with the MRSA knowledge scores. The only variable that has statistical significance is whether or not the student is employed, whether it is in a healthcare setting or not.

### **Conclusions**

This study has revealed that the amount of MRSA knowledge does not increase as the student progresses through the nursing program. Regardless of the increased quantity of clinical hours, experience, and education provided, the knowledge level remains the same throughout the program. Adding increased education regarding MRSA may prove beneficial to the quality of nurses that the school produces.

Difference in Knowledge of MRSA Regarding Sophomore and Senior Baccalaureate  
Nursing Students

Worldwide, the number of infectious diseases has been rapidly increasing in healthcare facilities during the past decade (Rohde et al., 2012). One of the most common infectious diseases that healthcare facilities encounter is Methicillin Resistant Staphylococcus Aureus, or MRSA, which has serious consequences for susceptible patients. The Center for Disease Control (2012), reports that in the U.S., Methicillin Resistant Staphylococcus Aureus (MRSA) has exceeded the human immunodeficiency virus, or HIV, prognosis related to morbidity and mortality causes. This illustrates how serious the infectious disease problem of MRSA is, as well as how important education and improved practice is needed to stop the spread in both science and healthcare facilities. Staphylococcus Aureus is a penicillin-resistance, Gram-positive bacterium that developed a resistance to methicillin – a penicillin derivative or anti-infective medication. The resistance extends to similar antibiotics making this infective agent exceptionally difficult to treat (Banning, 2005). In addition, MRSA is easily spread through direct contact of skin (especially contact with any open wounds), as well as indirect contact with contaminated items such as bed sheets, blankets, and bathing towels (Banning, 2005). Because of the resistance of the infection and the effect on an individual's weakened immune system, additional safety concerns for patients has greatly increased over recent years.

Throughout the past few years there have been sizable improvements in the prevention and control of MRSA. However, it is still responsible for a considerable amount of morbidity and mortality in hospitals with patients that have weakened immune

systems (Gould, 2011). MRSA occurrence and spreading can be prevented by patient screening, healthcare provider screening, decolonization therapy, isolation rooms, decontamination of any equipment brought into the patient's room, as well as hand washing (Matouskova & Janout, 2008). The World Health Organization (2009) recommends hand washing and hand hygiene to be one of the most important preventative measurements when having contact with patients to prevent the spread of MRSA and other infectious diseases. This recommendation describes the role nurses, nursing students, and other healthcare professionals have in upholding in order to help promote the prevention of MRSA contamination.

Due to the increasing rate and ever-mutating characteristics of this disease that make it difficult to treat, nursing students need to be knowledgeable of MRSA transmission, as well as precautions to ensure the safety of patients, their families, and visitors. In almost all prevention techniques, education plays the main role in decreasing the growth and spread of infectious diseases such as MRSA (Rohde et al., 2012). A survey of 174 doctors and nurses from a variety of clinical sites indicated 68% of respondents agreed that education was a necessity in dealing with MRSA colonies, infectious processes, viral infections and outcomes, as well as MRSA treatment (Easton et al., 2007).

Although infection control is an integral part of all nursing curricula, little is known about nursing students' knowledge of MRSA or how the level of knowledge varies throughout the nursing program. An understanding of nursing student's knowledge level of MRSA as they progress through a baccalaureate program could help to identify gaps in curriculum and areas of needed improvement.

The purpose of this study is to determine nursing students' knowledge of MRSA prevention practices and to compare knowledge levels between sophomore and senior level baccalaureate students at an urban public university in the Midwest United States. Identifying the knowledge level of MRSA guidelines at two points in the nursing curricula will indicate the progression of acquiring knowledge, and provide evidence to evaluate curriculum effectiveness. In addition, this study will identify correlations between knowledge level and demographic variables in order to further clarify the results. This study will set out to answer the follow question: What is the difference in knowledge regarding MRSA in sophomore and senior baccalaureate nursing students?

### **Review of Literature**

#### **Knowledge about MRSA**

The lack of information concerning nursing student's knowledge regarding the infectious disease of MRSA in the literature is evident and is one of the factors driving the basis of this study. However, the literature does contain information related to general scientific knowledge of MRSA, infection control, transmission, treatment failure, as well as nursing and other healthcare professional's risks, perceptions, and attitudes. An overview of the 10 current, primary, research studies used in this review of literature can be found under Appendix D.

As previously stated, methicillin resistant staphylococcus aureus, or MRSA, is a penicillin-resistant, Gram-positive bacterium that developed a resistance to methicillin, a penicillin derivative, or anti-infective medication (Banning, 2005). The first antibiotic, penicillin, was developed in the late 1940's and towards the end of the decade, up to 50% of MRSA strains of infection had become resistant to it, and other multidrug treatments

(Matouskova & Janout, 2008). To prevent colonization, transmission, and spreading throughout patients in the hospital unit, initial findings of previously occurring infections in patients plays a primary role in stopping the spread of other possible pathogens (Kurlenda & Grinholc, 2010). Easton et al. (2007) reported statistics of 174 doctors and nurses in regards to their knowledge of MRSA. 83% of the responders correctly chose that Staph aureus is a Gram-positive bacteria. Additionally, 36% of nurses as compared to 30% of doctors were able to choose the correct anatomical sites for colonization, and 70% more doctors than nurses were not able to list infection control regimens for preventing the spread of the MRSA infection (Easton et al., 2007). This statistical information reveals that if healthcare professionals were more educated about infectious disease interventions, MRSA transmission and infection rates would decrease.

