The role of the pharmacist in the process of controlling and combating hospital infections by *Staphylococcus aureus*

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To cite this article:

Caitete, M.G.; Oliveira, A.J.B.S.; Silva, E.B.; Silva, M.S.S.; Lopes, A.R.O.; Álvares, E.B.S.O. **The role of the pharmacist in the process of controlling and combating hospital infections by *Staphylococcus aureus*.** *International Journal of Sciences*. Vol. 2, No. 2, 2021, pp. 63-69. ISSN 2763-5392.

Received: 08 28, 2021; **Accepted:** 08 30, 2021; **Published:** 09 06, 2021

Abstract: As much as it is considered as part of the flora of the human organism, *in some situations Staphylococcus aureus* can cause an increase in the variety of infections and become a pathogen, being responsible for community and hospital infections. This research aims to analyze the role of the pharmacist in the control and fight against hospital infections by *Staphylococcus aureus*. For the elaboration of this study, the methodology of descriptive review of the scientific literature was used. In addition, the contamination caused by these bacteria constantly affects the subcutaneous and coating tissue, where most of them come from external causes. The technological advance also contributes to the increase in the incidence of hospital infection due to the disorderly use of antibiotics and the increase of invasive procedures and the emergence of resistant microorganisms.

Keywords: Control of Infections. *Staphylococcus aureus*. Drug therapy

1. Introduction

Hospital Infection was defined through ordinance no. 2,616 published in 1998 by the Ministry of Health, where we can monitor the measurement that this type of infection is acquired after the patient's admission to the hospital, or during the hospitalization period (BRASIL, 2015).

Staphylococcus aureus belong to the gram-positive coconut group, and can be found easily in the pits and lining epithelial tissue of healthy individuals of healthy people. Being defined as:

[...] "They are microorganisms often detected in the nasal

cavity and skin of the population. Such colonization determines the asymptomatic carrier or the state of the carrier, since the bacteria present in the host organism does not cause visible lesions" (SALES, 2012).

As much as it is considered as part of the flora of the human organism, *in some situations Staphylococcus aureus* can cause an increase in the variety of infections and become a pathogen, being responsible for community and hospital infections. These episodes are caused by decreased immunity or rupture of the skin barrier (OLIVEIRA, 2015).

Therefore, the contamination caused by these bacteria

constantly affects the subcutaneous and coating tissue, where most of them come from external causes. Opportunistic mild infections, such as cellulitis, pimples or boils, thus enabling the emergence of pneumonia, osteomyelitis, meningitis, pericarditis, sepsis, brain and muscle abscesses, considered to be the most severe infections (GUIMARÃES, 2017).

Because it is usually found in epithelial tissue coating *Staphylococcus aureus* can contaminate individuals who are using intravenous catheter and who have surgical wounds, may affect the blood stream (SANTOS, 2019). Thus, transmission can occur through direct contact. The hospital environment should be aware of the fact that professionals, patients and even visitors are considered vectors of *Staphylococcus aureus*, and subsequent configure threats for transmission of these microorganisms (VASCONCELOS, 2015).

A few years ago, it was believed that infections by such bacteria were restricted only to hospital environments, but the incidence rate has shown a gradual increase when it is in the general population. The difficulties encountered and the virulence pattern found in the treatment of infections caused by multidrug-resistant bacteria, causes a serious public health problem (ROSA; PINEDO, 2017).

Therefore, *Staphylococcus aureus* infections constitute a health threat and may favor the development of adaptation mechanisms and resistance in patients' organisms, thus hindering the adoption of appropriate treatments. Thus, the tiring microbiological and clinical investigation combined with biology tools, such as *Polymerase Chain Reaction* (PCR) and restriction enzymes, for example, are considered an indispensable arsenal for the control and combat of this bacterium (CRUZ, 2011).

With the constant advance in the area of molecular alteration over the years, new antimicrobials have efficacy in the treatment of control and fight against bacteria. And they confirm that the planning and development of medicines corroborate the usefulness in the numerous areas of health (SALES, 2012). Therefore, the participation of pharmacists in education is fundamental when addressing the prevention and control of infections and spread of *Staphylococcus aureus*, such as the insertion of systems to evaluate the implementation of the guidelines offered by the Ministry of Health (BRASIL, 2015).

