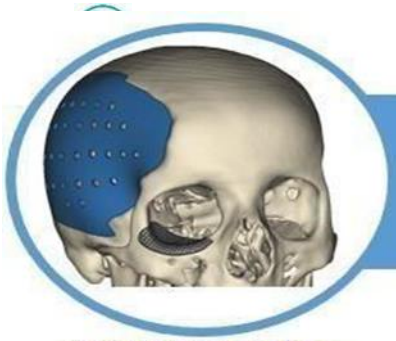

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Epidemiological screening of pathogenicity factors associated with multidrug-resistant bacteria isolated in uroculture of hospitalized neonates in the lakes region from Rio de Janeiro.

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ARTIGO ORIGINAL

Abstract

The discovery of antimicrobials revolutionized the treatment of infectious diseases caused by bacteria, as they are drugs that contribute to reducing morbidity and mortality rates associated with infectious diseases (JANEBRO, et al., 2008). However, the irrational use of antimicrobial drugs represents one of the main concerns worldwide, since the misuse of these drugs accelerates the natural process of bacteria resistance to antibiotics (ZIMERMAN, 2010). In view of all these problems, the objective of this study was to evaluate the profile of resistance of bacteria identified in the urine culture of neonates who are hospitalized, based on the records of the Laboratory of Clinical Analysis of a hospital in the lakes region from Rio de Janeiro. To do so, we used the following methodologies: (i) literature review for contextualization of the problem and basis for discussion; (ii) and monitoring of a descriptive observational study that had as instrument the reports of records containing results of urine culture and antibiogram of neonatal patients, referring to the period from January 2020 to September 2021. The results showed a higher incidence of Escherichia coli (44% - 2020; 56% - 2021) among the microorganisms isolated in the analyzed urine cultures, followed by Klebsiella pneumoniae (14% - 2020; 28% - 2021). Antimicrobials from the β-lactam group caused high bacterial resistance, among the strains of different microorganisms analyzed, increasingly indicating the need for the replacement of these drugs in the clinic, in order to choose a better therapy for the patient. As in any infectious pathology, to establish appropriate prevention and treatment of community-acquired urinary tract infections, effective and continuous research is needed, with the goal of defining in detail the etiology and profile of bacterial resistance in regional, national, and international standards. It is hoped that these new data profiling the level of resistance in which microorganisms isolated from neonatal patients admitted under hospital regimen are found will be of great value to the academic community and to health professionals, providing users with increasingly accurate and quality treatment.

Keywords: Bacterial Resistance, UTI, Antimicrobials, Clinical Analysis

Triagem epidemiológica de fatores de patogenicidade associados a bactérias multirresistentes isoladas em urocultura de neonatos hospitalizados na região dos lagos do Rio de Janeiro.

Resumo

A descoberta dos antimicrobianos revolucionou o tratamento das doenças infecciosas causadas por bactérias, por serem fármacos que contribuem para a diminuição de taxas de morbidade e mortalidade associadas a doenças infecciosas (JANEBRO, et al., 2008) Em contrapartida, o uso irracional das drogas antimicrobianas representa uma das principais preocupações mundiais, visto que, o mau uso desses fármacos acelera o processo natural de resistência das bactérias aos antibióticos (ZIMERMAN, 2010. Diante de toda está problemática o objetivo desse trabalho é avaliar o perfil de resistência das bactérias identificadas na cultura de urina dos neonatos que estão internados sob-regime hospitalar, a partir dos registros do Laboratório de Análises Clínicas de um Hospital da Região dos Lagos, RJ. Para tanto, utilizamos as seguintes metodologias: (i) revisão literária para contextualização do problema e base para discussão; (ii) e monitoramento de um estudo observacional descritivo que teve como instrumento os relatórios de registros contendo resultados da urucultura e antibiograma dos pacientes neonatais, referentes ao período de janeiro de 2020 a setembro de 2021. Os resultados mostraram uma maior incidência de Escherichia coli (44% - 2020; 56% - 2021) dentre os microrganismos isolados nas uroculturas analisadas, em sequência a Klebsiella pneumoniae (14% - 2020; 28% - 2021). Os antimicrobianos do grupo dos β-lactâmicos causaram alta resistência bacteriana, entre as cepas de diferentes microrganismos analisadas, indicando cada vez mais a necessidade da substituição destes medicamentos na clínica, com o objetivo de escolher uma melhor terapêutica para o paciente. Como em qualquer patologia infecciosa, para estabelecer a prevenção e o tratamento adequado das infecções do trato urinário adquiridas na comunidade, são necessárias pesquisas efetivas e contínuas, com o objetivo de definir detalhadamente a etiologia e o perfil da resistência bacteriana em padrões regionais, nacionais e internacionais. Espera-se que estes novos dados que traçam um perfil do nível de resistência em que se encontram os microrganismos isolados de pacientes neonatais internados sob regime hospitalar sejam de grande valia para a comunidade acadêmica e para os profissionais da saúde, proporcionando aos usuários um tratamento cada vez mais preciso e de qualidade.

