



Letter to the Editor

The increasing spread of carbapenem-resistant Gram-negative bacilli in Iran's hospitals raises the need for an urgent action against antimicrobial resistance

Editor: Stefania Stefani



Dear Editor,

The carbapenem-resistant Gram-negative bacilli (CR-GNB) represent a threat for public health, being among the top multidrug-resistant pathogens on WHO's priority list [1,2]. The Review on Antimicrobial Resistance, commissioned by the UK government, argued that drug-resistant superbugs could cause 10 million deaths and cost up to \$100 trillion per year by 2050 if their rampant global spread is not halted [3]. Studies show that the prevalence of CR-GNB in Iran has been increasing sharply in the past years [4], and it seems that the program set up and published by the Ministry of Health and Medical Education (MOHME) of Iran under the title 'National action plan of Islamic Republic of Iran to combating antimicrobial resistance (IRIAMR)' has not been sufficient or effective [5]. It is worth noting that this program has five objectives: (1) Raise public awareness and promote education and trainings, (2) Continuously monitor resistance and the use of antimicrobial drugs, (3) Prevent the spread of multidrug-resistant microorganisms, (4) Promote the appropriate use of antimicrobial drugs, and (5) Promote research and development in the field of antimicrobial resistance (AMR). Herein, we explain the most important reasons for the increase in antibiotic resistance and the spread of CR-GNB in Iran's medical centres, as well as the strategies to prevent it.

In general, the effective factors in increasing the trend of antibiotic resistance in Iran can be searched around six axes, which are listed below.

1. Political commitment – legislation

- There is an urgent need and political support for action to combat antimicrobial resistance in Iran.
- Political commitment is needed to promote the technical and financial investment necessary for effective development and implementation of national action plans.
- There are some internal managers of hospitals or vice presidents of universities of medical sciences who do not have a view of prevention and are not willing to pay for the prevention and control of infection. Infection control and prevention has to be a priority for hospital managers, vice-chancellors for education and treatment of universities and the MOHME of Iran.

2. Surveillance

- Inappropriate monitor the trend of prescribing and use of antimicrobial drugs in inpatient and outpatient service centers
- Lack of inter-provincial and national surveillance studies in terms of AMR mechanisms.

3. Guidelines and training

- Absence of infection control and antimicrobial stewardship training courses at different levels of education (nursing, medicine, operating room expert, etc.) in medical universities of the country.
- Absence of proper guidelines and instructions to prevent and control the infection of CR-GNB.
- The lack of suitable training units such as antimicrobial stewardship during university studies and the lack of proper training in the field of innate resistance, antibiotic resistance mechanisms and the Clinical and Laboratory Standards Institute (CLSI) or the European Committee on Antimicrobial Susceptibility Testing (EUCAST) guidelines. For example, because of the lack of knowledge of most specialists, except for some infectious specialists, the request to assess the minimum inhibitory concentration (MIC) distribution for meropenem and colistin antibiotics is not usually given; therefore, combination therapy with these two antibiotics is mostly experimental.

Other examples of inappropriate antimicrobial use can be mentioned:

- Indiscriminate and irrational prescribing of antibiotics, especially carbapenems, by specialists.
- Excessive change of antibiotics (2–6 different classes of antibiotics) during hospitalization by some specialists, especially by medical students in educational and treatment centers.
- Unfortunately, we often hear this sentence by most experts and supervisors of intensive care units (ICUs) in Iranian hospitals: 'ICU means infection'. We believe that this is due to inappropriate educational and treatment policies in the MOHME of Iran in order to prevent the increase of hospital infections and decrease the amount of antibiotic resistance.

4. Reference laboratory

- In the laboratories of medical centres in Iran, there is use of unstandardized and unreliable methods for antibiotic sensitivity testing due to the inappropriate tariff system for antimicrobial susceptibility testing—for example, the failure to determine susceptibility testing using the MIC method for meropenem, colistin and tigecycline.

5. Resources (personnel, specialists, isolations, PPE, etc.)

- Lack of specialist forces such as a bacteriology specialist, epidemiologist and clinical pharmacist and even infectious disease specialist in most infection control units and antimicrobial stewardship team of hospitals.
- Because of the lack of human resources the proper ratio of nurses to patients is not feasible to be applied resulting in the increasing rate of healthcare-associated infections.

- Failure to comply with the principles of contact precautions in infectious patients due to the lack of protective equipment such as disposable gowns by the care staff.
 - Employing nursing assistants without having the necessary knowledge and information in the field of antibiotic resistance and infection control issues, which are one of the most important causes of the spread of resistant strains to patients in medical centers.
 - The inappropriate structure of most ICUs and the lack of isolation rooms and the low distance between beds in these units in Iranian hospitals.
6. Changing the behavior and attitude of the organization and health care workers (HCWs).
- Urgent need for change the pattern of HCWs behaviours and attitude towards infection prevention and control and antimicrobial stewardship by increasing their knowledge.
 - Insurance organizations' interest in action plan on AMR because of cost-effectiveness of the plan and reduction of healthcare costs as a result of the rational use of antibiotics.

One serious concern to tackling antimicrobial resistance is understanding the true burden of resistance, particularly in our country where surveillance is minimal and data are sparse. Unfortunately, in Iran, we are witnessing an inappropriate trend in the fields of education, diagnosis and treatment. So, there is an urgent need for correct policies and strategies at the level of the Ministry of Health and medical universities to fight antibiotic resistance, decrease healthcare costs, and reduce morbidity and mortality. It is time to wake up and think before it is too late.

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