In view of the above, it will be necessary to implement the surveillance of hospital infections by *Staphylococcus aureus*, due to the epidemiological profile presenting high incidence rates for this disease. The perception of such agents and their vulnerability patterns are recognized as a significant tool for antimicrobial therapeutic guidance directed to pharmaceutical professionals (ROSA; PINEDO, 2017).

Therefore, the aim of this research is to analyze the role of the pharmacist in the process of controlling and combating hospital infections by *Staphylococcus aureus*.

2. Methodology

A survey of the literature was carried out in September 2020, in the periodic databases CAPES and Google Academic. The descriptors used were: " Infection control" AND "*Staphylococcus aureus*" AND "Drug therapy" AND "Thrombocytopenia" in both databases. The studies of this research were included according to the eligibility criteria according to Figure 1.

Figure 1. Flowchart of selection criteria and inclusion of studies. Source: Author

The inclusion criteria were: works in English, Spanish and Portuguese, published in the last 10 years, involving the role of the pharmacist in the process of controlling and combating hospital infections by *Staphylococcus aureus*. Exclusion criteria were literature review works or meta-analysis.

Table 1. Statement of the studies that make up the Integrative Review

N	Date	Title	Authors	Periodic	Goals	Findings
01	2019	Performance of Clinical and Hospital Pharmacy in The Management	Karina Cunha dos Santos; Marcelo Joaquim Barbosa; Willanda Niek Melo da Silva Araújo;	Magazine	Define multidisciplinary workflows for service standardization. Definition of the list of drugs to be monitored and study preliminary results.	It was observed that 35% of the treatments were maintained according to initial prescription. 18% had reduced

		of Antimicrobial Use in Public Hospital of df.	Vanessa de Vasconcelos Sena; Kenya Teixeira de Souza.			treatment duration and 9% were not authorised by CCIH due to non-conformities.	03	2016	Importance of the pharmacist in the prevention and control with the team of the hospital infection control program.	Jordane Mácia Gomes Quinino; Rafael de Carvalho Mendes.	FNJ Magazine	Demonstrate the importance of Hospital Infection Control Commissions for all health professionals in order to prevent and control bacterial dissemination; and how the Pharmacist can act directly or indirectly in the Hospital Infection Control Program as well as the rational use of antibiotics.	It was verified that the present study deals with a literature review on Hospital Infection Control and how the pharmacist can act in order to reduce or avoid infections.
02	2017	The role of the pharmaceutical professional in the control of hospital infections	Jheniffer Nayara Angelo Guimarães; Bianca Oliveira Horace; Junior André Tomaz Terra.	Scientific Journal of the Faculty of Education and Environment.	It is to show the significance of HI by the indiscriminate use of antimicrobials and for failures in prevention measures of health professionals, which has been aggravating factors for the proliferation of resistant bacteria	It was observed that the present study highlighted important data on the activities that the pharmaceutical professional has been instructing to act directly in the self-control of HI, possibilizing the rational use of antimicrobials, surveillance in the prescribed prescriptions of antimicrobials, the dispensing of these drugs and the elaboration of new measures to raise awareness of health professionals.	04	2015	The use of antimicrobials in the hospital environment and the attributions of the pharmacist in the hospital infection control committee (CCIH).	Douglas Vaz Vasconcelos; Thais Borges de Oliveira; Lais Lima Nabuco Araújo.	Semantich School	Describe through a literature review the use of antimicrobials in the hospital environment and the role of the pharmacist in the Hospital Infection Control Commission.	It was observed that, of the critically ill patients with infections by multidrug-resistant bacteria, a total of 68.47 (69.1%) were male. Regarding the reason for hospitalization, 52 (76.5%) were associated with clinical emergencies or worsening of various underlying diseases and 16 (23.5%) due to trauma as a

