

DOI: <https://doi.org/10.36489/saudecoletiva.2021v11i65p6024-6035>

Microbiological analysis of the torches of the medical clinic of a public hospital in the interior of the Amazon

Análisis microbiológico de las antorchas de la clínica médica de un hospital público en el interior del Amazonas

Análise microbiológicas das maçanetas da clínica médica de um hospital público do interior da Amazônia

ABSTRACT

Objective: To value the microbiological conditions of the internal and external door handles of the doors of the medical clinic unit of a Public Hospital in the interior of the Amazon, Santarém Municipality, West of Pará, Brazil. **Method:** Exploratory-descriptive, quantitative research, carried out through surface samples and door handles of the medical clinic of a hospital in Santarém-Pará. **Microbiological analysis** was performed not the agitator for bacteria desorption and the suspension was soed by exhaustion. **Results:** Of the 84 doorknobs, 26,2% presented positive microbiological results, and *Staphylococcus* sp bacteria were found in all cases. As for the cover material, 25% of the doorknobs were compromised, and among the positive cases in the microbiological analysis, 18,2% of the door knobs had the affected surface. **Conclusion:** Although the number of positive samples is relatively small, it is important to highlight actions aimed at the hygiene of hospital fomites, since these can function as reservoirs of pathogenic microorganisms.

DESCRIPTORS: Microbiological Analysis, Cross Infection, Bacteria.

RESUMEN

Objetivo: Valorar las condiciones microbiológicas de las manijas de las puertas internas y externas de las puertas de la unidad clínica médica de un Hospital Público en el interior del Amazonas, Municipio de Santarém, Oeste de Pará, Brasil. **Método:** Investigación exploratoria-descriptiva, cuantitativa, realizada a través de muestras superficiales y manijas de puertas de la clínica médica de un hospital en Santarém-Pará. Se realizó un análisis microbiológico no el agitador para la desorción de bacterias y la suspensión fue soed por agotamiento. **Resultados:** De los 84 pomos de las puertas, el 26,2% presentó resultados microbiológicos positivos, y se encontraron bacterias *Staphylococcus* sp en todos los casos. En cuanto al material de cubierta, el 25% de los pomos de las puertas se vieron comprometidos, y entre los casos positivos en el análisis microbiológico, el 18,2% de las perillas de las puertas tenían la superficie afectada. **Conclusión:** Aunque el número de muestras positivas es relativamente pequeño, es importante destacar las acciones encaminadas a la higiene de los fâmites hospitalarios, ya que pueden funcionar como reservorios de microorganismos patógenos.

DESCRIPTORES: Análisis Microbiológico, Infección Hospitalaria, Bacterias.

RESUMO

Objetivo: Avaliar as condições microbiológicas das maçanetas internas e externas das portas da unidade de clínica médica de um Hospital Público no interior da Amazônia, Município de Santarém, Oeste do Pará, Brasil. **Método:** Pesquisa exploratório-descriptiva, quantitativa, realizado através de amostras da superfície de maçanetas das portas da clínica médica de um Hospital em Santarém-Pará. A análise microbiológica, foi realizada no agitador para dessorção das bactérias e a suspensão foi semeada por esgotamento. **Resultados:** Das 84 maçanetas, 26,2% apresentaram resultado microbiológico positivo, sendo encontrada em todos os casos a bactéria *Staphylococcus* sp. Quanto o material de cobertura, 25% das maçanetas estavam comprometido, sendo que, dentre os casos positivos na análise microbiológica, 18,2% das maçanetas estavam com a superfície prejudicada. **Conclusão:** Apesar do número de amostras positivas serem relativamente pequenos, é importante destacar ações voltada para a higienização dos fômites hospitalares, dado que estes podem funcionar como reservatórios de microrganismos patogênicos.

DESCRIPTORES: Análise Microbiológica; Infecção Hospitalar; Bactéria.

RECEIVED ON: 01/15/2021 APPROVED ON: 02/05/2021



Zaline de Nazare Oliveira de Oliveira

Nurse, Pará State University.

