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ORIGINALES

# Prevalence of health assistance infection in patients hospitalized in intensive therapy unit

Prevalência de infecção relacionada à assistência à saúde em pacientes internados em unidade de terapia intensiva

Prevalencia de la infección relacionada con la asistencia a la salud en pacientes hospitalizados en unidad de cuidados intensivos

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## ABSTRACT:

**Objective:** To determine the prevalence of Infection Related to Health Care (IRHC) in patients admitted to the Intensive Care Unit (ICU).
**Method:** Descriptive, retrospective study, with a quantitative approach. Data were collected through a form completed from infection notifications, followed by analysis of the results of microbiological tests available on the MV 2000i system.
**Results:** The patients admitted to the ICU were female, elder and came from other inpatient units of the institution. The prevalence rate of infection was 5.3% confirmed by positive culture, and the respiratory system was the most frequent site of infection (42.5%). Most isolates were gram-negative pathogens (71.05%), highlighting the *Acinetobacter* sp. The antibiogram showed that *Klebsiella* sp. was resistant to ampicillin and amoxicillin plus clavulanic acid. Regarding *Pseudomonas* sp., 50% were resistant to

imipenem, cefepime and ciprofloxacin. All Acinetobacteres were resistant to ceftazidime, followed by ceftriaxone and cefepime.
**Conclusion:** The prevalence of IRHCs in critically ill patients represents a huge challenge, not only for professionals, but also for health managers and the whole society, justifying the need and relevance of actions aimed at prevention and control.

**Descriptors:** Nosocomial Infection; Intensive Care Units; Microbial Drug Resistance.

## RESUMO:

**Objetivo:** Determinar a prevalência de Infecção Relacionada à Assistência à Saúde (IRAS) em pacientes internados em Unidade de Terapia Intensiva (UTI).
**Método:** estudo descritivo, retrospectivo, com abordagem quantitativa. Os dados foram coletados por meio de um formulário preenchido a partir das notificações de infecção, seguido de análise dos resultados de exames microbiológicos disponíveis no sistema MV 2000i.
**Resultados:** Os pacientes admitidos na UTI eram do sexo feminino, idosos e procedentes de outras unidades de internamento da instituição. A taxa de prevalência de infecção foi de 5,3% confirmada por cultura positiva, sendo o sistema respiratório o sítio de infecção mais frequente (42,5%). A maioria dos patógenos isolados eram gram-negativos (71,05%), com destaque para o Acinetobacter sp. O antibiograma evidenciou que a Klebsiella sp. era resistente a ampicilina e amoxicilina mais ácido clavulânico. Quanto a Pseudomonas sp. 50% apresentou resistência a imipenem, cefepime e ciprofloxacino. Todos os Acinetobacteres foram resistentes a ceftazidima, seguido por ceftriaxona e cefepime.
**Conclusão:** A prevalência das IRAS em pacientes críticos se configura em um desafio, não apenas aos profissionais, mas, aos gestores de saúde e a toda sociedade, justificando a necessidade e a relevância de ações voltadas à prevenção e controle.

**Descritores:** Infecção Hospitalar; Unidades de Terapia Intensiva; Resistência microbiana a medicamentos.

## RESUMEN:

**Objetivo**: Determinar la prevalencia de infección relacionada con la atención sanitaria (IRAS) en los pacientes ingresados en la Unidad de Cuidados Intensivos (UCI).
**Método**: Estudio descriptivo, retrospectivo, con un enfoque cuantitativo. Los datos fueron recolectados a través de un formulario lleno de notificaciones de infección, seguido por el análisis de los resultados de las pruebas microbiológicas disponibles en el sistema 2000i MV.
**Resultados**: Los pacientes ingresados en la UCI fueron las mujeres, los ancianos y los procedentes de otros unidades de hospitalización de la institución. La tasa de prevalencia de la infección fue del 5,3% confirmada por cultivo positivo, y el sistema respiratorio el lugar más frecuente de infección (42,5%). La mayoría de los patógenos aislados fueron gramnegativos (71,05%), destacando el Acinetobacter sp. El antibiograma mostró que Klebsiella sp. Era resistente a la ampicilina y amoxicilina más ácido clavulánico. La Pseudomonas sp. 50% mostró resistencia a imipenem, cefepima y ciprofloxacina. Todos los Acinetobacteres eran resistentes a la ceftazidima, ceftriaxona y seguido de cefepima.
**Conclusión**: La prevalencia de infecciones hospitalarias en pacientes críticamente enfermos se configura en un reto, no sólo para los profesionales, sino para los gerentes de salud y toda la sociedad, lo que justifica la necesidad y pertinencia de las acciones dirigidas a la prevención y control.

