

The key role of government national planning around the world for antimicrobial resistance: State of the art and perspectives

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Antimicrobial resistance (AMR) is 'the ability of microorganisms to grow in the presence of a chemical (drug) that would normally kill them or limit their growth' [1]. As a result, infections persist in the body, killing the host and/or spreading to others. This phenomenon occurs naturally over time, usually through spontaneous genetic changes in microbes. However, inappropriate and excessive antibiotic use by clinicians in primary care settings and hospitals, self-medication by the public, and the excessive use in agriculture, aquaculture, and animals for the food industry are accelerating this process [2].

Nowadays, 700,000 are deaths attributable to AMR worldwide every year. Nevertheless, unless action is taken, the burden of deaths from AMR will cost 10 million lives every year by 2050, and a cumulative cost to global economic output of 100 trillion USD [3]. One of the main concerns will be preventing

the use of ineffective antimicrobials for the prevention and treatment of infections in order to ensure the success of antimicrobial drugs used in organ transplantation, cancer chemotherapy, diabetes management, and major surgery.

As a consequence, AMR could undermine the achievement of the UN's Sustainable Development Goals as well [2]. For all these reasons, the World Health Organization (WHO) called for a coordinated action among all countries worldwide, giving a special role to their governments [2]. WHO required every country to set up a comprehensive national plan based on a multisectoral approach and sustainable financing [4].

The national 'master plans' should provide a 'legal, policy and regulatory framework that covers all aspects of drug supply and use' [4]. These plans should be integrated into the national health strategy and include a program

KEY WORDS: Drug resistance, microbial; global health; government; health policy; World Health Organization.

based on a needs assessment and a realistic cost plan. Furthermore, a key aspect will be building partnerships with civil society to educate people about the efficacy, safety, quality, and appropriate use of medicines [4].

However, how many countries have realized such a plan?

In April 2015, WHO published an initial country situation analysis over a two-year period (2013–2014) in order to ‘determine the extent to which effective practices and structures to address antimicrobial resistance have been put in place and identify areas in which more work is needed’ [5]. The survey was conducted in countries from all six WHO regions and focused on six building blocks to combat AMR. The most important among them was, of course, the development of a comprehensive national plan. Improving laboratory capacity to undertake surveillance for resistant microorganisms, ensuring good access to safe, effective antimicrobial medicines, controlling the misuse of these medicines, and increasing awareness and understanding among the general public through effective infection prevention and control programmes should be considered the natural consequences of the first building block [5].

However, according to the 2015 WHO report, only a few countries have realized a national plan. Indeed, out of only eight African states (17%) that even provided information for the analysis, only one of them reported having a national plan. In the WHO Eastern Mediterranean region, 13 (62%) was the number of member states for which information was available for the analysis; however, none of those states reported having a national action plan for AMR. In the WHO European region, 49 states (92%) were available for the analysis, but only 40% of them reported having an action plan. Many, however, had a national coordinating mechanism (47%) or a national focal point (70%). In the WHO Southeast Asia region, all of the 11 countries provided information, but only five of them reported having such a plan. Finally, in the WHO Western Pacific region, where the first WHO regional office to implement recom-

mendations for the surveillance of AMR is located, 26 (96%) countries provided information, but only four of them (17%) declared having a national action plan [5].

Recently, Italy has launched its national action plan to combat AMR, which is in line with the principles of the Global Antimicrobial Resistance Action Plan (GAP), adopted in 2015 by WHO and supported by the Food and Agriculture Organization (FAO) and the World Organization for Animal Health (OIE).

With the agreement of November 2, 2017 between the government, the regions, and the autonomous provinces of Trento and Bolzano, Italy adopted its first National Action Plan on Antimicrobial Resistance (PNCAR) 2017–2020 [6]. The PNCAR represents the tool needed to implement the Italian strategy. This plan has two general objectives, which are reducing the frequency of infections caused by antibiotic-resistant microorganisms and reducing the frequency of hospital and community healthcare-associated infections. Furthermore, the plan has six areas of interest: 1) antibiotic resistance surveillance and prevention; 2) appropriate use and surveillance of antimicrobial consumption; 3) surveillance, prevention, and control of healthcare-associated infections; 4) training of healthcare staff; 5) information and education of the population; and 6) research and innovation [7].

The training of healthcare staff is one of area of interest of PNCAR. In order to reach an appropriate use of antibiotics in humans, it is necessary to increase the level of knowledge and awareness of the appropriate use of antibiotics in all healthcare areas and for all healthcare staff. In this issue of the *Journal of Health and Social Sciences*, Nucera et al. [8], in one of few Italian studies on knowledge and awareness of sepsis among nurses and physicians, show that continuous educational training for healthcare professionals is essential and should be based on scientific community guidelines according to the principles of evidence-based medicine. The potential linkage between an increased rate of intra-hospital sepsis and AMR related to Gram-negative

bacteria causing hospital-acquired infections is becoming increasingly worrying. *Acinetobacter baumannii*, *Pseudomonas aeruginosa*, and the Enterobacteriaceae are three killers, and these are at the top of a priority pathogens list drawn up by WHO of bacteria for which new antibiotics are urgently needed [9].

In another study published in this issue of the *Journal of Health and Social Sciences*, Amarasinghe et al. show the bacterial profile and antibiotic susceptibility pattern of adult lower respiratory tract infections in Sri Lanka [10]. Although AMR is an increasingly serious threat to global public health that requires action across all government sectors and society [2], the causes of AMR may vary depending on the country. Therefore, in developing countries, intervention efforts need to address the context and focus on the root causes specific to every country that may be different from those of developed countries [11]. For instance, more than 300 extensively drug-resistant cases of typhoid have been re-

cently reported in Pakistan, where the responsible bacterium was a strain of *Salmonella enterica* that had become resistant to multiple antibiotic treatments through acquiring new DNA [12].

We have such a long way to go. In order to take control of the situation, it is useful to emphasize which national plans against AMR have been realized today since the publication of the 2015 WHO report. This journal works as a forum for the exchange of scientific experiences relevant to global public health. I would like, therefore, to launch a call for papers encouraging researchers and scholars looking at this issue to analyse the situation in their own countries. Ultimately, every governmental or action plan should be evidence-based.

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Competing interests - none declared.

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Cite this article as - Chirico F. The key role of government national planning around the world for antimicrobial resistance: State of the art and perspectives. *J Health Soc Sci.* 2018;3(1):9-12

DOI 10.19204/2018/thky1

Received: 01/03/2018

Accepted: 15/03/2018

Published: 15/03/2018

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