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ORIGINAL ARTICLE

PROFILE OF HOSPITAL INFECTIONS IN THE INTENSIVE CARE UNITS OF AN EMERGENCY HOSPITAL

PERFIL DAS INFECÇÕES HOSPITALARES NAS UNIDADES DE TERAPIA INTENSIVA DE UM HOSPITAL DE URGÊNCIA

PERFIL DE LAS INFECCIONES HOSPITALARIAS EN LAS UNIDADES DE CUIDADOS INTENSIVOS DE UN HOSPITAL DE URGENCIAS

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ABSTRACT

Objective: evaluating the profile of nosocomial infections in intensive care units of a tertiary public hospital. ***Method:*** an exploratory, descriptive, prospective, cross-sectional study of a quantitative approach, from the epidemiological survey conducted in medical records of two intensive care units in Piaui/PI. The sample consisted of 27 patients who acquired infection. There was used Action statistical software. The test results were displayed in tables and figures and the discussion was based on the literature. The study had the project approved by the Research Ethics Committee, CAAE: 35877614.0.0000.5512. ***Results:*** the hospital infection rate was of 43,5%. Regarding invasive procedures, all patients received urinary catheterization and peripheral venous access; there was identified superiority in cases of respiratory infection. The bacterium with the largest number of episodes was Pseudomonas aeruginosa (34,6%). ***Conclusion:*** hospital infection rates in this service were quite high. ***Descriptors:*** Nosocomial Infection; Epidemiology; Intensive Care Unit.

RESUMO

Objetivo: avaliar o perfil das infecções hospitalares em unidades de terapia intensiva de um hospital público terciário. ***Método:*** estudo exploratório, descritivo, prospectivo, de corte transversal, com abordagem quantitativa, a partir do levantamento epidemiológico realizado em prontuários de duas unidades de terapia intensiva do Piauí/PI. A amostra foi constituída por 27 pacientes que adquiriram infecção. Foi utilizado o software de estatística Action. Os resultados das análises foram expostos em tabelas e figuras e a discussão foi feita com base na literatura. O estudo teve o projeto aprovado pelo Comitê de Ética em Pesquisa, CAAE: 35877614.0.0000.5512. ***Resultados:*** a taxa de infecção hospitalar foi de 43,5%. Quanto aos procedimentos invasivos, todos os pacientes receberam sondagem vesical e acesso venoso periférico, identificou-se superioridade nos casos de infecção respiratória. A bactéria com maior número de episódios foi a Pseudomonas aeruginosa (34,6%). ***Conclusão:*** as taxas de infecção hospitalar neste serviço mostraram-se bastante elevadas. ***Descritores:*** Infecção Hospitalar; Epidemiologia; Unidade de Terapia Intensiva.

RESUMEN

Objetivo: evaluar el perfil de las infecciones nosocomiales en las unidades de cuidados intensivos de un hospital público de tercer nivel. ***Método:*** un estudio exploratorio, descriptivo, prospectivo, transversal, con enfoque cuantitativo, a partir de la encuesta epidemiológica realizada en gráficos de dos unidades de cuidados intensivos de Piauí/PI. La muestra se formó con 27 pacientes que adquirieron la infección. Se utilizó el software estadístico Action. Los resultados del análisis se muestran en las tablas y figuras, y la discusión se basó en la literatura. El estudio tenía el proyecto aprobado por el Comité de Ética en la Investigación, CAAE: 35877614.0.0000.5512. ***Resultados:*** la tasa de infección hospitalaria fue de 43,5%. En cuanto a los procedimientos invasivos, todos los pacientes recibieron cateterización urinaria y el acceso venoso periférico, ha identificado superioridad en los casos de infección respiratoria. La bacteria con el mayor número de episodios fue la Pseudomonas aeruginosa (34,6%). ***Conclusión:*** las tasas de infección hospitalaria en este servicio eran bastante altas. ***Descriptores:*** Infección Nosocomial; Epidemiología; Unidad de Cuidados Intensivos.

