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REVIEW

Bacterial threat in the ICU: clinical impact and strategies against multi-resistance

Amenaza bacteriana en UCI: impacto clínico y estrategias frente a la multirresistencia

Gabriela Pinto Coelho do Valle[1], Sandra Arcieri[1]

[1]Universidad Abierta Interamericana, Facultad de Medicina y Ciencias de la Salud, Carrera de Medicina. Buenos Aires, Argentina.

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Corresponding author: Gabriela Pinto Coelho do Valle

ABSTRACT

Antimicrobial resistance became established as one of the main challenges in hospital medicine, especially in the Intensive Care Units of the General Hospital for Acute Patients 'Manuel Belgrano'. In this environment, there was an increase in infections caused by multi-resistant bacteria such as Klebsiella pneumoniae, Acinetobacter baumannii and Pseudomonas aeruginosa, making clinical treatment difficult. Factors such as prolonged mechanical ventilation, comorbidities and the intensive use of antibiotics favoured the spread of these pathogens. The study recognised the need to implement comprehensive strategies, focused on surveillance, the rational use of antimicrobials and the training of healthcare personnel. The situation at the Manuel Belgrano Hospital reflected a broader problem that required a multidisciplinary healthcare response.

Keywords: Antimicrobial Resistance; Multi-Resistant Bacteria; Intensive Care; Mechanical Ventilation; Epidemiological Surveillance.

RESUMEN

La resistencia antimicrobiana se consolidó como uno de los principales desafíos en la medicina hospitalaria, especialmente en las Unidades de Cuidados Intensivos del Hospital General de Agudos "Manuel Belgrano". En ese entorno, se observó un incremento de infecciones por bacterias multirresistentes como Klebsiella pneumoniae, Acinetobacter baumannii y Pseudomonas aeruginosa, dificultando el tratamiento clínico. Factores como la ventilación mecánica prolongada, las comorbilidades y el uso intensivo de antibióticos favorecieron la diseminación de estos patógenos. El estudio reconoció la necesidad de implementar estrategias integrales, centradas en la vigilancia, el uso racional de antimicrobianos y la capacitación del personal sanitario. La situación del Hospital Manuel Belgrano reflejó una problemática más amplia que requirió una respuesta sanitaria multidisciplinaria.

Palabras clave: Resistencia Antimicrobiana; Bacterias Multirresistentes; Cuidados Intensivos; Ventilación Mecánica; Vigilancia Epidemiológica.

INTRODUCTION

Antimicrobial resistance has become one of the most pressing challenges in contemporary medicine, especially in hospital settings where critically ill patients, invasive procedures, and high antibiotic use converge. Intensive care units (ICUs) are particularly vulnerable to this problem, as they house patients with multiple comorbidities and medical devices that, although vital, can facilitate the colonization and spread of resistant bacteria. Against this backdrop, this study seeks to analyze the magnitude and characteristics of antimicrobial resistance in critically ill patients at the Manuel Belgrano Acute Care Hospital, recognizing its

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impact on clinical outcomes and the need to implement effective control and prevention strategies.

DEVELOPMENT

Antimicrobial resistance represents a growing threat to global public health, particularly in hospital settings such as intensive care units (ICUs), where patients are especially vulnerable due to their critical condition and the need for invasive interventions. The emergence of multidrug-resistant bacteria, also known as "superbugs," has transformed the clinical landscape by significantly limiting therapeutic options.[1] These bacteria have developed complex molecular mechanisms that allow them to evade the effect of multiple classes of antibiotics, such as the production of degrading enzymes, modifications at target sites, and efflux pumps.[2]

Among the most concerning multidrug-resistant bacteria are Klebsiella pneumoniae, Acinetobacter baumannii, and Pseudomonas aeruginosa, widely reported in critical settings due to their ability to survive in hospital conditions and their resistance to carbapenems, a group of antibiotics considered to be the last line of defense.[3] These microorganisms have genes such as KPC (Klebsiella pneumoniae carbapenemase) and metallo-beta-lactamases (MBL), which are responsible for extreme resistance that hinders clinical management.[4]