### **Nursing Risks/Perceptions/Attitudes**

Pedro, Sousa-Uva, and Pina (2014) discussed the valid responses from 139 nurses regarding their perceived attitudes and risks toward MRSA. In the responses, nurses stated that they abided by current guidelines and contact precautions related to entering and leaving a patients room; however, cleaning and decontaminating equipment used in patient room as well as explaining discharge information were less implemented and enforced by nurses (Pedro et al., 2014). Attitudes of nurses, as well as other potential healthcare professionals, will be influenced by the chance of risk, thus implying that if self risk and patient risk are well recognized, protective measures will be used in turn preventing cross transmission (Pedro et al., 2014).

### **Infection Control**

The prevention being sought is the basis for the MRSA infection control

measures. Infection control measures for MRSA have recently been focusing on hygiene in the healthcare environment (Easton et. al., 2007). Before infection control guidelines and protocols can be put in place, it is crucial that the site be identified in a timely manner. Guidelines can then be implemented to start treatment after identification of MRSA has been confirmed (Forstner et. al., 2013). The guidelines used for infection control are using alcohol hand sanitizer or soap and water to clean hands, and gown and gloves prior to entry or upon exiting the patient's room (Sopirala et. al., 2009). These measures are known to be effective for infection control, but there have been issues implementing these protocols in healthcare facilities. These problems include accessibility, comprehensibility, applicability and acceptability in application (Easton et. al., 2007). It was also noted that one protocol for MRSA could not be used for an entire hospital because nurses have to make circumstantial clinical decisions, in regards to individual patient care (Easton et. al., 2007). Knowledge is the first step in adherence to clinical guidelines. It is important to be knowledgeable in the infection control of MRSA because if there is deficient awareness in clinical practice guidelines and procedures, it is unlikely for good practice to follow (Easton et. al., 2007).

### **Transmission**

Due to MRSA's ability to transform and change, multiple subtypes have developed. This increase has contributed to the continuing obstacle of treating and preventing infection and spread, which supports the problem of MRSA becoming a worldwide threat to health (Banning, 2005). In a study by Seibert, Speroni, Oh, DeVoe, and Jacobsen (2014), more than 100 healthcare professionals were observed for adherence to hand hygiene. 94.1% of medical staff, 88.6% of the nurses, 83.3% of allied

health, and 45.5% of support staff washed their hands before and after patient related contact (Seibert et al., 2014). The healthcare workers all strongly agreed that hand hygiene as well as glove and gown precautions were important in preventing the spread of MRSA. This illustrates that there are significant discrepancies in reported and observed behaviors in healthcare (Seibert et al., 2014). Although nurses, nursing students, doctors, and other medical professions are important in preventing the transition of MRSA, it must also be known that he or she may function as a reservoir or victim of MRSA as well (Rohde et al., 2012).

### **Theoretical Framework**

The study is guided by the conceptual definition of caring (Scotto, 2003). Scotto (2003) proposed that nurses must follow a new definition of caring, described as involving an “offering of self” (p. 290). This means that a healthcare provider needs to use intellectual, psychological, spiritual, and physical aspects of their person to reach optimal healthcare goals (Scotto, 2003). The intellectual aspect consists of the importance of knowledge, clinical decision making, and continued knowledge. The psychological aspect consists of having the consciousness of feelings, emotions, and empathy towards patients and understanding their experiences. The spiritual aspect consists of inquiries toward the question “Why?” and struggles with significance of why things happen. Finally, the physical aspect consists of taking care of ones own body to in turn, use nursing skills to take care of the patient’s body (Scotto, 2003).

Scotto (2003), reported that a central part of nursing is to “cultivate a strong knowledge base and reasoning skills and to develop psychomotor skills to efficiently meet patients’ needs” (p. 291). Knowledge, shown in this study as the knowledge of

MRSA, is important to a caring nurse because without it, clinical judgment and effectiveness of meeting patient's needs cannot be adequately met. However, if a nurse is adequately equipped with knowledge and clinical practice, they will have more to offer in terms of patient care (Scotto, 2003). Based on the theoretical framework, this study expects to find the knowledge of MRSA to be higher in senior baccalaureate students rather than sophomore baccalaureate students. This hypothesis has been made on the judgment that students who have received a greater amount of teaching and clinical time will not only be more accurate, but will furthermore care about making correct clinical decisions to meet patient goals.

### **Design**

This study was a descriptive, correlational study using quantitative data to examine the difference in knowledge of MRSA in sophomore and senior baccalaureate nursing students and determine if relationships exist between the knowledge scores and the demographic data. This study was conducted after receiving approval by the Institutional Review Board from the urban public university in the Midwest United States that was used in this study.

### **Setting and Sample**

The participants were a convenience sample of sophomore and senior baccalaureate nursing students enrolled at an urban public university in the Midwest United States. A goal 200 participants, 100 in each group was expected. Inclusion criteria for the study was enrollment in the generic baccalaureate nursing program, and senior and sophomore class standing. Participants of all ages, races, and genders were included.

### **Sampling and Data Collection Procedures**

After receiving permission from faculty, the researchers did approach students at the beginning of a regularly scheduled nursing class session. The researchers briefly explained the purpose of the study and that participation was voluntary. The participants received a cover letter describing the study and containing all the elements of informed consent (See Appendix A). Completion of the surveys served as informed consent. No identifying information was used in completing this study. Data was entered into SPSS and statistical analysis was then performed. The surveys are kept in a locked area, only accessible to the researchers and sponsor, and will be disposed of after a year.