**Descriptores**: Infección Hospitalaria; Unidades de Cuidados Intensivos; Farmacorresistencia Microbiana.

## INTRODUCTION

Health Care-Related Infections (HCRI) are adverse events that persist in the country's public health scenario and relate to increased hospitalization time, morbidity and mortality and costs of care[(1)].

Infection rates in teaching or university hospitals are higher in the Brazilian scenario, a fact that is justified by the typical characteristics of these institutions, such as: diversity of pathologies, practice of high complexity procedures, prolonged hospitalization periods, interaction with several health professionals and students in the area.

Furthermore, they are acquiring technical skill by performing invasive procedures, which constitutes additional risk for contamination[2].

According to Ordinance No. 2,616 of the Brazilian Ministry of Health, hospital infection is the one that arises after 72 hours of hospitalization, or before, since it relates to diagnostic and/or therapeutic procedures performed with the patient, as well as after hospital discharge[3]. Information on hospital infection rates are consolidated in many hospitals in the country, are little known or old[4].

Worldwide, it is estimated that almost half a million cases of HCRI occur each year in Intensive Care Units (ICUs)[5]. Since the specificities of this sector make it an environment conducive to infections, such as the clinical severity of the patients, the need for prolonged hospitalization, immunosuppressive therapy, routine antimicrobial use and consequent resistance to microorganisms, and the use of invasive devices such as: Central Venous Catheter (CVC), Delay Urinary Probe (DUP), and Orotracheal Tube (OTT) ventilation support [6].

Given a global concern with issues aimed at minimizing adverse reactions to patients at health services, the Ministry of Health creates, through Administrative Rule 529/2013, the National Patient Safety Program (NPSP) in order to search for a safe care practice, based on protocols established by the World Health Organization (WHO). Hand hygiene practice consisted of one of the protocols established by the document and a determining factor in the occurrence of infections in ICUs[7].

By understanding that the occurrence of infection in a hospital environment involves several factors internal and external to the individual, there is need for preventive, educational and epidemiological control measures aimed at controlling and reducing its appearance, in order to achieve acceptable rates according to the public profile and types of procedures performed by the institution[4].

Therefore, characterization, as well as the dissemination of infection rates in the hospital environment are relevant to sensitize the professionals of the multiprofessional health team, especially those working at the ICU, to the severity of the problem. Also, encouraging the adoption of measures that aim to prevent and minimize these diseases, contributing to a reduction in length of stay and morbidity and mortality rates. Moreover, the nurse is a professional who plays an important role in the adoption of measures of prevention and control of the ICU environment. Therefore, the study aimed to determine the prevalence of health care-related infection (HCRI) in patients admitted to an intensive care unit (ICU).

## METHODOLOGY

This is a descriptive, retrospective, quantitative study, carried out at a university hospital, located in the city of Natal, state of Rio Grande do Norte. The institution is a reference in medium and high complexity in several specialties for the whole state, providing beds for clinical, surgical hospitalizations and cardiac emergencies.

The population consisted of all patients who performed cultures of biological material during hospitalization in the general adult ICU, from October 2014 to April 2015.

Suring the studied period, 749 patients were admitted to the ICU. In the study period, the Nosocomial Infection Control Commission (NICC) reported 40 infections per laboratory criterion in 33 patients, and five presented more than one infection in the respective period.

