

Editorial

Bacterial resistance. A global public health problem with difficult solution

Just three years after large-scale commercialization of penicillin G started in 1945, the first therapeutic failures were described. While the emergence of antibiotic resistance is a natural phenomenon that occurs in microorganisms, this fact is mainly exacerbated by the inappropriate use of antimicrobials, poor quality of medicine, lack or deficient programs for the prevention and control of infections, weak capacity of laboratories to detect resistance, inadequate surveillance and regulation of antimicrobial use.

Misuse of antibiotics is one of the most important factors determining the current alarming situation: use of antibiotics without prescriptions, inappropriate consumption time, non-compliance of administration schedules, and underdosing. On the other hand, many of our physicians make unnecessary prescriptions, especially for upper airway diseases, in most cases of viral etiologies or even in allergies. Based on studies about antibiotic use, upper airway cases are the pathologies in which antibiotics are more unnecessarily used.

In our country, another point of concern is the deficiency of prevention and infection control programs, mainly for those of nosocomial origin. In health centers, especially in public hospitals, it is essential to promote consciousness of the importance as well as to monitor the compliance of simple, easy and inexpensive measure such as frequent hand washing; which can greatly reduce the frequency of hospital infections and thus, contribute to reduce antibiotic use in hospitals.

The increased bacterial resistance, due to the selective pressure that represents the use of antibiotics on a large scale, especially in our hospitals, has led to the spread of strains with resistance mechanisms that often leave us with no alternatives for treatment of bacterial infections. Antimicrobial resistance reduces the chances of effective treatment of diseases, prolongs the agony of the patients and forces them to use expensive drugs, in addition to lengthen the time of hospitalization and increase the risk of mortality.

Currently in Paraguay, the emergence of methicillin-resistant *Staphylococcus aureus* is among the most worrying resistances. For a long time, it was considered exclusively nosocomial but today it is a major cause of community-acquired infections. Until a few years ago, the antibiotic of choice for this bacterium responsible for surgical wounds and skin and soft tissue infections, was cephalexin; however, this antibiotic has no activity on methicillin-resistant *Staphylococcus aureus*. Neither beta-lactam antibiotics can be used to treat infections caused by this bacterium, not even in combination with beta-lactamase inhibitors (amoxicillin, sulbactam, tazobactam).

Another group of widely spread bacteria is the gram-negative bacilli of the *Enterobacteriaceae* family, which have significantly increased their resistance, especially by easily spread mechanisms like the production of beta-lactamase type enzymes; which are of several types. Those of broad spectrum have the ability to hydrolyze first generation aminopenicillins, carboxipenicillins and cephalosporin, while those of extended spectrum inactivate third and even fourth generation cephalosporins.

The increase of resistant-bacteria to carbapenem (imipenem, meropenem), both enterobacteria by KPC carbapenemase production and non-fermenting glucose gram-negative bacilli by metallo-beta-lactamase type carbapenemase production, impermeability, efflux, among others, especially in high complexity hospitals of our country, leave us only toxic and / or very costly therapeutic alternatives like colistin.

The resistance to fluoroquinolones (norfloxacin, ciprofloxacin, levofloxacin) is also worrying because they are excellent antibiotics due to their pharmacokinetics and easy administration by oral via, but with the disadvantage of presenting cross resistance. We are losing these antibiotics, widely used in adult urinary tract infections as well as

in gastrointestinal infections, as an empirical therapy due to the current increasing resistance.

We cannot fail to mention other factors that increase the magnitude of the problem, as the use of antibiotics in consumption agriculture and animals.

The phenomenon of bacterial resistance is considered a global public health problem with difficult solution. While it is not possible to end the problem of antimicrobial resistance, it is possible to convert this growing threat into a manageable problem.

At the World Health Assembly held in 2014, a consensus was reached about the need for a global action plan to fight antimicrobial resistance, involving countries from all regions. This plan points to raise awareness and education, optimize antimicrobial use, reduce infection incidence and resistant organism spreading, and ensure sustainable investment for the fight against antimicrobial resistance.

Though science advances rapidly, very few pharmaceutical companies make investments for the search of antibiotics because they do not consider it profitable, since the misuse and abuse favor bacteria quickly find ways to evade antibiotics action. Consequently, no new family of antibiotics has been discovered in the last three decades.

Let us contribute to preserve antibiotics for future generations. Each of us from our workplace, from our environment, we can provide a molehill to mitigate the problem.

If we do not start to raise awareness of the problem of antimicrobial resistance and deal with it very soon we will be in danger of running out of treatment options for many bacterial infections.

References

- 1- Blanco MG, Labarca JA, Villegas MV, Gotuzzo E. Extended spectrum β -lactamase producers among nosocomial *Enterobacteriaceae* in Latin America. Rev. The Brazilian Journal of Infectious Diseases . 2014; 18(4), 421–33
2. Organización Panamericana de la Salud (OPS), USAID. Informe Anual de la Red de Monitoreo. Vigilancia de la Resistencia a los Antibióticos. San José, Costa Rica: OPS/OMS. 2010.
- 3- Worldwide country situation analysis: response to antimicrobial resistance. World Health Organization. Geneva. April 2015 <http://www.who.int/drugresistance/e>.
- 4- Casellas JM. Resistencia a los antibacterianos en América Latina: consecuencias para la infectología. Rev Panam Salud Pública. 2011;30(6):519-28.
- 5- Melgarejo N, Martinez M, Franco R, Falcón M. Enterobacterias resistentes a Carbapenemes por producción de KPC, aisladas en hospitales de Asunción y Departamento Central. Revista de Salud Pública del Paraguay. 2013;3(1):30-5

Dra Norma Fariña
Researcher at IICS, UNA
Categorized Level 1 in PRONII