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INTRODUCTION

The Nosocomial Infection (IH-in Portuguese) emerged with the advent of the hospital, becoming a major problem for global public health, increasing morbidity and mortality among patients and increasing hospital costs, basically due to the use of procedures each time more sophisticated, the pathogenicity of microorganisms and inadvertent use of antimicrobials resulting in the emergence of microbial resistance to these drugs.[1] The presence of resistant microorganisms is a great generator of clinical and economic impact.[2]

Hospital infection is a major concern found within the hospitals, especially in intensive care units (ICUs), it is the most frequent and important complication in hospitalized patients.[2]

In intensive care units, patients are confined to bed for a long time, immunocompromised patients with serious diseases who require invasive monitoring and the use of broad-spectrum antibiotics, making them more susceptible to IH.[3] In recent years, the incidence of hospital-associated infection resistant microorganisms has increased worldwide.[4]

Complications of these nosocomial infections are due to difference between the anti-infective defense mechanisms of the body related to an primary disease and the therapeutic or diagnostic aggression and opportunistic pathogens that are the resident microbiota or transient host, so all local complications or systemic, anatomical or functional human body are potentially facilitate the emergence of infectious process.[5]

In Piaui/PI, this situation is similar, for an epidemiological survey conducted in the first six months of 2011 in a public hospital of high complexity reference, showed a prevalence rate of IH in 24% ICUs. It is the ICU 1 to account for the highest 64.1% infection rate while the ICU 2 had a prevalence of 18.9%, well above the tolerance standards recommended by the Ministry of Health.[1]

The control ICUs in infections is a complex issue and very important for the proper functioning of the unit, showing, therefore, the need to protect both individual patients and the realization of appropriate techniques and procedures to avoid any injury to the patient, another no less important factor is the cleanliness of the hospital environment.[6]

With the global end of reducing at the national level the incidence of Infections Related to Health Care (IRAS) and resistance to the National Health Surveillance Agency (ANVISA) published in 2012, Ordinance number 1218, from January 2014, all health services that have ICU mandatorily shall notify each month to ANVISA on its data to the primary bloodstream infection associated with central venous catheter infection and in surgery: cesarean section, in addition to microbial resistance indicators identified.[7]

The use of information, training, commitment and awareness of the medical staff and employees about the importance of daily use of the standards recommended by the Hospital Infection Control Commission (CCIH), it is possible to obtain significant and satisfactory results in decreased cases of nosocomial infection, improving health care quality.[8] Thus, this study aims to:

♦ Assessing the profile of nosocomial infections in Intensive Care Units of a tertiary public hospital.

METHOD

This is an exploratory, descriptive, prospective, cross-sectional cohort study of a quantitative approach conducted with patients diagnosed with nosocomial infection in intensive care unit of a referral hospital for high complexity in the State of Piaui/PI.

The study was conducted in two intensive care units of the hospital, called clinical ICU and neurosurgical ICU, which have a total of 16 beds, divided into clinical ICU with eight beds and neurosurgical ICU with eight beds. It is a bed of each unit intended for patients in isolation.

The hospital where this work took place was in the city of Teresina, the capital of the State Piaui/PI. It was chosen because it is in a public tertiary hospital, teaching and of reference to the high complexity for the State of Piaui, assisting patients coming from the state and from neighboring states.

The sample under study consisted of 27 patients admitted in the months of September and October 2014 those presented the diagnosis of hospital infections, according to criteria established by the Ministry of Health.

There were considered as inclusion criteria: patients aged from 20 (twenty) years old, admitted to the ICU - Clinic and ICU - Neurosurgical showing signs suggestive of nosocomial infection with positive culture, being followed from admission until discharge from this unit, through visits of researchers conducted daily to assess the positive culture results and other information contained in the medical records. Data were collected daily in patients' records.

There was used the statistical software Action, which has as a base the R platform together with Excel software. To assist in the organization of statistical data, the analysis results were displayed in tables and figures and the discussion was based on the literature.

