

# Comparative Analysis of Community Acquired Methicillin Resistant Staphylococcus Aureus Nasal Carriage in Eastern Province of Saudi Arabia

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## Problem

Methicillin resistant staph-aureus (MRSA) is a bacterium that has taken the world by storm. In 2005, the number of deaths caused by MRSA was approximately 19,000 fatalities, in contrast, the amount of AIDS fatalities in that very same year was about 16,000. Methicillin resistant staph-aureus is also considered the number one leading cause of hospital associated infections. According to the CDC, over 11,000 deaths occur yearly in the US, and it seems to be increasing. MRSA is prevalent in the Kingdom of Saudi Arabia, but little research has been conducted regarding this life threatening bacterium. The worry is that with the lack of necessary health procedure, MRSA prevalence would increase greatly in a community that is already prone to being infected by other bacterium and viruses.

## Purpose:

- To investigate the prevalence of MRSA nasal carriage among community members in the eastern province of Saudi Arabia at the time of their hospital admission for other health related issues.
- Conduct a thorough comparison between our results from the eastern province and data from other regions of the Kingdom as well as the United States.
- Identify possible factors that contribute to the spread of MRSA in the community as well as in the health care setting.

## Background

Methicillin-resistant Staphylococcus aureus (MRSA) is a type of bacteria that can cause infections to different parts of the body. However, it is more arduous to treat than other Staphylococcus aureus strains because of its resistance to semi-synthetic penicillin such as methicillin, nafcillin, and oxacillin. Studies show that about one third of people carry Staphylococcus aureus (SA) in their nasal cavity. MRSA infections first emerged in the 1960s in the health care settings, and now are classified into two main types: HA-MRSA (health acquired MRSA) and CA-MRSA (community acquired MRSA). Of growing concern is the emergence of MRSA in communities

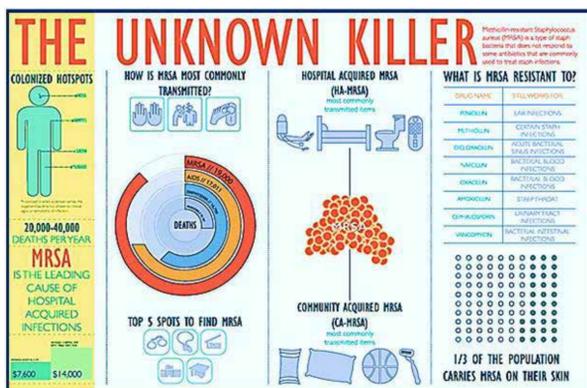


Figure 1. Diagram which displays key info relating to MRSA, adapted from <http://www.sterishoe.com>

with no healthcare contacts or risk factors. Thus, it is of extreme importance to identify the nasal carriage of MRSA in the Eastern Province, and compare it to other regions in Saudi Arabia (KSA) as well as the United States (US) population [1-7]. While there is a plethora of data relating to MRSA in places such as North America, Saudi Arabia and the middle east as a whole have a minute amount of data when it comes to this bacteria. Additionally, a recent study conducted in Finland concluded that most cases of CA-MRSA is characterized by having the mec-a gene.

## Hypothesis

The researcher hypothesized the following:

- CA-MRSA will be prevalent in low rates in the community of the eastern province when compared to other regions in Saudi Arabia.
- CA-MRSA carrier rates will be lower in the United States of America rather than in Saudi Arabia.

## Methods

Nasal Swab Collection

- The study population includes patients of all ages who were screened for MRSA carriage. Nasal swabs were collected routinely for MRSA screening. A total of 3188 swabs were collected.
- Real-Time PCR
- All samples were tested using the "Gene Xpert SA Nasal complete assay".
- Viewing the Results
- The results were interpolated by the GeneXpert Dx System from measured fluorescent signals and embedded calculation algorithms.
- Data Analysis
- The data gathered from the kit was analyzed and studied so that conclusions could be drawn from them
- Literature Review
- The analyzed data was compared to other pieces of literature and a comparative analysis was then created.