Mechanical ventilation is a standard procedure in the ICU, used in patients with severe respiratory failure, a condition that often coexists with lung infections caused by resistant pathogens. Although indispensable, this life support can also act as a risk factor for nosocomial infections, such as ventilator-associated pneumonia (VAP), especially if the device is used for a prolonged period.[5]

Several institutions have recognized the impact of antimicrobial resistance in healthcare. The World Health Organization (WHO) considers it one of the main threats to modern medicine, requiring strict surveillance, rational use of antimicrobials, and the development of new therapeutic alternatives.[6] Similarly, it has been reported that mortality in patients with multidrug-resistant pathogen infections can exceed 50 %, especially when bacteria such as carbapenemase-producing Klebsiella pneumoniae are involved.[7]

Studies conducted in Latin American hospitals have shown that antibiotic combinations, such as meropenem with colistin or ceftazidime with avibactam, may offer some degree of efficacy. However, results are still variable and dependent on the bacterial sensitivity profile.[8] The complexity increases when comorbidities such as diabetes, hypertension, or chronic lung disease are added, factors that are closely associated with increased susceptibility to serious infections and worse clinical outcomes.[9]

The general situation is replicated in the Manuel Belgrano Acute Care Hospital: a significant increase in infections caused by multidrug-resistant microorganisms in high demand for medical care, advanced technology, and diverse professional teams.[10] As the referral hospital for the San Martín district, it must face medical challenges and social, demographic, and economic factors that influence the complexity of care.[10,11,12,13]

In conclusion, the effective management of multidrug-resistant pathogen infections requires a comprehensive approach that combines epidemiological surveillance, rational antibiotic use, continuing education for healthcare personnel, and ongoing research in clinical microbiology. This conceptual framework underpins the importance of the present study, which aims to identify risk factors and resistance patterns in critically ill patients at Manuel Belgrano Hospital.

CONCLUSIONS

Antimicrobial resistance in ICUs is a multidimensional threat beyond the clinical setting and involves social, structural, and microbiological factors. As observed at the Manuel Belgrano Acute Care Hospital, the sustained increase in multidrug-resistant bacterial infections requires a coordinated and sustained response from the healthcare system. It is essential to strengthen epidemiological surveillance, promote the rational use of antibiotics, provide ongoing training for healthcare personnel, and encourage applied clinical research. Only through a comprehensive and collaborative approach will it be possible to contain the spread of these "superbugs" and improve the prognosis of the most vulnerable patients.

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CONFLICT OF INTEREST

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AUTHOR CONTRIBUTION

Conceptualization: Gabriela Pinto Coelho do Valle, Sandra Arcieri.
Data curation: Gabriela Pinto Coelho do Valle, Sandra Arcieri.
Formal analysis: Gabriela Pinto Coelho do Valle, Sandra Arcieri.
Research: Gabriela Pinto Coelho do Valle, Sandra Arcieri.
Methodology: Gabriela Pinto Coelho do Valle, Sandra Arcieri.
Project management: Gabriela Pinto Coelho do Valle, Sandra Arcieri.
Resources: Gabriela Pinto Coelho do Valle, Sandra Arcieri.
Software: Gabriela Pinto Coelho do Valle, Sandra Arcieri.
Supervision: Gabriela Pinto Coelho do Valle, Sandra Arcieri.
Validation: Gabriela Pinto Coelho do Valle, Sandra Arcieri.
Visualization: Gabriela Pinto Coelho do Valle, Sandra Arcieri.
Writing – original draft: Gabriela Pinto Coelho do Valle, Sandra Arcieri.
Writing – review and editing: Gabriela Pinto Coelho do Valle, Sandra Arcieri.