### **Tool**

Participants completed a demographic survey including: age, gender, race/ethnicity, class level, and if they are currently employed at a healthcare facility (See Appendix B). The MRSA knowledge was assessed using a tool developed by De Giusti et. al. (2011), which consists of seven multiple response questions. The questions are derived from categories that encompass MRSA knowledge. The categories are localization of infection, clinical signs and symptoms, transmission of infection, susceptible population, and therapeutic aspects. The tool has been selected to be used in this study because the categories and questions adequately represent the knowledge needed by nursing students. The study that originally used the tool ran a pilot study in order to validate the questionnaire. It was tested on a small sample size and the results showed a very good level of comprehension, in that there were few missing values on the returned questionnaires, and replicability that was tested with Cronbach's Alpha. The MRSA knowledge survey is included in Appendix C.

**Data Analysis Plan**

Descriptive statistics were generated to describe the sample, a correlation matrix was used to examine the relationships between knowledge levels and demographic variables. Finally, a t-test was completed to determine if a significant difference in knowledge exists between the groups. Level of significance was set at 0.5.

**Results**

The groups were very similar with regard to demographic and personal variables. As expected, the seniors were approximately two years older than the sophomores. The school of nursing is predominately female, but the sophomore class has 20.4% men, and the senior class 18.5%. The number of male nurses makes up around 10% or less of the total population of nurses in developed countries, in the United States the number is 9.1%, so these numbers fall outside of the norm for this profession (O'Connor, 2015). In regards to the ethnicity and race of the students at both the sophomore and senior nursing levels that participated in this study, the percentage that are Caucasian is more prominent than any other race or ethnicity. The amount of students that are employed at both levels is about the same. 73.5% of the sophomore nursing class is employed, and 76.5% of the senior class is employed. While the amount of students that are employed stays about the same, the type of employment changes from the sophomore level to the senior level. Significantly more seniors are employed in a healthcare setting than the sophomore class. This is most likely attributed to the increased skills acquired, increased hiring of more advanced students, and the students working and gaining experience in the field that they will be working in.

The mean scores for the MRSA knowledge test were the same between both groups. A t-test was performed and it was found that the sophomore class and the senior class both earned an average of 43% correct answers on the survey questions that were administered. In order to determine correlations between the demographic variables and the MRSA knowledge questions, Pearson and point bi-serial tests were performed on the data. It was determined through the calculations that the variables of age, sex, whether or not the student is employed, and healthcare employment all showed a weak positive relation with the MRSA knowledge scores. The only variable that has statistical significance of  $P = 0.002$  is that of whether or not the student is employed, regardless of the type of employment. The weak positive correlations between the demographic variables and the MRSA knowledge test scores tells us that whether or not someone answers questions correctly about MRSA knowledge is not dependent or highly related to age, sex, whether or not a student is employed, and healthcare type of employment.

### **Conclusion**

This study has revealed that the amount of MRSA knowledge does not increase as a student progresses through the nursing program. The knowledge that is learned at the sophomore level and retained to the senior level stays the same throughout the rest of the program, even with the increased quantity of clinical hours, experience, and education provided. The average score being at 43% is low and considered to be a failing grade when compared to the School of Nursing's "C" average minimum passing requirement for students on coursework. Comparing the 43% average in this study to the findings recorded by Easton et. al (2007) where it was shown that being knowledgeable is important in adherence to clinical guidelines, it is possible that the low average of

knowledge by the students in this study may correlate with substandard clinical practice regarding this disease.

There are some limitations to this research study. One limitation is a lack of prior studies regarding nursing student's knowledge of MRSA. This affects the reliability of the study. More research and studies on this topic could improve the reliability of the results obtained because of the ability for increased comparison. Another limitation is the generalization of the results to other universities and areas because each university and area has a difference in curriculum. There would need to be an increase in studies regarding this topic with the same results in order to generalize the conclusion of this research study.

Due to the low score between both groups of nursing students, improvement of the knowledge base regarding MRSA is recommended. The improvement could be completed by emphasizing this type of knowledge in the nursing school curriculum at the sophomore level, and reinforcing this knowledge throughout the rest of the program. Based on MRSA being relevant and pertinent to nursing practice, adding increased education regarding this topic that increases the knowledge level of the students at this school may prove beneficial to the quality of nurses that it produces.

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## Appendix A

## Description of the Study

**Title of Study-** Difference in Knowledge of MRSA Regarding Sophomore and Senior Baccalaureate Nursing Students

**Introduction-** You are invited to participate in a research project being conducted by Lori Crimaldi, Payton Lloyd, and Daniel Whited, nursing students in the School of Nursing, in the College of Health Professions at The University of Akron.

**Purpose-** The purpose of this research study is to determine nursing students' knowledge of MRSA prevention practices and to compare knowledge levels between sophomore and senior level baccalaureate students at an urban public university in the Midwest United States

**Procedures-** If you choose to participate in the research study, you will be asked to give some demographic information (age, gender, level of education, ethnicity and employment) and complete questionnaire about MRSA knowledge. It will take less than 15 minutes to complete this survey. You will not be asked to give any identifying information at any time during this survey. You are eligible to participate in this study only if you are currently enrolled in the traditional baccalaureate nursing program.

**Benefits and Risks-** There will be no direct benefit from your participation in this study, but your participation may help to better future curriculum in nursing programs for future undergraduate nursing students. There are no known risks to completing this survey but during the unlikely event that someone was upset by the questions of information given he or she will be referred to professionals within the university. You may contact the Counseling Center located in Simmons Hall 306, phone number 330-972-7082, at any

time during or after the survey.

**Right to refuse or withdraw-** Participation in this research study is voluntary. Refusal to participate or withdraw from the study during any time will not affect your grade in this class or your standing at the school of nursing.