The study had the research project approved by the Research Ethics Committee of the Federal University of Piaui/UFPI, CAAE: 35877614.0.0000.5512.

RESULTS

The population of patients hospitalized in the period established for the collection: September and October 2014, was of 62 patients. Of this total, 27 patients amounted to sample. So, it is appropriate the use of a small sample considering the use of a low rotativity in the ICUs under study. It was observed that the predominant age group consists of patients who are 60 or older, corresponding to 12 (44,5%) patients, followed by between 20 and 39 (33,3%) and with less influence the range of 40 to 59 years old (22,2%). It turns out that the average age is of 52,6 years old.

Table 1. Hospital infection rate in clinic ICU and neurosurgical ICU. Teresina, 2014.

	Sector						Total		
	Clinic ICU			Neurosurgical ICU					
	P	n	%	P	n	%	P	n	%
Total	29	13	44,8	33	14	42,4	62	27	43,5

Legend: P= number of patients hospitalized; n= positive number of culture and % = IH rate.

During the period established for research, 62 patients were hospitalized, being 29 patients in the clinical ICU and 33 patients in the neurosurgical ICU. The rate of hospital infection per intensive care unit was of 43,5% with 27 positive results of culture. There was no significant difference between the units, 44,8% (13) patients with IH in clinical ICU and 42,4% (14) patients in the neurosurgical ICU.

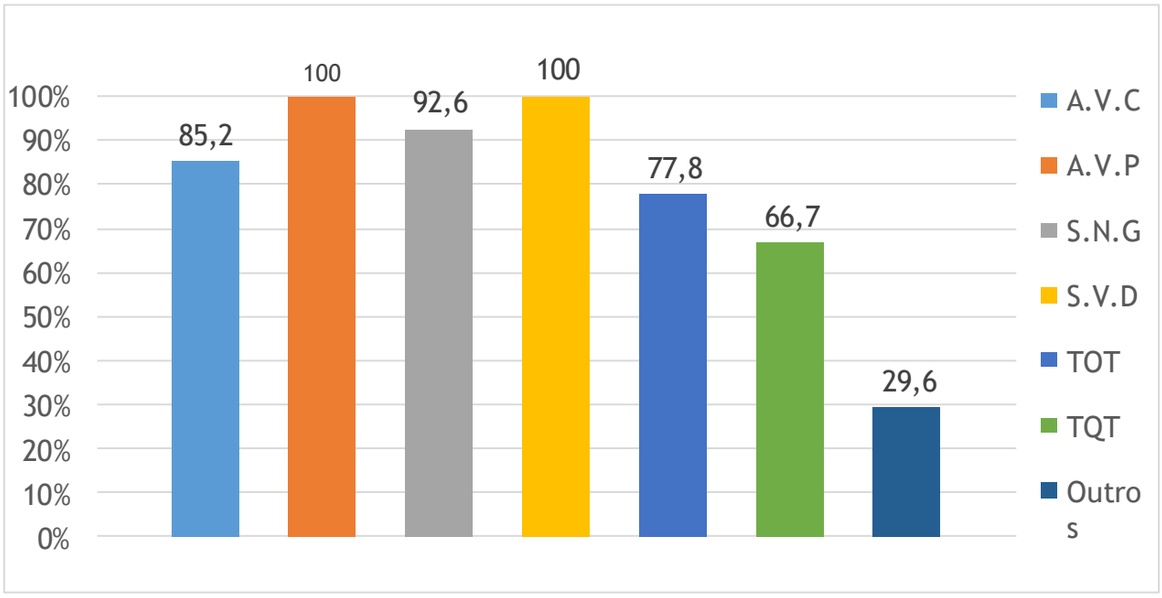

Figure 1. Main invasive procedures performed on inpatients with positive culture result in ICUs. Teresina-PI, 2014.
Legend: AVC: central venous Access; AVP: Peripheral Venous Access; SNG: Nasogastric Tube; SVD: Probe of delay; TOT: Orotracheal Tube; TQT: Tracheostomy.