## Graphs And Data

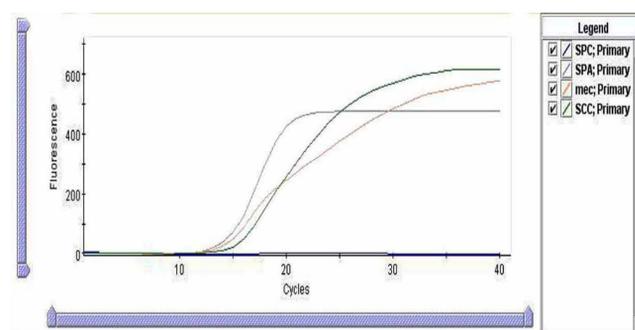


Figure 2. Genes that are amplified in a sample which is positive for MRSA

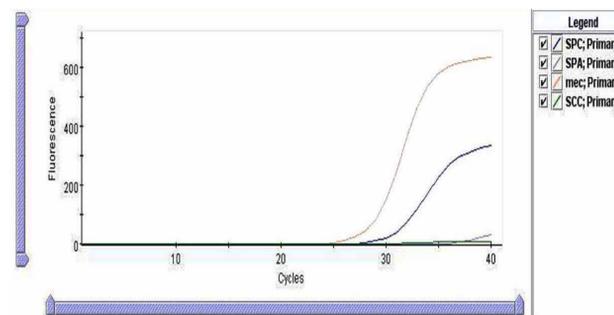


Figure 3. Genes that are amplified in a sample which is negative for MRSA

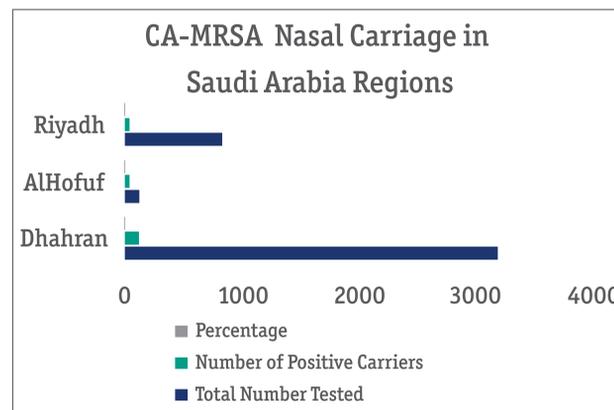


Figure 4. Comparison between number of CA-MRSA nasal carriers in Saudi Arabia's regions

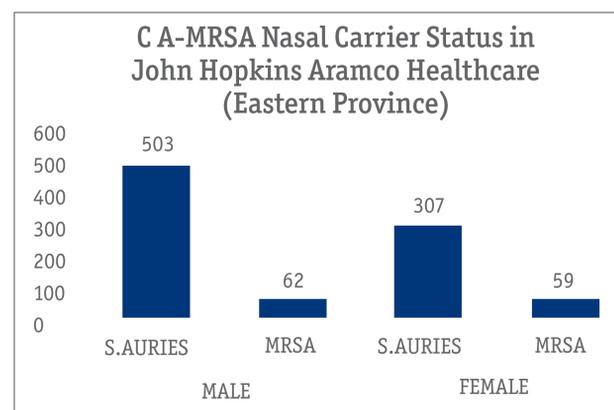


Figure 5. Nasal carrier prevalence in John Hopkins Aramco Healthcare (Eastern Province) between males and females.

## Results

A total of 3188 patients were screened for MRSA/SA carriage. 810 patients showed colonization by SA, of which 796 (95%) were Saudi. Whereas 121 patients were colonized by MRSA, of which 120 (99%) were Saudi. Male to female ratio for SA colonization was 503:307, and male to female ratio for MRSA was 62:59. A total of 503 male patients were shown to be colonized by SA, of which 475 (95%) were Saudi patients. 96% of Saudi female patients screened were positive for S. Aureus.

Based on the data gathered from the nasal swab tests and the literature review, the rate of nasal carriage of MRSA in Al Hofuf was clearly the lowest in the Kingdom at 1.1%, Dhahran (John Hopkins Aramco Healthcare) had a rate of 4%, and Riyadh was the highest at 4.6%. The average CA-MRSA carrier rate in Saudi Arabia was calculated to be 3.23%, compared to the US average of 2% (CDC).

## Conclusions

After analyzing the data and interpreting the results, it is clear that we are faced with a massive challenge. The prevalence of CA-MRSA is quite high in Saudi Arabia especially when compared to the benchmark of MRSA research in the U.S. But when realizing the fact that the source of the CA-MRSA spread is not from healthcare centers, then the focus of the region must change from healthcare settings to the community. It is vital to raise awareness in Middle Eastern communities since the populations' general knowledge surrounding the disease is low. People in the Middle East must be notified of the dangers of MRSA via awareness campaigns and educational programs. Simple tasks that people take for granted such as cleaning ones hands and covering while sneezing and coughing go a long way when it comes to preventing disease spread and infection control.



## References

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