**Anonymous and Confidential Data Collection-** No identifying information will be collected and the responses to this survey will be kept in a secure area for one year following the conclusion of this research study.

**Confidentiality of Records-** Once all surveys have been completed and collected, the data will be entered into an excel spreadsheet data set. This information will only be accessible by the researchers and corresponding sponsor.

**Who to Contact with Questions-** If you have any questions, you may contact Lori Crimaldi, Inc20@zips.uakron.edu, Payton Lloyd, pt15@zips.uakron.edu, and Daniel Whited, dbw21@zips.uakron.edu, as well as Carrie Scotto PhD, RN (Advisor) at cscotto@uakron.edu.

**Acceptance-** My completion and submission of this survey will serve as my consent to participate.

## Appendix B

## Demographic Survey

Please fill in the blank or circle the response for each of the following questions.

1. What is your age?

\_\_\_\_\_ yrs.

2. What is your gender?

Male

Female

3. What is your race/ethnicity?

Caucasian

African American

Hispanic/Latino

Native American

Asian

Pacific Islander

Prefer not to respond

Other (Specify) \_\_\_\_\_

4. What is your current class standing?

Sophomore

Senior

5. What is your employment status?

Healthcare facility

Other

Not currently employed

## Appendix C

## MRSA Knowledge Questionnaire

Please circle the correct response in the following questions.

1. In what type of infections can MRSA be found?

Pimples

Skin

Bladder

Bowel

Mouth

Do not know

2. What does the skin infected by MRSA look like? (Multiple responses allowed)

Red

Warm

Painful

Have pus or other drainage

Skin symptoms accompanied by fever

Do not know

3. How is MRSA transmitted from an infected person to an uninfected person?

Direct contact with colonized or infected individuals

Indirect contact with items, or environmental surfaces contaminated

Parenteral transmission

Sharing personal items such as towels or razors with infected individual

All of the above

Do not know

4. What type of people are at increased risk for MRSA infections?

Healthy people

Healthy people who frequent a sport club

Immune deficient people

All the above mentioned categories

Do not know

5. What is the best treatment for a MRSA skin infection?

Incision and draining the skin damage made by healthcare providers

Homemade incision and drainage of the skin damage

Treatment with antibiotics only

Do not know

6. Are there drugs to treat MRSA infections?

Yes, disinfectants

Yes, antibiotics

Yes, anti-inflammatories

No

Do not know

7. Is it possible that staphylococcus bacteria develop resistance to antibiotics causing skin infections that cannot be cured?

Yes

No

Do not know

## Appendix D

## Review of Literature Table

APA formatted reference <sup>1</sup>	Problem. Research Purpose &/or Research Question <sup>2</sup>	Theoretical Framework  What is it and how is it used?	Design of study, Level of evidence, Site, Population, Sampling Method. Sample Size.	Variables and measures/tools . Reliability and validity of measures/tools	Findings Conclusions	Implications	Limitations of findings <sup>3</sup>
Seibert, D. J., Speroni, K. G., Oh, K. M., DeVoe, M. C., & Jacobsen, K. H. (2014). Knowledge, perceptions, and practices of methicillin-resistant <i>Staphylococcus aureus</i> transmission prevention among health care workers in acute-care settings. <i>American</i>	<b>Problem:</b> the frequency of hand hygiene (washing with soap and water or using alcohol-based hand sanitizers) and the consistent use of contact precautions, such as the use of gloves and gowns, are often found to be suboptimal. <b>Purpose Statement:</b> The goal of our study was to evaluate knowledge, perceptions, and practices related to MRSA	No theoretical framework was used to guide the study.	<b>Design:</b> Nonexperimental, cross-sectional data collection <b>Level of Evidence:</b> VIII <b>Site:</b> acute care hospital in the eastern US <b>Population:</b> Medical, nursing, allied health, and support services staff <b>Sampling Method:</b> convenience sampling <b>Sample Size:</b> 276	<b>Research variable and tool:</b> knowledge, perceptions, and self-reported adherence, practice related to MRSA. <b>V&amp;R of tool:</b> Survey items were developed based off of other studies The hospital's research council rated the relevance and clarity of each item on a 4-point scale (from not relevant to highly relevant and from not clearly written to clearly written). A content	Descriptive statistics were used to compare individual self-report and observed behavior. Two-sided t2 tests and analysis of variance were used to compare responses to KAP questions by HCW type. HCWs strongly agreed that preventive behaviors reduce the spread of MRSA. The vast majority reported that they almost always engage in preventive	It is important to reduce barriers to adherence with preventive behaviors and to help all HCWs, including support staff who do not have direct patient care responsibilities, to translate knowledge about MRSA transmission prevention methods into consistent adherence of themselves and their coworkers to prevention	<b>Strengths:</b> The strengths of our study include the use of both survey and observational methods, the use of validated survey items for all of the KAP areas, and the inclusion of all types of HCWs rather than limiting participation to 1 group such as nurses.  <b>Weaknesses:</b> the results must be interpreted conservatively because the

<sup>1</sup> Indicate if primary or secondary source and if quantitative, qualitative or mixed methods.

<sup>2</sup> Construct purpose statement and research question is not stated in article. Identify independent variables, dependent variables, and population.

<sup>3</sup> List limitations related to validity and reliability of methods and applicability of findings. Consider strengths and weaknesses of study.