The vesical polling delay (SVD) and peripheral venous access (AVP) were performed in all patients n = 27 (100%) with positive culture result in both ICUs, followed by nasogastric probe (NGP) performed in 25 patients (92,6%), soon after, central venous access (CVA) n = 23 (85,2%).

Table 2. Description of the sample according to site of infection. Teresina-PI, 2014.

Site of Infection	Clinic ICU	Neurosurgical ICU	Total	%
Tracheal secretion	10	8	18	66,7
Blood culture	6	6	12	44,4
Urine culture	6	2	8	29,6
Catheter tip	4	3	7	25,9
Other	0	1	1	3,7
Indeterminate	3	5	8	29,6

From the occurrence of 27 cases of nosocomial infection in the units under study, it identifies the superiority of cases of respiratory infection, with 66.7% (18); 44,4% (12) reported cases of bloodstream infection; 29,6% (8) of urinary tract infection (UTI); 25,9% (7) infections from catheter tip collection; and 3,7% (1) infection elsewhere. 29,6% (8) patients had no notification about their results, considering therefore as undetermined site.

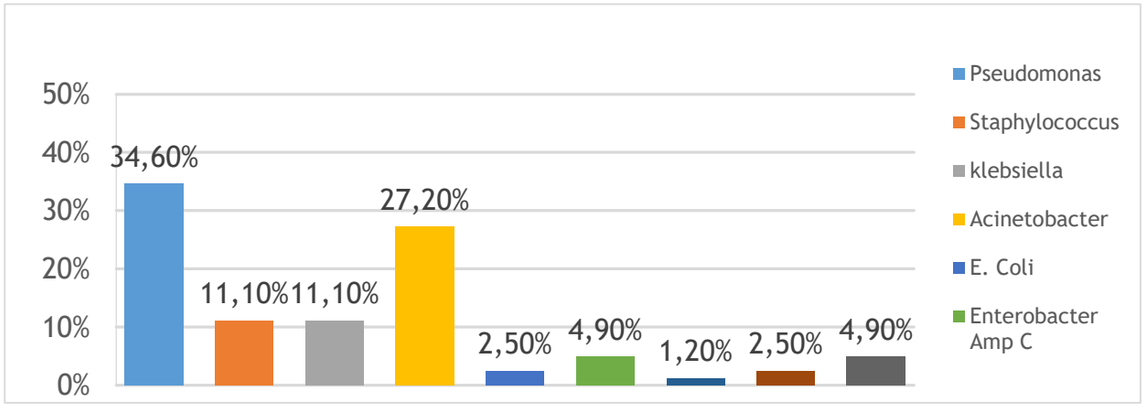

Figure 2. Main microorganisms causing nosocomial infection in ICUs. Teresina-PI, 2014.

The most common microorganisms were: Pseudomonas aeruginosa, 28 episodes (34,6%), followed by Acinetobacter baumannii with 22 episodes (27,2%), Staphylococcus aureus and Klebsiella after with 9 episodes (11,1%). It was also noted that some microorganisms were present in more than one culture.

Table 3. Evaluation of the clinical outcome of patients with nosocomial infection in ICU. Teresina-PI, 2014.

Clinical Outcome	Sector				Total	
	Clinic ICU		Neuro ICU			
	n	%	n	%	n	%
Clinic	4	14,8	8	29,7	12	44,5
Death	7	25,9	5	18,6	12	44,5
Indeterminate	2	7,4	1	3,7	3	11
Total	13	48,1	14	51,9	27	100

Table 3 shows a misgiving of data of the distribution of the sample (n = 27) and the clinical outcome in the ICUs. It demonstrates equivalence in the total of patients who were discharged and died, both 12 (44,5%) patients. It is considered as indeterminate outcome patients who remained hospitalized in the units after the date established in this study for data collection; it is not possible to know the fate of the same.