ORCID: 0000-0001-7083-4973

Irinêia de Oliveira Bacelar Simplício

Nurse, Master in Bioengineering from UNICASTELO.
ORCID: 0000-0001-8271-9569

Andreza Dantas Ribeiro

Nurse, Master's student in Biosciences at the Federal University of Western Pará.
ORCID: 0000-0002-0017-8488

Carla Suellem Sousa Araújo

Nurse, Master's student in Society, Environment and Quality of Life at the Federal University of Western Pará.
ORCID: 0000-0001-6844-4781

Brenda dos Santos Coutinho

Nurse, Master's student in Biosciences at the Federal University of Western Pará.
ORCID: 0000-0001-5449-6003

Leticia Gomes de Oliveira

Nurse, Master's student in Epidemiology and Health Surveillance by the Evandro Chagas Institute.
ORCID: 0000-0002-8830-728X

Raiane Cristina Mourão do Nascimento

Nurse, Pará State University.
ORCID: 0000-0002-7306-9258

Dara Marcela Gama dos Anjos

Nurse, Coordinator of the São Jorge Family Strategy
ORCID: 0000-0003-3205-7522

INTRODUCTION

Healthcare Related Infections (HAIs) are those acquired after the patient's admission and manifest during hospitalization or after discharge when related to hospital procedures or hospitalization. ⁽¹⁾ They represent one of the most important public health problems in the world, being classified as an adverse event to the treatment of the patient and cause of increased morbidity and mortality. Causing repercussions with regard to the length of hospital stay, the cost of treatment, the safety and quality of health services. ⁽²⁾

In general, HAIs are associated with the severity profile of patients, use of immunosuppressants, performance of invasive procedures, prolonged hospital stay, indiscriminate use of antimicrobials and the hospital environment itself, which favors the natural selection of microorganisms. ⁽³⁾

Millions of patients are affected by HAIs each year worldwide, causing an

Healthcare Related Infections (HAIs) are those acquired after the patient's admission and manifest during hospitalization or after discharge when related to hospital procedures or hospitalization.

increase in the rate of morbidity and mortality and financial losses for health systems. It is estimated that for every 100 hospitalized patients, seven in developed countries and 10 in developing countries will acquire at least one HAI. ⁽¹⁾ It should be noted that, according to data from the European Center for Disease Prevention and Control (2016), about 20% to 30% of HAIs are considered preventable through intensive control and hygiene programs. ⁽⁴⁾

Research that addresses the environment for the spread of hospital bacteria in Brazil is scarce and uses databases, rarely Brazilian. There is no concrete evidence that cross-contamination across contaminated surfaces favors hospital infections. The surfaces present a low risk of direct transmission of infection, but contribute to secondary cross-contamination, through contacts of health professionals and equipment or instruments with such surfaces, which may be contaminated and, later, end up conta-

minating patients and other frequently handled locations.^(5,6)

Factors such as the ability of microorganisms to survive on inanimate surfaces and the lack of specific cleaning of these surfaces, which hinder the removal of pathogens, reinforce the evidence that hospital environments represent sources of colonization and dissemination of pathogens.⁽⁷⁾

The hospital environment becomes contaminated and, consequently, inanimate surfaces and equipment are potential reservoirs of bacteria, especially those resistant to antimicrobials.⁽⁸⁾ From this, fomites stand out as an important challenge for the control and prevention of HAIs, as these can serve as secondary reservoirs and cause cross-contamination. In view of this, the door handles of the hospital sectors are a form of intense manipulation, which increases the possibility of contamination.⁽⁹⁾

Thus, keeping the environment biologically safe is also the role of health professionals. The hands of professionals are recognized as the most common pathways for the transmission of pathogens, between the patient and the environment, and these are in direct contact

with the patient when carrying out the procedures.⁽¹⁰⁾

Therefore, this study had the following question: "What are the microbiological conditions of the door handles of the medical clinic unit of a Hospital in the Municipality of Santarém, Pará?". The study sought to evaluate the microbiological conditions of the internal and external door handles of the medical clinic unit of a Public Hospital in the interior of the Amazon, Municipality of Santarém, Western Pará, Brazil.