In order to select the sample, the study adopted the following inclusion criterion: patients aged 18 years old or more who underwent cultures during ICU stay. Patients with negative cultures and with diagnosis of pneumonia without laboratory criteria were excluded. Thus, the final sample consisted of 33 patients with laboratory-confirmed infection.

The data collection used a form, with sociodemographic variables (gender, age, origin, length of hospital stay and outcome) and clinical variables (type of patient, presence of community infection, isolated microorganism, infection focus and sensitivity) built by the researchers based on literature. Initially, the knowledge of infection reports was obtained through NICC records and the results of microbiological exams and the electronic medical record of the patients available in the MV 2000i® system.

The statistical data analysis used simple measures such as: distribution of absolute and relative frequencies. However, in order to study the association between hospital infection and types of procedures, the prevalence ratios were calculated. The tables show the most significant data.

The study was carried out after approval by the Research Ethics Committee of the Federal University of Rio Grande do Norte (UFRN), with CAEE nº 36086414.0.0000.5537 in 2014, according to determinations of Resolution 466/12 of the National Health Council [8].

## RESULTS

There was a prevalence of infection of 5.3%. Table 1 below presents the sociodemographic characteristics and clinical data of the patients.

**Table 1** - Distribution of the evaluated patients according to the study variables. Natal, 2015 (n=33)

| Variable | Category | n | % |
|---|---|---|---|
| Gender | Male | 12 | 36.4 |
| | Female | 21 | 63.6 |
| Age | 18 - 30 years | 1 | 3.0 |
| | 31 - 61 years | 14 | 42.4 |
| | 62 - 92 years | 18 | 54.6 |
| Origin | Other units of the hospital | 26 | 78.8 |
| | Other hospitals | 4 | 12.1 |
| | Home | 3 | 9.1 |
| Type of patient | Surgical | 20 | 60.6 |
| | Clinical | 13 | 39.4 |
| Community infection | Yes | 2 | 6.0 |
| | No | 31 | 94.0 |
| | ICU discharge | 19 | 57.6 |
| Outcomes | Death | 14 | 42.4 |

The data in table 1 show that most of the respondents were female, with 21 (63.6%). The distribution by age group revealed that the minimum age was 18 years and the maximum, 92 years. However, the highest percentage was between 62 and 92 years (54.6%), with a mean age of 61.65 years and standard deviation of 14.90.

As to the origin of the hospitalized patients, 26 (78.8%) had been transferred to the ICU after hospitalization at other units of the same institution. Most of these patients

underwent surgeries and procedures at the surgical and/or hemodynamic center of the institution, corresponding to 20 (60.6%) of the sample. Regarding the length of ICU stay, it ranged from two to 66 days, with an average of 27.42 days and a standard deviation of 13.85.

Of the surveyed patients, 31 (94%) did not have a previous diagnosis of community infection, while the others, 2 (6%) individuals, were diagnosed with pneumonia and the other with central nervous system infection. Regarding the clinical outcome, 19 (57.6%) patients were discharged from the ICU and 14 (42.4%) died.

The respiratory system was the most frequent site of infection with 17 (42.5%) cases, followed by urinary 10 (25%), bloodstream 9 (22.5%), vascular catheter 3 (7.5%) and nervous system 1 (2.5%).

**Table 2** – Frequency of microorganisms associated with HCRI cases in patients admitted to the ICU from October 2014 to April 2015. Natal, RN, 2015.

| Microorganisms | Gram | n | % |
|---|---|---|---|
| *Acinetobacter* sp. | - | 11 | 29.0 |
| *Pseudomonas* sp. | - | 6 | 15.8 |
| *Klebsiella* sp. | - | 5 | 13.2 |
| *Staphylococcus aureus* | + | 4 | 10.5 |
| *Enterococcus* sp. | + | 3 | 7.9 |
| Estruturas leveduriformes | | 3 | 7.9 |
| *Citrobacter* sp. | - | 2 | 5.3 |
| *Streptococcus* sp. | + | 1 | 2.6 |
| *Escherichia coli* | - | 1 | 2.6 |
| *Serratia rubidea* | - | 1 | 2.6 |
| *Enterobacter* sp. | - | 1 | 2.6 |
| ***Total*** | | **38** | **100** |