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						result of accidents, violence, among other causes.	06	2015	Ordinance No. 2616, May 12, 1998	Brazil	Concierge	Mandatory maintenance by hospitals in the country, hospital infection control program.	It was observed that hospital infections constitute a significant risk to the health of hospital users, and their prevention and control involve measures to qualify hospital care, health surveillance and others, taken within the state, the municipality and each hospital, related to their functioning.
05	2015	Hospital Infection Control Commission (CCIH) and the performance of the hospital pharmacist: context and importance.	Francisco Roberto Pereira de Oliveira; Karla Bruna Nogueira Torres Barros; Martha Maria of France Fonteles; Raphael dos Santos Saturn; José Marcio Batista.	Geum Newsletter	Characterize the CCIH of the hospitals of the 8th CRES - CE and the performance of the hospital pharmacist in these committees.	It was verified, the present study was conducted in the hospitals of the 8th Regional Health Coordination (CRES - CE, located in the central sertão region, where of the 11 (eleven) hospitals that compose it, only 36% (4) had the Hospital Infection Control Commission - CCIH, all of which agreed to participate in the research	07	2012	<i>Staphylococcus aureus</i> resistant to methicillin: a challenge to public health.	Silva Sales, 2012	Acta biomédica brasiliensis.	<i>Staphylococcus aureus</i> resistant to methicillin: a challenge to public health.	<i>Staphylococcus aureus</i> has been found to be considered the main etiological agent of income and community. This bacterium, belonging to the group of gram-positive coconuts, can be easily found on the skin and in the nasal sinuses of healthy individuals.
							08	2012	Hospital infection in surgical patients of a hospital in the interior of Minas Gerais.	Lucas Carvalho Santana; Guilherme Santos Ramos; Juliana Cristina Pereira; Paulo Célio Almeida Hugo; Helisamara Mota	Nursing magazine of the central west of Minas Gerais.	To investigate the prevalence of HI in surgical patients through a descriptive, retrospective, quantitative study.	A hospital infection rate was observed in surgical patients of 4.14%.

			Guedes.			
09	2011	Pharmaceutical Dispensation: proposal of a model for practice	Daniela Agonesi; Marcela Unes Pereira Rennó	Science & Public Health	Propose a new concept and a dispensing model based on a flowchart that guides the main actions that must be performed by the pharmacist during the interview and guidance of the patient looking for a pharmacy to acquire a prescription drug.	It was found that direct the conduct of the pharmacist during dispensing.
10	2011	Prevalence of <i>Staphylococcus aureus</i> in the saliva of health workers.	Elaine Drehmer de Almeida Cruz; Fabiana Cristina Pepper; Izabel Cristina Vanzato Palazzo; Ana Lucia da Costa Darini; Elucir Gir	Medical Colombia	To analyze the prevalence of <i>Staphylococcus aureus</i> in the saliva of university hospital workers.	It was observed that among the workers investigated, 60.9% were colonized by <i>Staphylococcus aureus</i> in saliva, with 67.9% being transient carriers and 32.1% persistent carriers; the prevalence of methicillin-resistant <i>Staphylococcus aureus</i> (MRSA) among the isolates was 15.7%. The mean prevalence of MRSA was 12.7% being higher among nursing technicians (21.4%) and cleaning assistants (20.6%) and lower among

						nurses (4.5%) and physicians (5.9%).
11	2011	Detection of <i>Staphylococcus aureus</i> in the mouth of hospital cleaning workers.	Elaine Drehmer de Almeida Cruz; Fabiana Cristina Pepper; Izabel Cristina Vanzato Palazzo; Ana Lucia da Costa Darini; Lucite Gir.	Rev. Latino-Am. Nursing	It investigated the prevalence of colonization by MRSA and MSSA, knowledge and beliefs associated with the problem among hospital cleaning assistants.	It was found that the persistent carrier status of <i>Staphylococcus aureus</i> , resistant to methicillin, was detected in 15.4% of the cases. Low knowledge and perception of occupational risk were observed. The mouth was identified as an important reservoir of methicillin-resistant <i>Staphylococcus aureus</i> .
12	2011	Pharmacy and Control of Hospital Infections	Solange Cecilia Cavalcante Dantas	Brazilian Pharmacia No. 80	Promote technical support with the health team, in the analysis of prescription, monitoring of the treatment and clinical condition of the patient, during his hospitalization.	It was observed that, the pharmacy is one of the pillars that support the actions of control of hospital infections at all levels: planning, operational and educational, is the attribution of the pharmacist so that this control is effective and effective.
13	2011	The colonization of nursing professionals	Josely Pinto de Moura; Fabiana Cristina	Latin American Nursing Review	To investigate the presence of <i>Staphylococcus aureus</i> in	It was verified that the results showed that nurses and nursing