Palavras-chave: *Resistência Bacteriana, ITUs, Antimicrobianos e Análises Clínicas*

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Introduction

The discovery of antimicrobials revolutionized the treatment of infectious diseases caused by bacteria, because they are drugs that contribute to the reduction of morbidity and mortality rates morbidity and mortality rates associated with infectious diseases (JANEBRO, et al., 2008)

The first historical reports related to these drugs were through Pasteur and Jouber in 1877. In 1936, sulfonamides were introduced in the therapeutic treatment patients, ushering in the modern era of antimicrobial chemotherapy. The landmark milestone in relation to these drugs was reported in 1941, with the introduction of penicillin, because a revolution occurred in the therapeutic principles used in the treatment of infectious infectious diseases. Consequently, there was progress in the isolation and discovery of new and more potent more potent antimicrobial agents (JANEBRO, et al., 2008).

In terms of public health, the irrational use of antimicrobial drugs represents one of the major global concerns, since the misuse of these drugs accelerates the natural the natural process of bacterial resistance to antibiotics. Microbial resistance was percussion of the strains of microorganisms that are able to proliferate in the presence of concentrations of antibiotics higher than human therapeutic doses. Thus, bacterial resistance represents a risk to the quality of human life achieved over the years, besides contributing to increased costs in the health system and the hospitals themselves. Therefore, the irrational use of these drugs has increasingly favored the increase the increase of this problem. In Brazil, few resources are used for monitoring actions on the rational use of antimicrobials (ZIMERMAN, 2010).

The main causes of demand for medical consultation are the Urinary Tract Infections infections (UTI), second only to respiratory infections (BRAOIOS et al., 2009). A UTI is determined when the urinary tract is contaminated by pathogens, verifying an inflammation

inflammation, presenting itself as one of the most common diseases and affecting individuals of all ages. of all ages. However, in children, especially in the first year of life, urinary infection is frequent, and is considered one of the most common infections is frequent, being considered one of the most prevalent bacterial infections among infants. infants. In neonates it is a particularly serious infection, due to the risk of formation of pyelonephric scar formation (LOPES, et al., 2005).

The urinary tract does not contain infectious microorganisms in healthy people, and When it has the amount is minimal to cause an infection, but this is subject to opportunistic infections that can cause serious problems. Although infections by other pathogens occur, most infections that occur in the urinary tract are bacterial (COSTA, et al., 2010).

Materials and Methods

A literature review was performed on aspects of bacterial resistance in uroculture of neonates. The contents will provide a broad spectrum on the topic approached seeking an understanding in the professional field, as well as the specific aspects specific aspects directed to bacterial resistance in neonatal urine culture.

The descriptors in Health Sciences (Decs) were used, with the following key words: bacterial resistance, UTIs, types of bacteria causing UTIs and irrational use of antimicrobials. irrational use of antimicrobials. Scientific support tools were used, such as: Scielo, Google academic and Eric. To carry out the bibliographical survey, the inclusion criteria of the documents investigated considered the following aspects: references with all the identifications language in Portuguese, descriptions of the studies (full, short communication, review

communication, review, case report, scientific notes etc.), published in indexed journals and available indexed journals and available on the aforementioned scientific platforms.