Of the microorganisms isolated in the cultures, the highest frequency was gram-negative bacteria, corresponding to 27 (71.05%) cultures, being *Acinetobacter* sp. the most prevalent pathogen, followed by gram-positive bacteria, 8 (21.05%) cases, and finally the fungi, with 3 (7.9%) cases. In two culture results, the microorganisms were not identified and were only defined as non-fermenting gram-negative bacilli, as shown in table 2.

**Table 3** - Susceptibility profile of microorganisms isolated in cultures according to antibiogram. Natal, 2015.

| Antibiotics | *Klebsiella sp.* | | *Pseudomonas sp.* | | *Acinetobacter sp.* | |
|---|---|---|---|---|---|---|
| | n (5) | Resistance % | n (6) | n (11) | n (11) | Resistance % |
| Amoxicillin + Clavulanic Acid | 5 | 100.0 | 1 | - | - | - |
| Ampicillin | 5 | 100.0 | 1 | 1 | 1 | 18.2 |
| Ceftazidime | 4 | 80.0 | 2 | 11 | 11 | 100.0 |
| Cephalothin | 4 | 80.0 | - | - | - | - |
| Sulfa + trimethoprim | 4 | 80.0 | - | 7 | 7 | 63.6 |
| Gentamicin | 4 | 80.0 | 2 | 7 | 7 | 63.6 |
| Tetracycline | 3 | 60.0 | - | 4 | 4 | 36.7 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Ceftriaxone | 3 | 60.0 | - | 10 | 10 | 90.9 |
| Cefepime | 3 | 60.0 | 3 | 10 | 10 | 90.9 |
| Aztreonam | 2 | 40.0 | - | 2 | 2 | 18.2 |
| Ciprofloxacin | 2 | 40.0 | 3 | 9 | 9 | 81.8 |
| Imipenem | 2 | 40.0 | 3 | 8 | 8 | 72.7 |
| Meropenem | 2 | 40.0 | 2 | 7 | 7 | 63.6 |
| Nitrofurantoin | 2 | 40.0 | - | - | - | - |
| Norfloxacin | 2 | 40.0 | - | - | - | - |
| Cefazolin | 2 | 40.0 | - | - | - | - |
| Piperacillin + tazobactam | 1 | 20.0 | 1 | 8 | 8 | 72.7 |
| Cefoxitin | 1 | 20.0 | - | - | - | - |
| Chloramphenicol | 1 | 20.0 | - | - | - | - |
| Amikacin | - | - | - | 5 | 5 | 45.4 |

Table 3 represents the percentage of resistance and sensitivity to the antibiotics of the three most frequent microorganisms that were isolated in the cultures of patients hospitalized in ICU. In this sense, *Klebsiella* sp. was 100% resistant to penicillin: ampicillin and amoxicillin plus clavulanic acid. Half of the *Pseudomonas* sp. presented resistance to imipenem, cefepime and ciprofloxacin. All Acinetobacteres were resistant to ceftazidime, followed by ceftriaxone and cefepime.

## DISCUSSION

The prevalence rate of infection was 5.3% for infections confirmed with positive culture of biological material at the ICU under study. Other studies found larger results, with values of 23.4% and 27%, respectively[9-10].

The data obtained regarding the gender of the patients confirmed the predominance of the female gender, unlike what other studies found, with a frequency greater than male[2,11-12]. Another study found similar age, with a mean of 63.02 years[10].

Thus, the data show that the elderly population represents an age group that needs health services more frequently, a fact that is justified by the natural aging process and the presence of chronic diseases, requiring highly complex resources [11].