<p><i>Journal Of Infection Control</i>, 42(3), 254-259. doi:10.1016/j.ajic.2013.09.005</p> <p>Primary and qualitative</p>	<p>among a diverse sample of HCWs - medical, nursing, allied health, and support services staff - at an acute care hospital.</p> <p><b>Research question:</b> What is knowledge, perceptions, and practices of methicillin-resistant <i>Staphylococcus aureus</i> transmission prevention among health care workers in acute-care settings?</p>			<p>validity index was calculated from these scores. A content validity index score of 0.80 (on a scale of 0 to 1) is desirable, and the assessors rated the relevance of the questions at 0.98 and the clarity at 0.97</p> <p><b>V&amp;R of tool:</b> Valid and reliable</p>	<p>practices, but observations of hand hygiene found lower rates of adherence among nearly all HCW groups. HCWs who reported greater comfort with telling others to take action to prevent MRSA transmission were significantly more likely to self-report adherence to recommended practices. Greater self-efficacy (comfort telling others to take action to prevent MRSA transmission ) predicted self-adherence. Knowledge and perceptions did not predict self-adherence.</p>	<p>guidelines.</p>	<p>participation rate suggests that self-selection bias may have occurred. Also, because the study was conducted at only 1 health care facility, the findings may not be generalizable to other HCW populations.</p>
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<p>Pedro, A. L., Sousa-Uva, A., &amp; Pina, E. (2014). Endemic methicillin-resistant Staphylococcus aureus: Nurses' risk perceptions and attitudes. <i>American Journal Of Infection Control</i>, 42(10), 1118-1120. doi:10.1016/j.ajic.2014.07.013</p> <p>Primary and qualitative</p>	<p><b>Problem:</b> “In Portugal, methicillin-resistant Staphylococcus aureus (MRSA) is endemic in most hospitals, with resistance rates &gt;49% in cerebrospinal fluid and blood samples.”</p> <p><b>Purpose Statement:</b> “We conducted a cross-sectional study to determine perception and attitudes in relation with risk of exposure to MRSA”</p> <p><b>Research question:</b> What knowledge do nurses have on the precautions, procedures, and consequences of MRSA outbreaks in local hospitals for themselves, other nurses, and patients?</p>	<p>No theoretical framework was used to guide the study.</p>	<p><b>Design:</b> Cross-sectional</p> <p><b>Level of Evidence:</b> IX</p> <p><b>Site:</b> Lisbon</p> <p><b>Population:</b> Nurses from 10 clinical sites in a teaching in Lisbon, with limited isolation facilities.</p> <p><b>Sampling Method:</b> Purposive- they chose nurses from sites where MRSA isolation facilities were limited and where wards with more risk factors for MRSA present.</p> <p><b>Sample Size:</b> 139 questionnaires and 8 interviews= 147 participants</p>	<p><b>Research variable and tool:</b> Risk perceptions and attitudes about MRSA transmission.</p> <p><b>Risk perceptions included self, others, and patients</b></p> <p><b>V&amp;R of tool:</b> Valid and reliable</p>	<p>Nurses were complying with the set guidelines by the hospital and were performing contact precaution. However patient units and equipment cleaning and information weren't fully implemented practices. It was also stated that patient safety would rise if all measures were actually performed.</p>	<p>This could be used for the section of the proposal that describes how current nurses are involved with MRSA precautions, and how that affects nursing students as they begin their career. It could also be used to explain why this study is important to look into.</p>	<p>Lack of power analysis, small sample, lack of reliability in questionnaire, and the fact that the sample was taken from only two hospital locations- in wards that had high risk of MRSA infection to begin with.</p>
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<p>Forstner, C., Dungal, C., Tobudic, S., Mitteregger, D., Lagler, H., Burgmann, H., &amp; Lina, G. (2013). Predictors of clinical and microbiological treatment failure in patients with methicillin-resistant <i>Staphylococcus aureus</i> (MRSA) bacteraemia: a retrospective cohort study in a region with low MRSA prevalence. <i>Clinical Microbiology &amp; Infection</i>, 19(7), E291-E297. doi:10.1111/1469-</p>	<p><b>Problem:</b> Invasive infections with methicillin-resistant <i>Staphylococcus aureus</i> (MRSA) have been associated with greater morbidity and mortality than infections with methicillin-susceptible strains as the result of a combination of host-, pathogen- and therapy-related factors <b>Purpose Statement:</b> The aim of the present study in patients with MRSA bacteraemia was to determine clinical and microbiological outcomes and to identify independent predictors of treatment</p>	<p>No theoretical framework was used to guide the study.</p>	<p><b>Design:</b> retrospective cohort study <b>Level of Evidence:</b> IV <b>Site:</b> University Hospital of Vienna, Austria, a 2141-bed central hospital <b>Population:</b> Patients already infected with MRSA at the University Hospital of Vienna <b>Sampling Method:</b> Medical screening of patients at the hospital <b>Sample Size:</b> 124 patients (98 men, 26 women)</p>	<p><b>Research Variable and Tool:</b> Patient demographic s, source of bacteraemia, antimicrobial treatment and microbiological characteristics were evaluated <b>V&amp;R of tool:</b> Valid and reliable</p>	<p>Median length of hospital stay was 37 days (range 1–203 days); intensive care unit admission was required in 46 (37.1%) patients. Fifty (40.3%) patients died during hospitalization.</p>	<p>The 28-day mortality in the study population was 30.6% and death could be related to MRSA bacteraemia in 23.4%. The crude mortality rate increased to 41.9% in the first half-year after MRSA bacteraemia and reached 45.2% after the first year</p>	<p>Although all the MRSA isolates tested were susceptible to linezolid and tigecycline, only a small number of patients received one of these agents. A limitation of the study was that they did not determine in vitro susceptibility to daptomycin. Also, some of the patients had previously been treated with antibiotics and had higher Vancomycin in their blood stream previous to the study.</p>
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<p>0691.12169 Primary and quantitative</p>	<p>failure in a region with low MRSA prevalence. <b>Research Question:</b> Do patients already infected with MRSA have predicted failure outcomes because of the low MRSA prevalence in the area?</p>						
<p>Rohde, R. E., Rowder, C., Patterson, T., Redwine, G., Vasquez, B., &amp; Carranco, E. (2012). Methicillin resistant <i>Staphylococcus aureus</i> (MRSA): an interim report of carriage and conversion rates in nursing students. <i>Clinical</i></p>	<p><b>Problem:</b> Healthcare associated infections have become one of the most costly and deadly growing public health threats of our time. The Centers for Disease Control and other studies estimate that Methicillin Resistant <i>Staphylococcus aureus</i> (MRSA) has surpassed HIV as the leading cause of morbidity and mortality in the U.S.</p>	<p>No theoretical framework was used to guide the study.</p>	<p><b>Design:</b> A prospective, longitudinal cohort design (interim report) with three times of measurement. <b>Level of Evidence:</b> VI <b>Site:</b> Texas State University, San Marcos, TX. <b>Population:</b> Nursing students at Texas State University <b>Sampling Method:</b> A purposive sampling strategy took place with the final sample consisting of nursing students</p>	<p><b>Research variable and tool:</b> Rate of <i>Staphylococcus aureus</i> and MRSA identification; confirmation and antibiotic susceptibility by Vitek 2. Self-administered questionnaires collected demographics and risk factors. <b>V&amp;R of tool:</b> Valid and reliable The researchers also explained that anyone who tested positive for MRSA would be privately contacted by a</p>	<p>MRSA colonization did not increase. 5. <i>aureus</i> prevalence (20-26%). Species prevalence other than <i>S. aureus</i> increased (9.2% to 80%). The following associations were found to be statistically significant: boil or skin infection odds with <i>S. aureus</i> (OR= 2.43, p&lt; .05), working or volunteering in healthcare facility odds</p>	<p>MRSA colonization did not increase. The risks of known MRSA infections will play a role in whether the healthcare workers comply with the precautions and barriers.</p>	<p>Most participants that completed the study were Caucasian females. However, because the study is longitudinal the authors hope to regain the participants and balance out the study. Individual clustering was also used.</p>