METHOD

It is characterized as an exploratory-descriptive research with a quantitative and qualitative approach. The research was carried out from May to August 2018 at a Public Hospital of medium and high complexity in the Interior of the Amazon, in the Municipality of Santarém, Western Pará, Brazil.

The study was carried out by collecting samples of the surface of the internal and external door handles of the medical clinic's doors, on May 22nd, August 9th and August 19th, since the acquisition of the inputs was carried out according

to the logistics necessary to maintain the quality of the product and the shelf life with an average duration of 90 days.

The SRK KIT was used, which contains the sterile swab, which was manipulated, following the manufacturer's guidelines. Initially, the swab was moistened in a buffer solution with neutralizer (which accompanies the swab), compressing it against the walls of the diluent bottle, to remove excess liquid. The swab cotton was rubbed three times in a zigzag motion. After that, the collected microorganisms were transferred to the tube containing 10 ml of buffer solution with neutralizing agents, to inactivate possible residual amounts of sanitizing agents.

The tubes were taken for one minute to the Mixtron shaker (Toptronix) for desorption of the bacteria. The suspension was sown by exhaustion, with the swab itself, in Petri dishes at no-tillage and incubated at room temperature for at least three days. Sowing was carried out in the Agar McConkey and Agar Sangue culture media. The microbiological evaluation was carried out at Laboratório Santos, Santarém-Pará.

For data analysis, the descriptive analysis technique was used in the Microsoft Excel® 2013 software. The study was approved by the Research Ethics Committee (CEP) of the University of the State of Pará Campus-XII according to opinion 3.148.072, in accordance with resolution 466/12.

RESULTS

The samples consisted of 84 handles, 42 of which were from the wards with their respective bathrooms; 6 hallway bathrooms; 4 of the accommodation of the medical residence with its bathroom; 2 from the medical equipment room; 2 from the satellite pharmacy; 2 from the kitchen; 4 from multiprofessional accommodation; 2 at the nursing station; 4 of the door that offers access to the stairs; 4 of the door that gives access to the elevator's hall; 2 of the door that gives access to the service hall, which contains an

Table 1 – Distribution of the places of origin of the door handles of the medical clinic by test result, Santarém, Pará, Brazil, 2018.

LOCAL	Nº DE AMOSTRA ESTUDADA	%	RESULTADOS DOS TESTES			
			POSITIVO		NEGATIVO	
			N	%	N	%
Infirmery	18	21,4	5	27,7	13	72,3
Infirmery bathroom	18	21,4	4	22,2	14	77,8
Nursing station and bathroom	4	4,7	4	100,0	-	-
Elevator door	4	4,7	3	75,5	1	25,5
Arsenal	2	2,3	1	50,0	1	50,0
Insulation and isolation bathroom	6	7,1	1	16,7	5	83,3
Medical equipment	2	2,3	1	50,0	1	50,0
Medical resident accommodation and bathroom	4	4,7	-	-	4	100,0
Multiprofessional accommodation and bathroom	4	4,7	-	-	4	100,0

Hallway bathroom	4	4,7	1	25,0	3	75,0
Drugstore	2	2,3	-	-	2	100,0
Kitchen	2	2,3	-	-	2	100,0
Service hall door	6	7,1	1	16,7	5	83,3
Stair access door	4	4,7	1	25,0	3	75,0
Solarium	4	4,7	-	-	4	100,0
Total	84	100	22	26,2	62	73,8

