


# The pandemic of antibiotic resistance and the role of nursing professionals

*A pandemia da resistência bacteriana e o papel dos profissionais de enfermagem*

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Bacterial resistance is one of the main threats to public health in the 21st century<sup>(1)</sup>, affecting patients and their families, multiprofessional teams, and healthcare institutions.

Several factors, in addition to the inappropriate use of antibiotics, contribute to the complexity of this issue. Some of these factors are related to microorganisms, such as bacterial-antimicrobial and bacterial-host interactions, clone mutation rates, and transmission rates of resistance determinants, whereas others concern control measures, such as failures to adopt infection prevention and control measures, including standard and transmission-based precautions, and poor adherence to hand hygiene among healthcare workers.

Considering factors related to microorganisms, when discovering penicillin in 1929, Fleming was the first to observe the natural resistance of microorganisms to antibiotics. The euphoria of the discovery of antimicrobials represented an important factor that contributed to their indiscriminate use. Around 1940, studies by Abraham and Chain demonstrated an enzyme in *E. coli* extracts that was capable of destroying the action of penicillin, which they called penicillinase, later verified also in strains of *Staphylococcus aureus*, which are endemic in health facilities. In 2008, the enzyme New Delhi Metallo- $\beta$ -Lactamase, discovered in the Indian city of that same name, was identified as being responsible for resistance to carbapenem antibiotics, considered one of the last possibilities of treatment for infections by resistant germs, when all others are considered ineffective<sup>(2)</sup>.

Aggravating the problem, in addition to the indiscriminate use of antibiotics in hospital environments, there is also the use of antibiotics in livestock farming for fast growth and fattening of animals, in agricultural production and in the food industry, plus inadequate surveillance and monitoring, and insufficient regulation and supervision of the use of these drugs<sup>(3)</sup>.

In this context, in 2016, O'Neil<sup>(4)</sup> estimated that by 2050, multidrug-resistant bacteria could end the lives of more than 10 million people a year, which corresponds to one death every three seconds.

This threat is aggravated by the global shortage of new drugs, which poses a challenge to be faced worldwide<sup>(4)</sup>. The World Health Organization (WHO) has estimated that approximately 700,000 people die each year from untreatable infections caused by bacterial resistance<sup>(4)</sup>.

However, when the coronavirus disease (COVID-19) emerged in 2020 as an unknown disease with high transmission and mortality rates, antimicrobials were one of the main options in an almost desperate attempt to fight it, in the hope of saving human lives, when treatment was not yet available. This scenario caused the use of azithromycin and doxycycline to increase between 400% and 500% worldwide. Experts have warned that COVID-19 has worsened the silent pandemic of bacterial resistance, and the high estimated deaths predicted by O'Neil<sup>(4)</sup> for 2050 are expected to begin in 2030<sup>(5)</sup>.

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The pharmaceutical industry, for its part, cannot keep up with the situation of bacterial resistance around the world as fast as the mechanisms are developed by microorganisms<sup>(4)</sup>.

The immediate effects of bacterial resistance will have a greater impact on the population in underdeveloped or developing countries, as is the case with healthcare-related infections, for which the estimated mortality in underdeveloped countries is up to 10 times higher than in developed countries<sup>(4)</sup>.

The National Action Plan for the Prevention and Control of Antimicrobial Resistance (PAN-BR), developed by the Brazilian Health Regulatory Agency (ANVISA)<sup>(6)</sup>, in line with the objectives set by the tripartite alliance between WHO, the Food and Agriculture Organization of the United Nations (FAO), and the World Organisation for Animal Health (WOAH), has the general objective of ensuring the maintenance of the capacity to treat and prevent infectious diseases with safe and effective quality drugs, and making sure that they are provided in a responsible and accessible way to all who need them. In light of this, several initiatives around the world, such as the World Antimicrobial Awareness Week, were immediately formatted to discuss and warn about the problem. In 2021, in a very timely manner, it invited us to reflect on the topic 'Spread Awareness, Stop Resistance', reinforcing the importance of disseminating information on the subject to everyone<sup>(7)</sup>.

In this context, this editorial points out some of the strategic aspects that directly involve nursing workers, as well as other health professionals and citizens.

First, we highlight the importance of including the topic in the training process for human resources in the health field, especially in nursing.

It is important to recognize nursing for its leadership capacity in health management and the defense of good practices when it comes to preventing the transmission of resistant microorganisms. We need to rediscuss our practices, and rethink how we have inserted adherence to standard and transmission-based precautions into our care context, how our adherence to hand hygiene in the five moments recommended by WHO is taking place. In the middle of the 2020s, professionals still lack knowledge, or have limited knowledge, about this issue<sup>(8)</sup>. It is no longer possible to ignore the transmission rates in healthcare settings and the lack of effective policies to promote hand hygiene

Healthcare institutions should continuously prepare for carrying out integrated surveillance and monitoring, and develop strategies to improve the evaluation and performance capacity of health surveillance and state and municipal hospital infection control committees regarding the adopted infection prevention and control measures, such as the Antimicrobial Stewardship Program. In these programs, the role of nurses and nursing staff is fundamental. Nurses act as elements

that can interrupt failures in the process, closely monitoring prescriptions and their consistency with microbiological results, and the duration of treatment, and participating in multiprofessional discussions with regard to maintenance and routes of administration of drugs, as well as handling their administration at the correct time, in order to promote their proper action and contribute to the best therapeutic responses of patients with fewer complications<sup>(9)</sup>.

As nurses and health professionals, we need to identify aspects of our practice that may favor the spread of microorganisms and take clear positions regarding health promotion, patient education on the excessive and improper use of these drugs, risks of their use in conditions that do not require them, and the importance of complete compliance with the prescribed treatment, at the recommended times and dosages<sup>(10)</sup>.

At the same time, we must carry out permanent health education actions with nursing teams regarding administration, doses, treatment times, and potential effects such as antibiotic resistance.

Furthermore, we must remain active in the promotion of public policies aimed at the control of antibiotic resistance. In this context, nursing is the main communication link between health care and hospitalized patients, and also plays a crucial role in preventing the spread of antibiotic-resistant bacteria through antibiotic stewardship programs, such as the Antimicrobial Stewardship Program, and in infection control.

Once again it is obvious that nurses need to be attentive to guidelines and strategies based on scientific evidence and laboratory data of patients under our care so that we can systematically propose qualified interventions that favor better clinical outcomes, reducing lengths of hospital stay, morbidity and mortality, and unexpected care expenditures<sup>(9)</sup>.

Therefore, what is new in the scenario is based on the understanding that, even though nurses do not prescribe antibiotics, their rational use involves interdisciplinary actions for which the presence of nurses is fundamental, whether in clinical care or infection control. We need to recognize the issue that arises here and unite in the search for better possibilities for life, and for patient safety.

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