DISCUSSION

Hospital infections increase morbidity and mortality rates, increase the cost for therapeutic diagnostic procedures, greater use of hospital beds, and reflect the socioeconomic relations with the patient. In this context, the ICU is an important focus of attention related to care practices to represent on average from 20 to 30% of all infections reported in hospitals.[4]

There was a predominance of males (59,3%) compared to females, a fact that highlights the feminization of society. Data analysis demonstrated in this study showed high hospital infection rates, with a prevalence of 43,5% (Table 2), above the maximum rate recommended tolerance by the World Health Organization which is 2% for the hospital as a whole and 9-20% in ICUs. The Ministry of Health recommends lower rates than 6% of hospital infection for the entire hospital.[9]

Nosocomial infection rates are higher in large and teaching hospitals; it varies according to the type of monitoring use and the complexity of the hospital. Infection rates in intensive care unit between 18 and 54%,

with about five to ten times more than in other hospital inpatient units.[4,10]

A study conducted in 2012, revealed hospital infection rate of 20,3% in 246 patients. However, one of the months of research (December) had the highest infection rate, with a population of 58 hospitalized patients, of whom 29 were infected, ie 50% of those who were in intensive care had hospital infection records.[11] The rate of infection in this study is within the range of the percentage found in the literature.

The main source of outbreak of multiresistant bacteria is in the ICU, due to excessive consumption of antimicrobials, routine use of invasive techniques and the presence of patients with serious diseases.[12]

With respect to invasive procedures, all patients used at least one procedure. With other studies the indwelling catheter was performed in all patients n = 76 (100%), becoming the second leading cause of infection by this topography. Also, found similar results as the nasogastric probing n = 56 (85,5%) and central venous access n = 56 (73,7%).[1]

Central venous catheterization is of utmost importance in the needy patient approach intensive care by the underlying hemodynamic instability requiring aggressive fluid therapy, administration of hyper-osmolar solutions and irritating to the peripheral venous system and hemodynamic monitoring. Despite its almost imperative, this technique entails various risks, both local and systemic. The bacteremia associated with Central Venous Catheter (CVC) is a risk that requires nurse's specific performance and critical when necessary insertion, maintenance/handling and removal.[13]

Urinary tract infection related to SVD represents a three times higher risk of death; it is taken into consideration other comorbid conditions, and approximately 80% of these infections occur after urinary catheterization and patients require intravenous antimicrobial treatment.[14]

About the superiority of cases of respiratory infections, and especially infection of the bloodstream and urinary tract, it is clear that this is corroborated with similar results of studies reported in the literature.[11] In another study, the respiratory infection predominated, with a rate of 29%, then 27% of bloodstream infection, 17% of urinary tract.[14-5]

These findings contradict the results of other studies, where infections of the respiratory tract are less recurrent than urinary infections.[4] Respiratory infection is caused mainly due to immunosuppression, the pathogen inoculation in the respiratory tract of the patient, negating the defense, or high virulence of the microorganism. It is the most important cause of morbidity and mortality in intensive care units, the most frequent, with more cases double compared to urinary tract.[5]

Intubated patients lose the natural barrier between the oropharynx and trachea, eliminating the cough reflex and promoting the accumulation of contaminated secretions above the cuff, allowing greater colonization of the tracheobronchial tree and aspiration of contaminated secretions to the lower airways. The prolonged duration of mechanical ventilation in patients with tracheal intubation is associated with increased morbidity and mortality in ICU. Associated ventilator pneumonia presents a risk for its occurrence from 1% to 3% every day on mechanical ventilation. The risk factor for pneumonia increases from 6 to 20 times in patients who are in OTI and VM.[12]

This type of infection occurs by repeated aspiration of small amounts of secretions from the upper airway, aspiration of gastric contents, hematogenous spread of a focus distance or exploitation due to respiratory infection. [16] The literature also reports high incidence of urinary tract infections, with percentages of 37,6%.[4]

Infections related to health care determined by multi-resistant bacteria pose a significant public health problem in expansion, requiring joint action practices to prevent and control them and antimicrobials, holdings of the clinical staff and efficient analytical detection.[16]

Regarding the microbiological study, the highlights were Pseudomonas aeruginosa, Acinetobacter baumannii, Staphylococcus aureus and Klebsiella spp. However, it does not mean that the infections were caused by resistant microorganisms isolated, only that the settlements were in many cases associated with the presence of the same or other microorganisms in developed infections.