The length of stay of patients in the ICU was high and a study carried out at a teaching hospital in the state of Pernambuco found similar result, with a mean of 21 days and a standard deviation of 20 days[13]. The long stay at the ICU presented a strong relationship with colonization by multiresistant microorganisms for the occurrence of HCRI, because, with the prolonged hospitalization time, the patient is exposed to other risk factors resulting from his/her clinical severity, need for invasive procedures and the risk of cross-infection[14]. As observed in the present study, 60.6% of the patients were surgical and, due to the need for prolonged hospitalization, they were colonized or infected by pathogenic microorganisms.

In 6% of the sample, there was diagnosis of prior community infection, which implies a greater chance of infection during ICU stay compared to patients without previous infection[6].

The mortality rate found was 42.4%. Other studies found similar data, in which 42.5% and 50% of the patients died during ICU hospitalization[9,12]. The mortality rate at the ICU is known to be high, varying between 9 and 38% depending mainly on the profile

of the assisted clientele. When it comes to mortality in patients who developed HCRI, this rate can reach 70% of the cases[14].

Multi-resistant microorganisms often fail to cause infection, but only colonization thus constitutes a hidden reservoir for the spread of these pathogens, and a large number of these patients receive antimicrobial treatment even without an indication[15]. The frequency of positive cultures identified at the ICU and presented in this research does not determine the occurrence of infection in the patient, since correlation with the clinical evolution of the patient is necessary, since determinants of the individual, such as immunity, may not allow the infectious process.

Pneumonia acquired at the ICU associates with an increased hospitalization time and higher hospital costs, and may relate to ventilation-associated pneumonia (VAP) and to non-ventilated patients[16]. As pointed out in the present study, in most ICUs, VAP is the most common among infections associated with invasive devices[17]. A retrospective study of four ICUs from a public hospital in Fortaleza (CE) revealed a superiority of respiratory infections, corresponding to 65.3% (132) of the cases, followed by a 17.8% infection of the bloodstream and 16.9% Urinary Tract Infection (UTI) [18].

VAP is recognized as the main infection causing high hospital mortality, especially when associated with antibiotic resistant bacteria, ranging from 20% to 70% of the cases and relates to a worse clinical outcome when caused by *P. aeruginosa* and *A. baumannii*[18] . In this study, the frequency of these pathogens was 23.5% and 35.3%, respectively. A study carried out at an ICU of a teaching hospital in Recife (PE) found approximate results, with superiority of *Acinetobacter* sp. in 23.9% of the sample[13]. The high occurrence of VAP associated with *A. baumannii* occurs due to its ability to form biofilms on the surface of the orotracheal tube, predisposing colonization in the lower respiratory tract of the individual[19].

UTI is characterized by the presence of an invading microorganism in any component of the urinary tract and accounts for about 30% of infections common in the hospital environment[20]. When related to bladder catheterization, its contamination may occur during insertion of the catheter resulting from failure of aseptic technique; by ascending periurethral way, through the extraluminal environment between the probe and the urethral lumen; by intraluminal contamination[13].

UTIs in the hospital environment have a microbial profile different from those acquired in the community, generally related to gram-negative bacteria such as: *Pseudomonas aeruginosa*, *Proteus* sp., *Klebsiella* sp., *Enterobacter* sp., and some gram-positive bacteria such as *Enterococcus* and *Staphylococcus*, and *Candida* sp. fungi[21]. In this study, *Klebsiella* sp. and *Citrobacter* were present in 60% of cases of UTI. They usually make up the microbiota of the man's intestine, mainly in the feces, so, due to its proximity to the genito-urinary tract, it and other enterobacteria commonly occur in the UTI[22].

Central Vascular Catheters (CVC) are routinely implanted devices in critical patients for treatment and care assistance. Nevertheless, it is a means of disseminating local or systemic infections, depending on the type of catheter, handling techniques, frequency of manipulation in addition to the individual's susceptibility[13].