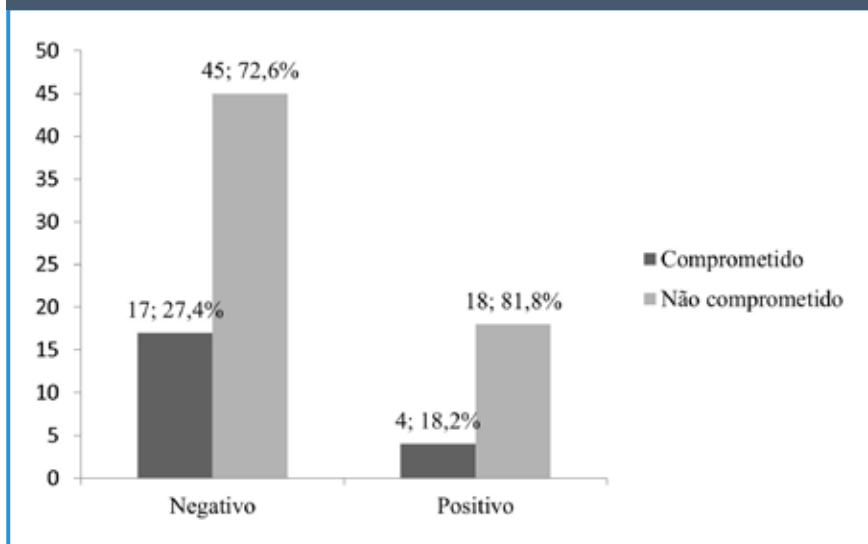
Source: Research data, 2018.

Table 2 – Distribution of sites with microbiological positivity by area, Santarém, Pará, Brazil, 2018.

PLACE	INTERNAL		EXTERNAL	
	N	%	N	%
Infirmery	2	9,0	3	13,6
Infirmery bathroom	1	4,5	3	13,6
Nursing station and bathroom	2	9,0	2	9,0
Isolation bathroom	-	-	1	4,5
Hallway bathroom	1	4,5	-	-
Medical equipment	1	4,5	-	-
Elevator door	1	4,5	2	9,0
Stair access door	-	-	1	4,5
Service hall door	1	4,5	-	-
Arsenal	1	4,5	-	-
Total	10	45,4	12	54,5

Source: Research data, 2018.

Graph 1. Doorknobs of the medical clinic with positive and negative microbiological findings in relation to the impairment of the surface covering material, Santarém, Pará, Brazil, 2018.



Source: Research data, 2018.

arsenal, a purge and a wardrobe, accounting for 6 more handles; and 4 from the solarium.

Of the 84 handles analyzed, 26.2%⁽²²⁾ showed a positive microbiological result, with the bacterium *Staphylococcus* sp. It was possible to observe that the highest frequency was in the bathrooms of the wards in 100%, followed by the wards with 27.7% (Table 1).

Of the 22 (26,2%) door handles that tested positive, the wards and bathrooms of the wards showed greater positivity on the external handles with 13,6%⁽³⁾ each; The internal doorknobs that obtained the most positive results were the wards and the nursing station with their respective bathroom, making 9,1%⁽²⁾ positive each. In addition, the other internal handles of the wards' bathrooms, the corridor bathroom, the elevator hall door, arsenal, medical equipment and the service hall door, showed 4,5% positivity, while on the external ones, only the isolation bathroom and the stair access door presented 4,5% (Table 2).

It is worth noting that during the collection it was seen that 25%⁽²¹⁾ of the door handles had the covering material compromised, and, among the positive cases in the microbiological analysis, 4 (18,2%) of the door handles had an impaired surface, as shown in Graph 1.

DISCUSSION

A study on the main infectious agents involved in nosocomial infections, gram-positive bacteria, such as *Staphylococcus aureus*, had a higher prevalence, this finding was noticeable in this study.⁽¹¹⁾ Another study that corroborates this is a literature review in which the microorganism most frequently found on surfaces and / or equipment in the hospital environment was *Staphylococcus aureus*.⁽⁷⁾

Staphylococcus aureus is one of the main microorganisms that infect individuals, and despite belonging to the microbiota, this bacterium has a high

degree of pathogenicity because it spreads easily in a hospital environment and has an association with antibiotic resistance.⁽¹²⁾

Such prevalence of *Staphylococcus aureus* can be explained by the presence of this bacterium in the human microbiota and its greater coverage in the hands and nasal cavity, being, therefore, easily transported by health professionals. In addition, it can be explained by the greater contamination and incidence of fomites where there is greater contact by health professionals, such as door handles, taps, bed rails, monitors, keyboards and what is related to the fact that heavily touched surfaces become more contaminated.⁽¹³⁾