<p>Laboratory Science, 25(2), 94-101.</p> <p>Primary and quantitative</p>	<p><b>Purpose Statement:</b> The purpose of this research was to assess initial prevalence or acquisition of <i>S. aureus</i> or MRSA in a cohort of nursing students and to follow these students over five semesters of clinical care experiences</p> <p><b>Research question:</b> How is MRSA and staphylococci carriage and conversion rates evaluated and characterized in nursing students across clinical semester rotations and what are the risk factors?</p>		<p>over the age of eighteen. All participation was voluntary.</p> <p><b>Sample Size:</b> 87 nursing students. Nursing investigators entered questionnaire (Figure 1) results and CLS investigators entered laboratory results into an Excel database (Microsoft, Redmond, WA) for initial data collection. Each wave of data was verified for completeness and accuracy, and data were then pooled</p>	<p>healthcare professional for follow up. Also, before the data was pooled it was verified for completeness and accuracy.</p>	<p>with 5. other (OR= 2.72, <math>p &lt; .05</math>) and gym and sports activities odds with <i>S. aureus</i> (OR= 4.98, <math>p &lt; .001</math>).</p>		
<p>Easton, P., Sarma,</p>	<p><b>Problem:</b> Even when procedures</p>	<p>No theoretical framework</p>	<p><b>Design:</b> Questionnaire <b>Level of</b></p>	<p><b>Research variable and tool:</b></p>	<p>There was considerable variation in</p>	<p>This study has highlighted</p>	<p>We acknowledge that not all</p>