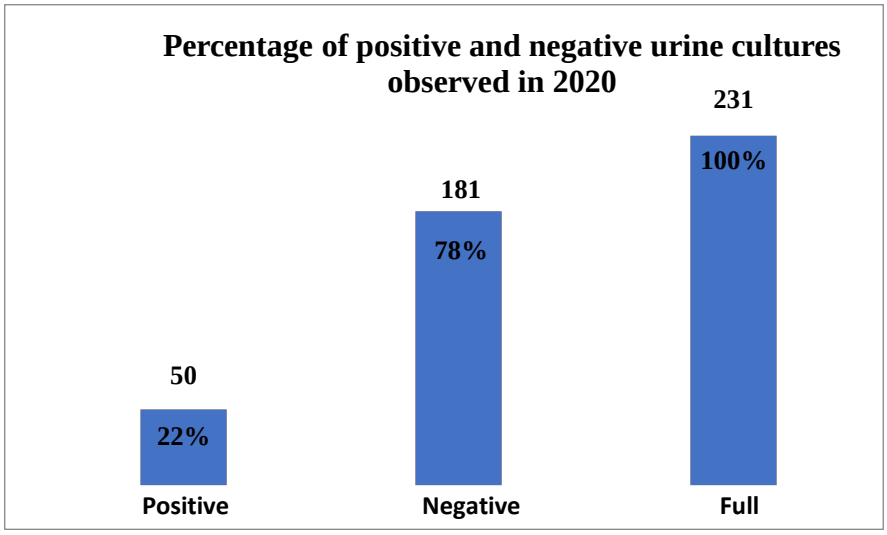
These documents were checked with regard to the reliability and fidelity of the sources and especially as to the veracity of the data obtained, observing the possible incoherence or contradictions inconsistencies or contradictions that the works could present.

The research carried out was of the quantitative documentary type and had as its instrument the reports containing results of urine culture and antibiogram of neonatal patients neonatal patients for the period January 2020 to September 2021. The research was developed in the Clinical Analysis Laboratory of a hospital in the Lake Region. We checked the medical charts, observing the sex and results of the exams. Our research guarantees the confidentiality of the personal information of patients submitted to urine culture and antibiogram, so the names will not be revealed

Results and discussion

The results of the observational study established a total of 231 (100%) (N=231) records of urocultures of newborn patients from the pediatric ICU ward of a hospital in the Lake District in the year 2020, from January to September. Interestingly, 22% (n=50) of these exams presented as positive urine cultures, being directly directed to perform the antimicrobial sensitivity test (ASCT). Exams that showed no evidence of infection represented 78% of the exams (n=181).

Figure I: Percentage of positive and negative urocultures observed in the year 2020.