Several studies point to the hands of professionals as the main sources of dissemination and colonization of pathogens, because often professionals, after touching a patient or manipulating possibly contaminated utensils and equipment, resuming their activities without performing the correct hand hygiene and not taking into account the possibility of transferring pathogens to other places of great manipulation. Thus, other surfaces that are regularly manipulated become a great potential for microorganisms to act.⁽⁸⁾

Microorganisms, including multi-resistant ones, are also in the most different parts of a hospital environment and that cleaning these environments together with professional care is an important factor to prevent the occurrence of hospital infections. Thus, it is essential to have a properly sanitized environment in addition to the maintenance of hospital objects for the reduction of pathogenic microorganisms in the environment.⁽¹⁴⁾

There is no concrete evidence that cross contamination across contaminated surfaces favors hospital infections, but there is evidence that items used in the hospital serve as secondary deposits that can carry cross contamination, that is, poorly sanitized environments should be considered as a source.⁽¹⁰⁾

Microorganisms, including multi-resistant ones, are also in the most different parts of a hospital environment and that cleaning these environments together with professional care is an important factor to prevent the occurrence of hospital infections.

Microbiological samples of surfaces can be useful both in verifying the cleanliness of the environment and in investigating whether hospital surfaces are acting as possible sources of diseases. Environmental surfaces close to patients can become sources of epidemiologically important microorganisms, and should be subjected to asepsis techniques routinely, and in accordance with the hospital's protocol, especially after the patient's discharge.⁽¹⁵⁾

Although the number of door handles contaminated with some pathogenic agent in the study was relatively small (26,2%), the adoption of good practices in hygiene of the environment, hand washing, care in handling the fomites, such as the door handles are extremely relevance for reducing the risk of HAIs.

Health institutions have been concerned, given that their main objective is to provide better quality care to patients.⁽¹⁶⁾ The Ministry of Health Ordinance No. 2.616/98, regulates the actions of HAI control in Brazil, among these actions, the formation of the Hospital Infection Control Program (PCIH - Programa de Controle de Infecção Hospitalar) is regulated, which will develop deliberate and systematic actions to the control and prevention of nosocomial infections.⁽¹⁷⁾ As a result, in addition to reducing morbidity and mortality, there is also a decrease in spending on public services, due to the need for specific means for the curative assistance of the HAI.⁽¹⁸⁾

For the standardization and execution of the PCIH in a correct way, the Hospital Infection Control Commission (CCIH - Comissão de Controle de Infecção Hospitalar) is formed in each hospital institution, to establish rates of incidence and prevalence of infections in the hospital environment. And through the results you will be able to evaluate and elaborate risk control measures for the occurrence of new infections, and, therefore, improve the assistance provided.⁽¹⁹⁾

CONCLUSION

It was possible to perceive that positivity in the microbiological analyzes was *Staphylococcus* sp. involved in all cases. This corroborates with what the Hospital Infection Control Commission of the hospital under study has been working with the aim of ensuring safety for patients and their collaborators.

And although the number of positive samples is relatively small, the CCIH's performance must also be focused on the hygiene of hospital fomites, given that they can function as reservoirs of pathogenic microorganisms. In addition, the continuing education of health profes-

... the CCIH's performance must also be focused on the hygiene of hospital fomites...

nals is essential to follow the rules of hand washing and care in the handling of hospital materials, as well as any type of fomite, such as door handles.

It is emphasized that studies that compare the microorganisms present in hospital fomites with those involved in hospital infections would be of great value to highlight the role of fomites as collaborators of this hospital problem. In addition, to believe that this study will serve as a basis for conducting new research on the topic addressed, since it is perceived its relationship with the quality of life of people. In this way, this survey will make it possible to choose strategies and interventions in order to minimize or eradicate HAIs. ■