onals	Pepper;	the saliva of	technicians
by	Miyeko	the nursing	represent the
Staphyl	Hayashid	team of a	professional
ococcu	e; Elaine	teaching	categories
s	Drehmer	hospital in the	most
aureus.	de	interior of São	susceptible to
	Almeida	Paulo.	MRSA.
	Cruz;		
	Silva Rita		
	Marin da		
	Silva		
	Canini;		
	Lucite		
	Gir.		

3. Results and discussion

Santana (2012) states that the Ministry of Health describes hospital infection as a change in the organism caused after the patient's admission to the unit where it manifests itself in hospitalization or even after discharge, being related to procedures or hospitalization, becoming a growing concern among researchers. Several factors are associated with the occurrence of this disease, among them, the variety of invasive procedures, a high number of beds in the same ward, the presence of multidrug-resistant microorganisms and complexity of the patient's clinical status.

Moura (2011) observed that the technological and scientific emergence has had numerous advantages for clinical practice, during the course of improvement and new medical techniques. However, this advance directly contributes to the increased incidence of hospital infection due to the disorderly use of antibiotics and the high rate of invasive procedures. Thus, it is possible to be able to carries microorganisms to the patient, making treatment difficult due to such drug resistance.

Guimarães (2017) describes that the location of the hospital infection changes according to the type of treatment performed and with the clientele. The rate of occurrence of hospital infection is beyond what is expected for the country, which is between 14% and 16% of hospital infections. The more invasive processes go beyond the body's natural defense barrier, the may the entry of microorganisms.

Dantas (2011) reiterates that antibiotic sums because they are used in large amounts in hospitals, particularly in patients with severe conditions, portray the indiscriminate use of medications. Being identified as, because that directly contributes to the appearance of resistant microorganisms and consequently increased hospital infection. Therefore, the importance of pharmaceutical auxilium in controlling the use of antimicrobials in order to ensure improvement in the quality of life of patients, preventing problems related to its inappropriate use.

According to Quinine (2016) the indiscriminate use of antibiotics has given opportunities for several problems related to bacterial resistance. In some studies, there was an

affirmation that 52.6% of the antimicrobial indications were prescribed by physicians, while in 10% the patient himself was responsible for self-medication. It was also observed that 29.3% of those responsible for antimicrobial indications were in commercial establishments performed by attendants. And finally, 8.1% of the referrals were made by other people - family or friends. Such data represent a great capacity for the habit of self-medication, and this act is recognized as a relevant public health problem.

Rosa and Pinedo (2017) point out that the participation of the pharmacist is extremely important, because it tends to decrease the spread of bacterial resistance by developing the appropriate use of antimicrobials. Therefore, there is a need to control the inappropriate use of medicines.

Therefore, the pharmacist has to work in clinical visits in the institution, disseminating knowledge and correct information about the treatment. Changes in pharmaceutical activity are necessary, ensured that the patient receives adequate attention and real condition of recovery of his health. Thus guaranteed, the quality of the clinical care processing the hospital environment (AGONESI; RENNÓ, 2011).

4. Conclusions

The pharmaceutic professional has essential performance, providing the conscious use of germicides, antibiotics and related in an outpatient and hospital unit. For many years the pharmacist was noted as administrator and drug driver inside pharmacies, having no contact with the patient, without clinical response of the pharmacological treatment administered and the rehabilitation of the patient, without adverse reactions and the recognition of errors to the medications. However, this scenario has been altered, by activities coordinated by pharmacists who directly assist in the process of promoting and preventing the patient's health, ensuring their full recovery.

Furthermore, changes in hospital pharmaceutical activity are necessary. These should ensure that the patient's place is the focus and recovery of their health is the result, providing an association in the quality of the clinical care process in the hospital environment and implementation of appropriate and well-planned strategies. Therefore, the pharmaceutical professional should be inserted, being recommended the creation of their commissions, where they will develop multiple activities of great importance for infection control.

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