A study identified 343 colonization by 13 different resistant microorganisms and the five most common accounted for over 90% of cases (Acinetobacter baumannii, 36,3%; Pseudomonas aeruginosa, 21,9%; Staphylcoccus aureus, 14,7%; Klebsiella pneumonia and Escherichia coli 11%, 7,8%. According to Julius (2013), the most common pathogens involved in the infection treated patients in the ICU are: Escherichia coli, Pseudomonas aeruginosa, Staphylococcus aureus and Enterococcus spp increasingly

resistant type of treatment available, increasing the length of stay, requiring higher cost of drugs and an increase in morbidity and mortality.[4]

Another study identified as the three main microorganisms responsible for infections: Pseudomonas aeruginosa 33,8% (51), S. aureus 25,2% (38) and Acinetobacter spp. 12,6% (19). Similar results were found by other studies those identified as more often resistant microorganisms causing hospital infections the pathogens Acinetobacte rbaumannii and Pseudomonas aeruginosa.[4]

Pseudomonas aeruginosa is responsible for infections in various parts of the body, especially in immunocompromised patients, altered mental status, prolonged intubation or tracheostomy, known by its intrinsic resistance to many antibiotics due to various mechanisms.[17-19]

The Pseudomonas aeruginosa is an increase of antimicrobial resistance most commonly used in its treatment, highlighting the most antimicrobial action spectrum as carbapenems and anti-pseudomonas cephalosporin which are the main treatment options currently used. [18-19] Another microorganism resistant to a large number of antimicrobials is Klebsiella pneumoniae, which is among the major pathogens that cause bacteremia in the United States and Canada.[20-21]

Regarding the death rate, the findings of this study have been corroborated by other studies that had similar death rates, revealing institutional mortality rate of 46,6%, with no statistically significant difference in the distribution of death among patients who had nosocomial infection and those who did not have this injury.[21-23]

A study reported positive relationship between increased mortality and patients with nosocomial infection. They report that among 195 (10,3%) deaths that occurred in their study, 39,5% (77) were patients who developed IH.[4]

CONCLUSION

The present study showed the profile of nosocomial infections in the studied ICUs, where it was found that this grievance has predominant age group of 12 elderly patients (44,5%), 16 male (59,3%) mostly and are residents in the countryside of the State of Piaui 14 (51,9%).

The hospital infection rates in ICUs were high (43,5%) compared to the recommended by the World Health Organization laying down 9-20%. However, when comparing the results of the two units studied: clinical ICU (44,8%) and neurosurgical ICU (42,4%), we observed no significant difference. Thus, it is pointed out as a problem the prevalence of it.

The procedures most commonly used were the indwelling catheter and the peripheral venous access (100%), the most involved site of infection of the respiratory tract infection (66,6%).

The case fatality rate was of 50% (n = 12), taking into account the patients who had their particular outcome, and clinical ICU responsible for the largest number of deaths, 58,3% (n = 7).

In the face of the analysis, it is considered very important to carry out studies for a longer period of time to assist hospitalized patients, so that it is possible to obtain a more representative sample and achieve more concrete results.

It is worth mentioning the importance of valuing and strengthening of CCIH of the institution so that it can act more effectively, preventing problems related to infectious complications, taking a greater dimension than the situation itself already shows.

There were identified high rates of hospital infection and mortality compared to those shown in the literature, revealing a worrying situation and that demand for urgent action by the management of the institution, which should motivate and qualify the multidisciplinary team, aiming at reducing risks and improving the quality of care provided to patients.

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