<p>A., Williams, F., Marwick, C., Phillips, G., &amp; Nathwani, D. (2007). Infection control and management of MRSA: assessing the knowledge of staff in an acute hospital setting. <i>Journal Of Hospital Infection</i>, 6629-33. doi:10.1016/j.jhin.2006.12.016</p> <p>Primary and qualitative</p>	<p>are routine, knowledge and expertise of staff should not be assumed. This was well demonstrated in a survey of blood pressure measurement, which found that many nurses did not understand or perform the technique properly.</p> <p><b>Purpose Statement:</b> The aim of this study was to assess the knowledge and perceived practice of staff regarding MRSA and its management in an acute hospital setting. A further aim was to determine what staff felt was needed in terms of information or education on the risks, management</p>	<p>was used to guide the study.</p>	<p><b>Evidence:</b> VI  <b>Site:</b> Two acute hospitals in tayside, scotland  <b>Population:</b> Doctors and nurses  <b>Sampling Method:</b> Convenience sample  <b>Sample Size:</b> 87 doctors and nurses. A questionnaire survey was carried out through group administration during a study day and by face-to-face interviews.</p>	<p>Risk factors for MRSA, common sites of colonization, infection and clinical complications, screening, decolonization and treatment, and knowledge of information and advice resources to support infection control.</p> <p><b>V&amp;R of tool:</b> Valid and reliable  <b>Dependent Variable and tool:</b> Infection control and management of MRSA  <b>V&amp;R of tool:</b> Valid and reliable  They used face to face content validity in order to check comprehension and clarity of the questions. All answers were also verified with an infectious disease consultant</p>	<p>responses between doctors and nurses answering correctly (Table I). No significant differences were found between interview and self-completed responses so the two groups were combined for analysis. No significant differences were found between interviewers, across age groups or time since qualification.</p>	<p>a range of knowledge deficiencies in healthcare staff as well as significant inter-professional differences in the key areas of infection control and management, similar to findings elsewhere. There must be time to educate the healthcare professionals to increase awareness.</p>	<p>of the questions set have clear-cut correct responses based on good evidence. No power analysis was done in the sample size. There were considerable variations between correct answers in term of doctor and nurse answers. Participants were not asked where their prior knowledge about MRSA came from, however most would assume it would be from their schooling.</p>
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	and treatment of MRSA. <b>Research question:</b> Do doctors or nurses have sufficient education about MRSA in an acute hospital setting?						
Sopirala, M., Yahle-Dunbar, L., Smyer, J., L., Dickman, J., Zikri, N. Wellington, & ... Mangino, J. (n.d). Infection Control Link Nurse Program: An interdisciplinary approach in targeting health care-acquired infection. <i>American Journal Of Infection Control</i> , 42(4), 353-359.	<b>Problem:</b> Increasing antibiotic resistance among the most common bacterial pathogens, in the hospital and community, presents a growing threat to human health worldwide. <sup>1</sup> Health care-acquired (HCA) infections cause significant morbidity and mortality in addition to posing huge financial burden to health care systems. <b>Purpose Statement:</b> Improving hand	As used in previous studies, <sup>13</sup> a Poisson regression analysis was used to generate an incidence rate ratio (IRR) compared with baseline MRSA rates.	<b>Design:</b> Nonexperimental correlational <b>Level of Evidence:</b> VIII <b>Site:</b> Wexner medical center, Columbus Ohio <b>Population:</b> Staff nurses <b>Sampling Method:</b> Nurses acting as liaisons <b>Sample Size:</b> Unknown	<b>Independent variable and tool:</b> Hand soap and sanitizer usage <b>V&amp;R of tool:</b> Valid and reliable <b>Dependent Variable and tool:</b> Baseline hand soap and sanitizer usage <b>V&amp;R of tool:</b> Valid and reliable	Total MRSA rate and MRSA bacteremia rate also showed significant reduction with nonsignificant reductions in overall non-HCA-MRSA and non-HCA-MRSA bacteremia. Hand soap/sanitizer usage and compliance with hygiene also increased significantly during IP.	Link nurse program effectively reduced HCA-MRSA. Goal-defined metrics with ongoing re-education for the nurses by IP personnel helped drive these results.	With our study design, simultaneous IP interventions could not be assessed as in a randomized controlled trial. Randomization was not feasible because the intervention was a hospital-wide study among a small group of hospitals that shared physicians and other hospital staff.

Primary, quantitative	hygiene compliance among health care workers (HCW) has shown to have a positive impact on HCA-MRSA. <b>Research question:</b> Does hand washing and use of sanitizer lower transmission and carriage of health care professionals						
Matouskova, I., & Janout, V. (2008). Current knowledge of methicillin-resistant <i>Staphylococcus aureus</i> and community-associated methicillin-resistant <i>Staphylococcus</i>	<b>Problem:</b> Bacterial strains that are oxacillin and methicillin-resistant, historically termed methicillin-resistant <i>Staphylococcus aureus</i> (MRSA) are resistant to all $\beta$ -lactam agents, including cephalosporins and carbapenems. MRSA are pathogenic and have a	No theoretical framework was used to guide this study.	<b>Design:</b> Systematic review <b>Level of Evidence:</b> II <b>Site:</b> Czech rep <b>Population:</b> N/A <b>Sampling Method:</b> N/A <b>Sample Size:</b> N/A	<b>Research variable and tool:</b> Genetics and development, laboratory diagnostics, and prevention of occurrence <b>V&amp;R of tool:</b> N/A	Analysis of blood isolates strains <i>S. aureus</i> collected in 2000-2005 showed increase in oxacillin resistance. Over the period, the MRSA incidence tripled from 3.8 % to 12.5 %. These organisms spread rapidly in hospitals	MRSA is an important cause of nosocomial infection and the interpretation of it is difficult. All the battlefronts are important and we must agree on strategies so that we can plan ways to overcome them.	This was performed in the Czech republic, and not the United States. It is talked about in context of recent literature.

<p>aureus. <i>Biomedical Papers Of The Medical Faculty Of The University Palacký, Olomouc, Czechoslovakia, 152(2), 191-202.</i></p> <p>Secondary, qualitative</p>	<p>number of virulence factors that enable them to result in disease. <b>Purpose Statement:</b> The purpose is to test the knowledge of MRSA and CA-MRSA <b>Research question:</b> What is the current knowledge of MRSA and CA-MRSA</p>						
<p>Gould, D. (2011). MRSA: implications for hospitals and nursing homes. <i>Nursing Standard, 25(18), 47-56.</i></p> <p>Primary and qualitative</p>	<p><b>Problem:</b> Methicillin-resistant <i>Staphylococcus aureus</i> (MRSA) is a major infection prevention and control challenge globally. <b>Purpose Statement:</b> The aim of this article is to update healthcare professionals' understanding of the implications of methicillin-resistant <i>Staphylococcus aureus</i> (MRSA) for</p>	<p>Guidelines for controlling MRSA in hospitals in the UK were originally developed by the Combined Working Party of the British Society for Antimicrobial Chemotherapy, the Hospital Infection Society and the Infection Control Nurses Association (Ayliffe et al 1998).</p>	<p><b>Design:</b> Summary <b>Level of Evidence:</b> II <b>Site:</b> UK <b>Population:</b> New patients and families <b>Sampling Method:</b> Interview <b>Sample Size:</b> Unknown</p>	<p><b>Independent variable and tool:</b> Surveillance, screening, decolonization strategies, standard infection prevention and control precautions and antibiotic stewardship <b>V&amp;R of tool:</b> Valid and reliable <b>Dependent Variable and tool:</b> MRSA prevalence and attitudes about <b>V&amp;R of tool:</b> Valid and reliable</p>	<p>At present, opportunities for patients to receive information about MRSA from healthcare staff vary and sometimes the information conveys confusing messages about its seriousness (Lindberg et al 2009). Verbal information is of limited usefulness without supporting written information</p>	<p>MRSA has been shown to be an indicator of the quality of care because of the extent of its prevalence.</p>	<p>The guidelines are from UK medical centers and health policies. It may differ. It also is in reference to nursing home residents.</p>