In the etiology of these infections, *Staphylococcus* sp. is the most frequent pathogen. However, gram-negative bacilli, such as *Candica* sp. and *Enterococcus* are also involved. Differently from the results of the present study, in which *Pseudomonas* sp. and *Acinetobacter* sp. were isolated, which are pathogens frequently involved in infections when the patient underwent excessive antimicrobial therapy[23].

Bloodstream infections, which, in this study, was the third most common ICU infection, present two common explanations of colonization. The first concerns the migration of microorganisms from the skin to the incision, causing colonization of the catheter tip. The second results from catheter contamination, usually by manipulation, resulting in colonization of the catheter by migration of microorganisms. In addition, factors such as catheterization time, catheter material type, system handling techniques, ability of adherence of organisms, among others, are involved[18].

The most frequent pathogens isolated in this type of infection were *Acinetobacter* sp. with 33.3% of the cases, followed by *Staphylococcus* sp. with 22.2% cases, and one case of *E. coli*, *Klebsiella*, leuriform structures and non-fermenting bacilli. Differently from what another study[24] observed, with a sample of 170 blood cultures, infections by *Staphylococcus aureus* and *S. epidermidis* corresponded to 58.5% of the sample and *Acinetobacter baumanni*, to 3.3% of the sample.

A study carried out at the ICU of a public hospital in Paraná identified 2.08% of infections in the Cerebrospinal fluid (CSF), corroborating with results observed in the present study, having as the isolated pathogen *Acinetobacter* sp.[25]. The prevalence of isolated microorganisms in cultures corroborates a study carried out at a hospital in João Pessoa (PB), which reported *Pseudomonas aeruginosa*, *Acinetobacter* and *Klebsiella Pneumoniae*, with frequencies of 31.58%, 15.79% and 10.53% respectively[10].

In the 1970s, gram-negative bacilli were more prevalent than gram-positive bacilli; however, with increased use of cephalosporins and invasive procedures by patients, gram-positive infection has been increasing in the hospital setting. As in the present study, another study[17] showed a higher frequency of gram-negative microorganisms (54.86%), followed by gram-positive (24.55%) and *Candida* (19.43%).

The genus *Acinetobacter* sp., which has an important characteristic for survival in different types of environment (soil, water, vegetables, animals, skin and gastrointestinal tract of healthy humans), was the most identified pathogen in the studied cultures, corresponding to 29% of the notification cases, due to their ability to undergo nutritional and metabolic adaptations. The species *A. baumannii* is an opportunistic microorganism that frequently affects patients in the hospital environment, rarely isolated in the community, in immunocompromised individuals or undergoing invasive procedures, causing bacteremia, respiratory, urinary, soft tissue and meningitis infections. Its pathogenicity relates to its ability to adhere to inanimate surfaces and to form biofilms, susceptibility to antimicrobial resistance and to acquire genetic material from independent genera, resulting in a versatile pathogen, complicated to control and eliminate[19,26].

*Staphylococcus aureus* was the most isolated gram-positive microorganism present in 10.5% of the cases and related to infections of the blood and respiratory tract. This is naturally present in the human skin, representing a pathogenic risk when there is a rupture of the skin barrier or immunosuppression[18].

Antimicrobial resistance is an event that affects developed and underdeveloped countries, and the occurrence of multidrug resistance has been increasing in health services and in the community. This problem is aggravated by the lack of innovation for the creation of new antibiotics, with the risk of returning to a pre-antibiotic period[27].

An important factor related to the occurrence of persistent infections and the phenomenon of antimicrobial resistance constitutes the formation of biofilms. It is characterized as a community of bacteria that are organized in a polymeric matrix in

the extracellular environment, being able to unite with biotic and abiotic surfaces, increasing its capacity of adaptation in the most diverse environments[28].

The resistance of *Klebsiella* sp. has an important characteristic that is the antimicrobial resistance intrinsic to ampicillin, because it possesses the chromosomal beta-lactamase (SHV1), guaranteeing ability to resist in the most adverse means of selective pressure by antibiotics[29]. This resistance profile was 100% in the present study.

