



## Occurrence of Staphylococcus Aureus in Hospitals: A literature review

RODRIGUES, Sheila da Conceição Sousa <sup>[1]</sup>, Fecury, Amanda Alves <sup>[2]</sup>, Dias, Cláudio Alberto Gellis De Mattos <sup>[3]</sup>, OLIVEIRA, Euzébio de <sup>[4]</sup>

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### SUMMARY

The present study sought to compile data on antimicrobial resistance of bacteria of the genus *Staphylococcus aureus* in Brazilian public hospitals, years of 2008-2015. The data found in articles published in national and international magazines, through active search in 2014 to 2015 period, with key words: *Staphylococcus aureus* in hospital environment, injury caused by *Staphylococcus aureus* in Brazilian public hospitals and *Staphylococcus aureus* resistance to antimicrobials. The results showed a large prevalence of multidrug-resistant *Staphylococcus aureus*-MRSA Methicillin-in hospital units in Brazil, according to the articles analyzed, published between the years from 2008 to 2015. It is concluded that the *Staphylococcus* are pathogens that remain in the hospital environment, creating some resistance to certain drugs, which has contributed to greater research with respect to the indiscriminate use of antimicrobials in the community and more effective drugs for the treatment of these microorganisms in hospital units.

Keywords: *Staphylococcus aureus*, hospital unit, antimicrobial resistance.

### INTRODUCTION

The presence of microorganisms such as bacteria from the genus *Staphylococcus aureus* in hospital units in recent years has grown considerably, due to the resistance of these microorganisms to certain types of antimicrobials, which has caused major pathologies. Yes, the *s. aureus* bacteria are responsible for various injuries in the individual.

The injuries that this type of bacteria can be cause only superficial as the skin (epidermitis) or invasive

type as endocarditis, osteomyelitis, arthritis, Myositis and pneumonia, in addition to the scalded skin syndrome, and food poisoning that depending on the bacterial stage, can lead to death. (more invasive), which depends on its structure, usually a single gene of bacterial chromosomes or plasmids <sup>1 2</sup>.

The clinical pictures usually are common in patients undergoing hospital units, as the *s. aureus* a common microorganism in these environments. In addition to remain for a long period of time, adhered to inanimate objects as in the hospital or furnitures in asymptomatic patients that can infect the community in General <sup>3</sup>.

Studies show that *Staphylococcus* are pathological microorganisms ancient humans, described by Robert Koch in 1878 and cultivated by Louis Pasteur in 1880, are micro-organisms belong to the family of Gram-positive coccus called *micrococcaceae*, and *s. aureus* the major human pathogen. Produce coagulase enzymes, produce pus and toxins, can also lead to bacteremia and endocarditis to spread through the bloodstream, pathogenic mechanisms presents how the tissue destruction that is the appearance of abscess in the skin, joints, brain and lungs, as well as the scalded skin syndrome, toxic shock and the food poisoning -<sup>4</sup>.

The *s. aureus* has become increasingly present in hospital units for being a microorganism which over the years has shown strains increasingly resistant to certain types of antibiotics. Therefore, the greater the amount of drugs for the treatment of infections caused by bacteria, the higher the probability of finding resistant strains such as MRSA Methicillin-Resistant *s. aureus*<sup>5</sup>.

In view of this problem there was the need to recognize the main causes of the presence of *s. aureus* in Brazilian public hospitals, as one of the leading causes of injury, emphasizing the strength of these microorganisms to certain types of antibiotics, which will be described in the course of this research.

The presence of bacteria of the genus *s. aureus* in hospital units, has been studied frequently over the last years by researchers from all over the world, as a result of strains resistant to antibiotics, which aimed at the realization of this research, in search of published data in articles that report the resistance of *s. aureus* to antimicrobial agents used in public hospitals, to treat the pathologies presented by this bacterium acquired in the community or in the hospital environment itself, of which were described earlier.

## **METHOD**

Refers to a retrospective survey held in 2014 to 2015 period, with Survey in databases, with a view to collecting of scientific articles published in national and international magazines from 2008 to 2015, on the occurrence of strains of bacteria of the genus *s. aureus* resistant to antimicrobials, in Brazil's public hospitals.

Uni-terms were used: *Staphylococcus aureus*, hospital unit, antimicrobial resistance. 60 articles related to research were selected and analyzed, of which fifteen were chosen to guide the research, including only those who have greater relevance. Confirming that the last-sixth article studied, it is a case study, with serious pathologies in a child of seven years.

This method allowed to find separate articles related to research regarding the presence of *s. aureus* in Brazilian public hospitals of which are presented below.

## RESULTS

After analysis of fifteen articles most relevant to search six were highlighted, showing results that characterised the search concerning the presence of *s. aureus* in the hospital environment.