REFERENCES

- Oliveira MF, et al. Infecções relacionadas à assistência à saúde sob a ótica da enfermagem em terapia intensiva adulto/Infections related to health assistance under the view of nursing in adult intensive therapy. 2019. *Ciê., Cuid. e Saúde*, v. 18, n. 4.
- Araújo BT, Pereira DCR. Políticas para controle de Infecções Relacionadas à Assistência à Saúde (IRAS) no Brasil, 2017. 2018. *Comuni. em Ciê. da Saúde*, v. 28, n. 03/04, p. 333-342.
- Vesco NL, et al. Infecções relacionadas à assistência à saúde e fatores associados no pós-operatório de transplante hepático. 2018. *Text. & Context.-Enfermagem*, v. 27, n. 3.
- European Centre for Disease prevention and Control. Healthcare-associated infections. 2016. Available from: <https://ecdc.europa.eu/en/healthcare-associated-infections>.
- Damasceno Q. Características epidemiológicas dos microrganismos resistentes presentes em reservatórios de uma Unidade de Terapia Intensiva [dissertation]. Belo Horizonte: Escola de Enfermagem/UFMG; 104 p. 2010.
- Oliveira HMO, Silva CPR, Lacerda RA. Políticas de controle e prevenção de infecções relacionadas à assistência à saúde no Brasil: análise conceitual. 2016. *Rev. Esc. Enferm. USP*, v. 50, n. 3p. 505-11.
- Dresch F, et al. Contaminação de superfícies localizadas em unidades de terapia intensiva e salas de cirurgia: uma revisão sistemática da literatura. 2018. *Rev. de Epidem. e Controle de Infecção*, v. 8, n. 1, p. 85-91.
- Ferreira AM, et al. Superfícies do ambiente hospitalar: um possível reservatório de micro-organismos subestimado? - Revisão Integrativa. 2013. *Revista de Enfermagem UFPE, Recife*, v.7, p. 4171- 4182.
- Silva SA, Deuschle RAN, Garlet CCM. Pesquisa de *Staphylococcus aureus* nas maçanetas das portas dos quartos de um hospital na região Noroeste, Rio Grande do Sul. 2012. *Saúde (Santa Maria)*, v. 38, n. 1, p. 129-138.
- Barros MMA. O enfermeiro na prevenção e controle de infecções relacionadas à assistência à saúde. 2016. *Universitas: Ciê. da Saúde, Brasília*, v. 14, n. 1, p. 15-21.
- Leão RNQ. Microbiologia e uso racional de antimicrobianos. Unimed Belém: prevenção e controle de infecção em serviços de saúde. Belém, 2008. 445 p.
- Silva KAB. Pesquisa de *staphylococcus aureus* e *escherichia coli* em aparelhos celulares utilizados em laboratório. 2018.
- Oliveira F, Melo K, Aoyama E, Rodrigues G. A importância da lavagem das mãos como atenuante microbiológico aos riscos de contágio da H1N1. 2019. *Rev. Brasile. Interdi. de Saúde*.1(1):33-8.
- Schneider RS, Fontana RT. A Educação em Saúde diante dos Saberes dos Trabalhadores sobre a Prevenção da Infecção Hospitalar. 2016. *Vivências*. v. 12, n.22, p. 16-29.
- Amador JFS, Basso LC, Vieira SLV. Prevalência de *Staphylococcus aureus* em superfícies de unidade de terapia intensiva. 2018. *Arqui. do Muse. Dinâm. Interdisciplinar*, v. 22, n. 2, p. 1-10.
- Dias JVM, de Oliveira LG, da Silva Moia CM, da Silva Ferreira J, Silva JHS, & de Souza MOLS. A percepção do enfermeiro sobre auditoria de enfermagem no âmbito hospitalar. 2020. *Enferm Brasil*, 18(6), 737-742.
- Portaria N° 2616, de 12 de maio de 1998. Programa de Controle de Infecção Hospitalar. 1998. Disponível em: http://bvsmms.saude.gov.br/bvsm/saudelegis/gm/1998/prt2616_12_05_1998.html. Acesso em: 5 de setembro de 2018.
- Venturioso, FF; Delgadillo, J; Farias, MS; Andrade, EX. O papel educador do enfermeiro no controle da infecção hospitalar enquanto membro da CCIH. 2018. *Rev. Saberes*, v.7, n.1.
- Carvalho, CA; Pinho, JRO; Garcia, PT. Epidemiologia: conceitos e aplicabilidade no Sistema Único de Saúde. 2017. São Luís: Edufma, 24-30.