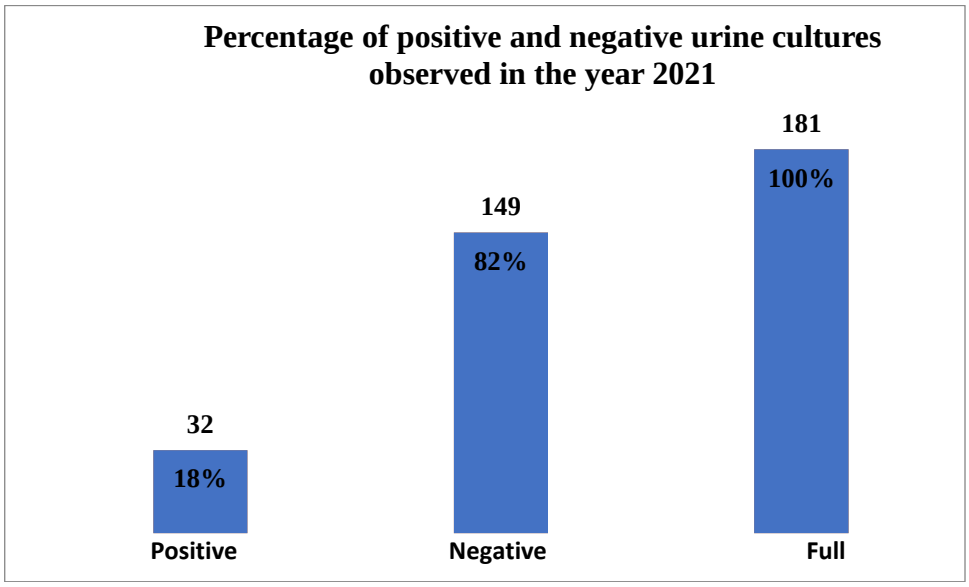


Legend: Graph represents the percentage of positive urocultures observed in the year 2020.

Source: Authors, 2022

Another important data was the total number of urine cultures performed in the period from January to September 2021, the result was lower when compared to the year 2020. In the period of 2021, a total of 181 tests were performed, however, only 18% (n=32) of the tests showed as positive for urinary tract infections and the other 82% (n=149) did not show positivity (Figure 2).

Figure 2: Percentage of positive and negative urine cultures observed in the year 2021.



Key: Graph represents the percentage of positive urine cultures observed in the year 2021.

Source: Authors, 2022

The information on UTIs related to the year 2020 (22%), when compared to the infections of the year 2021 (18%), is similar to different studies available in the literature and that were selected in our review such as Grillo and collaborators (2013) who described a rate of 19%, Muller; Santos; Correia (2008) who characterized a rate of 15.85%. Polleto; Reis (2005) also found UTI rates similar to our studies (17.9%). On the other hand, in 2021 the UTI scenario presented a lower percentage of positive urine cultures (18%) compared to the previous year (Figure 2). Other authors also present percentages that vary from 28.7% (RIEGER; HORTA, 2003) to 75% (KAHLMETER, 2000), this variation depends on the public studied.

When analyzing the records of the urine culture tests that were positive (n=50) in the year 2020, the presence of twelve different species of different uropathogens were observed. The species that showed the highest prevalence respectively were Escherichia coli 44% (n=22), Klebisiella pneumoniae 14% (n=7) and Candida albicans 14% (n=7). Citrobacter freundii 2% (n=1), Staphylococcus epidermidis 6% (n=3), Proteus mirabilis 4% (n=2), Enterobacter cloacae 4% (n=2) were also detected, Pseudomonas aeruginosa 2% (n=1), Enterococcus faecalis 2%(n=1), Staphylococcus saprophyticus 2% (n=1), Acinetobacter baumannii 4% (n=2) and Enterococcus faecium 2% (n=1).

Our study could verify the prevalence of multiresistant bacteria in a neonatal ICU of a hospital in the lakes region, where it was possible to observe mechanisms of resistance of these microorganisms, such as the production of extended-spectrum β-lactamase, which includes E. coli and Klebsiella pneumoniae, which ends up resulting in greater difficulty in treating urinary tract infection, requiring the use of broad-spectrum antibiotics with constancy, which makes it

difficult to treat newborns with UTIs due to the restriction on the use of antibiotics, which ends up increasing the incidence of bacteria and helping the progression of the infection.

It is of utmost importance to conduct research that collects knowledge about the regional prevalence of uropathogens and their antimicrobial resistance profile. These studies provide the medical community with options to choose among several therapeutic alternatives, the antimicrobials most commonly indicated for experimental treatment (MURRAY, 2004).

Conclusion

Urinary tract infection is of public health importance. *Escherichia coli* is the leading cause of urinary tract infections, followed by *Klebisiella pneumoniae*. The resistance profile observed in our research shows how much β-lactam antibiotics and fluoroquinones need to be replaced in the clinic when it comes to the treatment of this pathology.

To establish adequate prevention and treatment of community-acquired urinary tract infections, effective and ongoing research is needed. Encouraging research on pathogen prevalence and susceptibility may be one attempt to minimize the phenomenon of bacterial resistance. Another solution to reduce bacterial resistance is to take effective measures and target self-medication.

Declarations:

Conflict of interest/Competing interest-The authors declare that they do not have conflict of interest.

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