

Communication of evidence—the first step toward antimicrobial resistance containment

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All pathogens, without exception, have the ability to develop mechanisms for resistance to the action of antimicrobial drugs, which poses one of the greatest challenges to the effective treatment of infectious diseases. However, our knowledge of resistance has increased at a dizzying rate in recent years, thanks to progress in automation, clinical epidemiological research, and molecular biology. Nevertheless, antimicrobial resistance remains a serious medical, economic, and social problem.

This special issue is an effort by Pan American Health Organization to promote the development and dissemination of knowledge in priority public health areas such as advances in microbiology, antimicrobial resistance and food safety, antimicrobial drug use, and antimicrobial resistance surveillance. These areas should be continuously stimulated so that the resulting new knowledge can inform the development of technically feasible, economically viable, and socially acceptable programs.

For a broad overview of resistance mechanisms in the pathogens most relevant to clinical practice, special articles *Antimicrobial resistance in the age of non-communicable diseases* and *Resistencia a los antibacterianos en América Latina: consecuencias para la infectología* are obligatory starting points.

Moving on, the articles in this issue offer a broad perspective of the different facets and specific mechanisms that are appearing in the Region of the Americas, as can be glimpsed in *Frecuencia de enzimas asociadas a sensibilidad disminuida a betalactámicos en aislados de enterobacterias, Caracas, Venezuela*; *Methicillin-resistant Staphylococcus aureus DNA electrophoretic pattern: temporal changes in an endemic hospital environment*; *Detección de cepas de Neisseria meningitidis resistentes a rifampicina en el Uruguay*; *Resistencia a carbapenemes en aislamientos de Pseudomonas aeruginosa: un ejemplo de interacción entre distintos mecanismos*; *Susceptibilidad antimicrobiana y bases genéticas de la resistencia de cepas de Enterococcus causantes de infecciones en Cuba*; and *Estudio comparativo de clones de aislamientos de Staphylococcus aureus resistentes a meticilina prevalentes en la Argentina*.

Microorganisms circulate through different species, and, in this context, it is possible to document the presence of human pathogens, such as *Salmonella* (*Prevalence and antimicrobial resistance of Salmonella in chicken carcasses at retail in 15 Brazilian cities* and *Serovariedades y patrones de susceptibilidad a los antimicrobianos de cepas de Salmonella aisladas de alimentos en Cuba*), that have worrisome resistance patterns in other animal species.

The analysis of antimicrobial resistance in a single ecosystem in which species are interrelated is one of the most original approaches to this public health problem. This topic is discussed in depth in the study *Ecosystem approach to promoting appropriate antibiotic use for children in indigenous communities in Ecuador*, which proposes a system to promote the appropriate use of antimicrobial drugs in children under age 5. The use of antimicrobial drugs is without a doubt one of the factors that determine the selection and spread of resistance. Aspects of the prescription of antimicrobials are addressed in the studies *Physicians' responsibility for antibiotic use in infants from periurban Lima, Perú* and *Motivos de la prescripción inadecuada de antibióticos en un hospital pediátrico de alta complejidad*. Regulatory aspects are discussed in *Restricción de la venta de antibióticos en farmacias de Bogotá, Colombia: estudio descriptivo* and *Regulación de la dispensación de medicamentos y su efecto en el consumo de antibióticos en Venezuela*, and an assessment of the impact of programs to control antibiotic prescription is presented in the articles *Impacto de un programa de control de la calidad de la prescripción de antibióticos en un hospital de La Habana, Cuba*, and *Antimicrobial stewardship program in a developing country: the epidemiological barrier*. Furthermore, the study *Ceftriazone and ciprofloxacin restriction in*

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an intensive care unit: less incidence of Acinetobacter spp. and improved susceptibility of Pseudomonas aeruginosa provides specific examples of the impact of restricting antimicrobial drug use on the resistance profiles of pathogens typical to these settings.

In hospitals, the use of broad-spectrum antimicrobials creates environmental pressure for the selection of resistant strains. By studying the ecology of resistant strains in hospitals, we can learn more about the situation and be better able to provide appropriate empirical treatment of hospital infections. In this context, for example, the prevalence of methicillin-resistant *Staphylococcus aureus* is the focus of the multicenter study presented in *Frecuencia de portadores nasales de Staphylococcus aureus resistente a meticilina en personal de salud de hospitales de Nicaragua*, whose findings point to the need for measures to prevent this pathogen's spread.

Multidrug-resistant tuberculosis, and the risk of extremely drug-resistant tuberculosis, is a topic that should not be left out of this special issue. Thus, *Vigilancia de la resistencia a los fármacos antituberculosos en Cuba, 2000-2009*, offers an analysis of the prevalence of resistance during that decade and describes the progress made.

Public health surveillance of antimicrobial resistance is currently a major global challenge. The Region of the Americas is unique in having the Latin American Network for Antimicrobial Resistance Surveillance (RELAVRA), whose solid horizontal cooperation among the network's participating countries is based on structured and standardized operating principles. The results of the RELAVRA external quality program, presented in *Capacidad de los laboratorios nacionales de referencia en Latinoamérica para detectar mecanismos de resistencia emergentes*, were also evidenced in the recent outbreak of NDM carbapenemase-producing *Klebsiella pneumoniae* in Guatemala, detected in November 2011. RELAVRA is buttressed by the development of national capacity for resistance monitoring; a descriptive documented example of this process can be found in *Tendencias de los fenotipos de resistencia bacteriana en hospitales públicos y privados de alta complejidad de Colombia*.

The treatment and control of viral diseases are also being threatened by the development of resistance. From influenza viruses (*Virological surveillance and antiviral resistance of human influenza virus in Argentina, 2005-2008*) to HIV (*Prevalence and patterns of HIV transmitted drug resistance in Guatemala* and *HIV transmitted drug resistance in adult and pediatric populations in Panama*), different examples are presented on the prevalence of resistance to antiviral drugs. Of special interest is *Progress of implementation of the World Health Organization strategy for HIV drug resistance control in Latin America and the Caribbean*, related to WHO's latest progress in this area.

The Canadian Institutes of Health Research Institute of Infection and Immunity response to the threat of antimicrobial resistance provides another example from the Region of knowledge creation and translation and partnership-building, which in the final analysis benefit the global community. Resistance containment remains an elusive goal requiring constant innovation in the general and specific research on the topic, as well as sustainable programs for the training of future generations of researchers.

With this special issue of the *Revista Panamericana de Salud Pública/Pan American Journal of Public Health* we hope to share with our readers the experience and evidence obtained in the Region in recent years, from different angles (microbiology, antibiotic use, hospital infections, food security, public health surveillance). In this way, the *Journal* seeks to contribute to the development of increasingly effective interventions for the containment of antimicrobial resistance.