	<p>patients in hospital and residents in nursing homes.  <b>Research question:</b>                  What are the implications of MRSA for hospitals and nursing homes?</p>	<p>They have since been revised (Coia et al 2006).</p>			<p>(Burnett <i>et al</i> 2010).</p>		
<p>Kurlenda, J., &amp; Grinholm, M. (2010). Current Diagnostic Tools for Methicillin-Resistant Staphylococcus aureus Infections. <i>Molecular Diagnosis &amp; Therapy</i>, 14(2), 73-80.</p> <p>Primary and quantitative</p>	<p><b>Problem:</b> Methicillin-resistant Staphylococcus aureus (MRSA) is a common pathogen responsible for a wide spectrum of healthcare-associated and community-acquired infections  <b>Purpose Statement:</b> This article reviews the current knowledge concerning prospective diagnostics of MRSA infections.  <b>Research question:</b> What are the current diagnostic tools and the effectiveness of use</p>	<p>No theoretical framework was used to guide this study.</p>	<p><b>Design:</b> Quasi-Experimental  <b>Level of Evidence:</b> VI  <b>Site:</b> Poland  <b>Population:</b> Patients at clinics  <b>Sampling Method:</b> Convenience  <b>Sample Size:</b> unknown</p>	<p><b>Research variable and tool:</b> FISH model                  Identification of carriers, evaluation of etiology of infection  <b>V&amp;R of tool:</b> Valid and reliable</p>	<p>For epidemiologic reasons, early detection of carriers and infected patients plays a key role in limiting all possible sources of pathogens.</p>	<p>FISH appears to be the most useful and efficient method. It has lower costs in comparison with PCR.</p>	<p>A desired result has not yet been reached.                  Tested tools, and not directly on patients. No power analysis.</p>

<p>Banning, M. (2005). Transmission and epidemiology of MRSA: current perspectives. <i>British Journal Of Nursing</i>, 14(10), 548-554.</p> <p>Primary and qualitative</p>	<p><b>Problem:</b> methicillin-resistant <i>S. aureus</i> (MRSA) emerged as a bacterium that became less susceptible to the actions of methicillin and thus developed the ability to colonize and cause life-threatening infections.</p> <p><b>Purpose Statement:</b> Nurses must have a working knowledge of common microbes that they may encounter on a daily basis. One such microbe is staphylococcus.</p> <p><b>Research question:</b> What are the current perspectives of the transmission and epidemiology of MRSA</p>	<p>No theoretical framework was used to guide this study.</p>	<p><b>Design:</b> Summary  <b>Level of Evidence:</b> II  <b>Site:</b> N/A  <b>Population:</b> Nurses  <b>Sampling Method:</b> N/A  <b>Sample Size:</b> N/A</p>	<p><b>Independent variable and tool:</b> phenotypic variation, types of infections caused, most prominent enzymes, measures to limit the spread  <b>V&amp;R of tool:</b> Valid and reliable  <b>Dependent Variable and tool:</b> Infection control transmission and epidemiology  <b>V&amp;R of tool:</b> Valid and reliable</p>	<p>MRSA is an important nosocomial infection that is slowly evolving as a global threat to health. Owing to its ability to mutate, several clones and subgroups have emerged that add to the difficulties of treating this bacterium. Recently, evidence of the emergence of community-associated MRSA has been reported predominantly among young children</p>	<p>Nurses working in both hospitals and community settings should be aware of the growing threat of MRSA and acknowledge the need for universal precautions when nursing patients with this form of infection.</p>	<p>Decolonization is used as a measure to treat hospital-acquired MRSA, but is not recommended as a measure to treat community-associated MRSA except in select patient populations such as those undergoing hemodialysis or perioperatively in surgical patients</p>
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## Appendix E

## Statistical Results

<b>Variables</b>	Sophomore (N=132)	Senior (N=119)	Significance
Age	20.76	23.85	
Sex			
Male	27 (20.4%)	22 (18.5%)	
Female	105 (79.6%)	97 (81.5%)	
Race			
Caucasian	119 (90.1%)	104 (87.3%)	
Other	13 (9.9%)	15 (12.7%)	
Employed			
Yes	97 (73.5%)	91 (76.5%)	
No	35 (26.5%)	28 (23.5%)	
Worksite			
Healthcare	22 (22.6%)	63 (68.2%)	
Non-Healthcare	75 (77.4%)	28 (23.8%)	
<b>t-Test</b>			
Mean MRSA Score	3.59 (43%)	3.59 (43%)	(f=.272) p = .974
<b>Correlations</b>			
Age			(r=.058) p = .357
Sex			(r=.043) p = .493
Employed			(r=.191) <b>p = .002</b>
Healthcare Employed			(r=.035) p = .633