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Letter to the Editor

A tsunami of drug resistance in Iran's hospitals, is it true?

Sir

Less than a century ago, when Alexander Fleming discovered penicillin, the future seemed bright, with the possibility that all infections could be overcome; no one would then have thought that a day would come when antibiotics would become ineffective. Antimicrobial resistance occurs naturally, however, misuse and overuse of antibiotics has accelerated this process. In 2016, 700,000 deaths were attributed to antimicrobial resistance globally, and the World Health Organization (WHO) estimates that this figure will rise to 10 million deaths annually by 2050 [1]. According to the WHO global report on surveillance of antimicrobial resistance in 2014, Iran is classified among the countries with more than five multi-drug resistances in seven bacteria considered as major international concerns [2]. In Iran, resistance of *Escherichia coli* to third-generation cephalosporins is 41%, and to fluoroquinolones 54%; in *Klebsiella pneumoniae* resistance rates to third-generation cephalosporins and carbapenems are 48% and 54%, respectively; methicillin resistance in *Staphylococcus aureus* reaches 53%; 34% of *Streptococcus pneumoniae* are penicillin-resistant; and fluoroquinolone resistance rates in non-typhoidal *Salmonella enterica* and *Shigella* species are 6.3% and 2.7%, respectively [2]. Pursuant to this report, as in other developing and developed countries, Iran is exposed to a risk of a tsunami of drug resistance in the future; nevertheless, everything changed in 2016 with a bold move. The Ministry of Health and Medical Education (MOHME) set up and published a "national action plan of Islamic Republic of Iran to combating antimicrobial resistance (IRIAMR)" to stop and reverse the trend [3,4].

The most important causes of antibiotic resistance in developing countries include [3]: (1) non-adherence to treatment by patients and/or doctors; (2) not completing courses of treatment by patients; (3) sale of antibiotics by pharmacies without any prescription and professional oversight; (4) unprincipled prescribing of antibiotics by doctors; (5) use of human antibiotics in animal husbandry by veterinarians; and (6) patients' self-treatment of viral infections such as colds and influenza with antibiotics. Addressing these factors formed the core of the IRIAMR guidelines; however, despite the efforts of the MOHME, in the two years after the implementation of the programme, there has been no tangible change in the control of antimicrobial resistance in Iran's hospitals in recent field studies [5–8]. We believe that the effect of comprehensive IRIAMR guidelines has been reduced by the important weak points in the system [4]. These include poor coordination between different departments of the MOHME, the Iranian veterinary organization and the Iranian health insurance organization, and healthcare facilities failing to take the IRIAMR guidelines seriously. In laboratories, there is use of unstandardized and unreliable methods for antibiotic sensitivity testing, a problem compounded by difficulty in accessing up-to-date international guidelines [9], and an inappropriate tariff system for antimicrobial sensitivity testing. There is a lack of local antibiotic prescribing guidelines, and low public awareness of antibiotic resistance. There is no involvement of the insurance organization in detecting inappropriate antibiotic prescribing; there is over-prescription of antibiotics for outpatients by physicians in the private sector, and also selling of antibiotics without a prescription in some pharmacies. There is a lack of a proper organizational structure, including persons with specific job descriptions to deliver the plan, and a lack of a proper budget allocation. Finally, the medical community is generally disinterested in the use of IRIAMR guidelines for the rational prescription of antibiotics.

These issues must be addressed urgently if the national programme is going to be effective. We still hope that by the year 2021 Iran will be seen as a pioneer, and one of the most successful countries in controlling antibiotic resistance.

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