The article of Vieira and Agostini, 2008 emphasized the prevalence and profile of infections caused by *s. aureus* in a public hospital. The article of Cruvinel, Silveira et al., 2011 featured antimicrobial profile of *s. aureus* in an ICU in the Federal District. Article de Moura, pepper et al. .2011 portrayed the colonization of health professionals of a teaching hospital in Sao Paulo for *s. aureus*. Castro's article, Barth et al. .2009 determined the antimicrobial resistance of *s. aureus* isolates from a hospital lab. Article de Souza and Figueiredo, 2008 highlighted the prevalence of nosocomial infections caused by *s. aureus* in a regional hospital. And the article of Gelatti, .2009 Sukiennik et al. reported a case study with 7-year-old patient, a resident of Porto Alegre that presented septage caused by *s. aureus*, remained hospitalized for 50 days.

The items will be discussed below by name of where the authors carried out the research. Golden's article reports the *s. aureus* as an important microorganism the hospital environment that survives on inanimate objects or in patients with asymptomatic and aimed to search for new information about the profile of infections caused by this microorganism and the factors that contributed to their isolation in the hospital. The method used by the authors was conducted from 64 records of patients admitted for *s. aureus* infections in the period from January to December 2008, in which the data were collected from June to July 2009. Of a total of 617 cultivation plates were found 64 results positive for *s. aureus*, i.e. 10.37% of the total. What can confirm the presence of this organism in this hospital unit <sup>3</sup>.

The Federal District characterized *s. aureus* as the main causative agent of infection, being the main place of nasal colonization of these microorganisms in symptomatic or asymptomatic individuals, as well as its resistance to MRSA (Meticillin Resistant) on a global scale and other antimicrobials such as Vancomycin for example. The authors used nasal sampling methods collected with 20 ICU patients swab (recent hospitalization less than a week) in the period from February to May 2010.

The results for these isolates of *s. aureus* 07-37% were resistant to amoxicillin, 12-60% were resistant to ampicillin and only 3-15% resistant to ampicilina<sup>6</sup>.

São Paulo's article portrayed the presence of *s. aureus* in the saliva of nursing staff of a teaching hospital, with a view to identifying the antimicrobial sensitivity and also the phenotypic characterization of *s. aureus*. The method used was a cross-sectional epidemiological study, conducted in the period from January to December 2007, in the intensive care units (ICU) of a large public hospital in the country. The subjects of the research were 351 nurses, technicians and nursing assistants in professional activity, of which three methods: samples were taken from each subject, with two months of each collection, totaling 1,053. These samples have computed in a result of 17.6 (126) of the total positive for *s. aureus* shows. And, when identifying the antimicrobial sensitivity, of this total, 26 identified MRSA-resistant metricilina, being the other as MSSA sensivel<sup>7</sup>.

Santa Maria's article evidences the *s. aureus* as an emerging problem that brings great concern to hospitals as communities. Notes also that the mortality associated with *s. aureus* has decreased with the use of penicillin and resistant strains have emerged lately that shit (Methicillin-resistant *Staphylococcus aureus*-MRSA). The study research method, 34 isolates of *s. aureus* previously characterized as phenotypically

resistant to Oxacillin, obtained from a hospital de Santa Maria/RS. The results of computing on sensitivity of all isolates of *s. aureus* to Vancomycin antimicrobial, which made evident the greater effectiveness of the drug to treat patients colonized by that kind of microorganism, front of thirteen different drugs, including gentamicin azithromycin and ciprofloxacin<sup>8</sup>.

Paraná 's article refers to changes that have occurred over the years in relation to medicine and their demand for more effective antibiotics, in order to characterize the prevalence of nosocomial infections caused by *s. aureus* MRSA, a hospital regional de Maringá. The method of data collection was by means of a retrospective study based on data from hospital infection control Committee. The results obtained between February 2003 and December 2006 out of a total of 68 cases of *s. aureus* MRSA, 16.2% of this amount for MRSA infection in the year of 2003, with an increase of 62.2% in 2005<sup>9</sup>.

The Community of southern Brazil reports a case of 7-year-old male patient, a resident of the metropolitan region of Porto Alegre, which presented a severe sepsis framework for *s. aureus*, with severe pneumonia secondary to soft tissue injury in the left lower limb evolved for cellulite that on x-rays showed bone involvement, presence of liver abscess, Lung abscesses and multiple hemoptise<sup>10-16</sup>.

The case shows how relevant research on *s. aureus* in hospitals and in the community generally, seeking a greater knowledge regarding treatment through of antimicrobials, featuring his form of resistance in certain cases and certain strains, making us believe that it is increasingly difficult to contain diseases like that only with the antimicrobial agents that have been developed so far. That legacy requires deeper for better subsequent studies be clarified why the large presence of *s. aureus* in hospitals and in the community, making their treatment more effective in the face of these serious diseases such as patient involvement.

Articles which guided the research presented possible determinants of antimicrobial results in the treatment of *s. aureus* such as age, underlying disease, hospitalization time and others that will be discussed in the table 1, below:

## **ARTICLES**

## **DETERMINANTS**

DOURADOS