Nevertheless, *Klebisiela pneumoniae oxytoca* has the K1 enzyme, which has a broader behavior when compared to SHV1, and about 20% of them have the capacity to produce this beta-lactamase and become resistant to all penicillins, cefotaxin, cefetriaxon, aztreonan, but without resistance to carbapenics [30].

Frequently, infections caused by *Pseudomonas aeruginosa* are resistant to third- and fourth-generation cephalosporins and carbapenems (such as imipenem and meropenem)[18], corroborating the present study, with a 50% resistance to cefepime and imipenem.

There is a growing increase in the isolation of non-fermenting gram-negative bacteria, such as *Acinetobacter* and *Pseudomonas*, which are resistant to third- and fourth-generation cephalosporins, thus carbapenems become the main drug for the treatment of these microorganisms[31], corroborating the research data, which identified 100% resistance of *Acinetobacter* sp. to ceftazidime, and 90.9%, to ceftriaxone and cefepime. However, the resistance of *Acinetobacter* sp. to the class of carbapenems currently relates mainly to the production of class D b-lactamases[26]. As identified in the present study, in which this pathogen presented resistance to imipenem and meropenem of 72.7% and 63.6%, respectively.

From the above, we can observe that multidisciplinary health team that works in the ICU should have knowledge on the resistance profile of microorganisms in order to raise awareness and allow the adequacy of precautionary measures in addition to adequate medical prescription of antibiotics. The main and most economical measure to be practiced by the team is the constant washing of hands, as they are an important means of conducting pathogens[18,32].

Nurses play an important role in the success of infection control programs in critical care, as they perform many measures that reduce the risk of infection that are part of their routine, such as handling the vascular catheter, artificial airway and oral hygiene[15]. In addition to continuing education activities, active surveillance, epidemiological and antimicrobial and control of multiresistant microorganisms, allowing returning this data to the team[32].

The prescription of antibiotics performed by the intensivist physician consists of a task that requires deep technical and scientific knowledge. For a critical patient, there are several pathophysiological changes due to severe acute disease or sepsis, such as increased capillary permeability, poor volume distribution and increased interstitial space, hepatic and/or renal impairment affecting pharmacokinetics/ pharmacodynamics of antimicrobials. Thus, optimal empirical microbial therapy provides adequate mode of administration and dosage. It should be adapted, if necessary, in the presence of microbiological results of cultures, for reduction of frequency of doses and/or narrowing of the antimicrobial spectrum [15].

## CONCLUSION

The prevalence of Health Care-Related Infection (HCRI) in patients admitted to an intensive care unit (ICU) was 5.3%, representing a lower value than what the literature describes. The analysis of participants' sociodemographic data revealed that most of them were elders and female.

The execution of surveillance cultures in the admissions of patients in the studied ICU is a routine activity, with greater attention to individuals with long hospital stay, from other hospital institutions and with previously diagnosed infection. In the studied group, gram-negative bacteria, especially *Acinetobacter* sp., the most common pathogen and characterized as an opportunistic microorganism that frequently affects patients in the hospital environment, caused most infections.

Retrospective data collection made it impossible to follow the clinical evolution of the hospitalized patients, regarding changes in the clinical condition after the introduction of the antibiotic, and the need for readjustment of the antibiotics, which would be relevant for discussion, thus configuring a limitation.

The control of HCRI represents a difficult task, requiring joint action of the multiprofessional team that provides assistance to the critical patient, through the hygiene of the hands of professionals, adequacy of materials and equipment, human resources; use of collective and individual protection equipment; disinfection of the environment; epidemiological surveillance, identification of multiresistant pathogens and adequate treatment, continuing education for staff, among other measures that are essential to reduce HCRI rates.

The NICC has a relevant role in the hospital and especially in critical sectors such as the ICU through the standardization of practices and routines necessary to reduce these rates and improve the quality of care.

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