ORIGINAL ARTICLE

Estimating awareness of health care workers and degree of implementation of antimicrobial resistance policies; a cross-sectional study from Egypt

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ABSTRACT

Background: *The problem of Antimicrobial resistance crises (AMR) is a threat to health and economy. Misuse of antimicrobials in human, animals and plants, lead to evolution of more aggressive bacterial strains that are resistant to most of known antimicrobials. Projections suggest that the problem will cause economic inequality, and numerous speculations about a near health crises mostly in developing countries where the burden of resistance is highest. The objective of this study is to assess awareness and degree of implementation of world health organization WHO strategies of antimicrobial resistance; an initiative for improvement.* ***Methodology:*** *analytical, cross- sectional study that employed interviews for implementation of the research.* ***Results:*** *100% of HCW are aware of antimicrobial resistance problem. 45% of physicians have their policy in treatment with antibiotics while 35% have no policies at all. Regarding training in infection control, only nurses received training about infection control while other HCW do not. Infection control practitioners are the only ones aware of surveillance and research in infection control; while others do not.* ***Conclusion:*** *Global action plan objectives of WHO are partially implemented. Lack of standardized policies and regulations in antibiotic stewardship, infection control; in addition, absence of programmed training for physicians about infection prevention control are among the main finding in impeding the application of WHO objectives.*

INTRODUCTION

Antimicrobial resistance (AMR) is a global problem in bacteria, virus and fungi [1,2], undermining our ability to treat infectious diseases, and impeding advances in health and medicine

Bacterial bugs are resistant to most of known anti-microbial agents. Infections due to resistant microorganisms are increasing in frequency with detrimental consequences for public health and economy [3]. They are currently responsible for more than 700,000 deaths per year worldwide[4]. According to the World Bank[7]. If no strong measures are taken to prevent the progress, AMR will cost approximately 10 million lives by 2050 worldwide; in addition, about US$100 trillion per year extra expenses which is more than cancer and diabetes burden combined[8].

Reasons of prevalence of antimicrobial resistance differ from one country to another. In developing countries, root causes are more complex than developed ones [5, 6]. Current research is focusing on designing new antibiotics and urge pharmaceutical companies to regularly fill the pipeline[9]. Others are seeing resource

limitedness and lack of infrastructure as major causes in Low-Middle income countries 10. Research is underestimating the behavioral impact of healthcare practitioners in this problem. Factors such as over prescription of antibiotics, lack of experience, absence of standards and policies, could represent a great amendable part of the problem for low cost. Thus, intervention efforts should be home-made and based on the factors prevalent in the community[11]. Moreover, interdisciplinary research groups including scientists and social science should be encouraged to tackle the problem from different perspectives[12].

To achieve this goal, the world health organization (WHO) set the global action plan (GAP) in 2015 with definite objectives; improving awareness about antimicrobial resistance, strengthen knowledge through surveillance and research, reducing disease burden by following infection control measures, optimizing the use of antimicrobials [13]. Each country should take serious steps to reach these goals to ensure continuity of effective treatment and prevention of multidrug resistance.

The aim of this research is to assess the level of awareness of healthcare workers to AMR and detect the extent of implementation of the WHO objectives. This study will be a first step to set the baseline and detect the gap in Egyptian hospitals to reach some characteristics of the needed reform and the impeding factors.

METHODOLOGY

The study was conducted in a tertiary hospital in Cairo, Egypt from January 2019 to June 2019. It is analytical, cross- sectional study that employed interviews for implementation of the research. Approval of ethical committee was obtained from the American University in Cairo.

Study tool and data collection technique:

As this problem is considered to be a collective social behavior, data gathering will depend on qualitative research methods.

The interview's questions (Annex1) were designed to be semi-structured with many open ended questions for flexibility and to explore the issue broadly. This was followed by in depth questions to study certain issues in details. In addition, further questions were designed based on what the interviewee have said to obtain more clarification and details[14].

Annex 1:

1. Do you see Antimicrobial resistance (AMR) as a big problem at your hospital? What is the percent?
2. Do you know or share in practices for detection and surveillance of AMR?
3. How do you prescribe antibiotics for patients?
4. Do you have protocol and standards for treatment?
5. How do you see infection control practices in your ward?
6. Did you receive infection control training?
7. How do you find the WHO global action plan to combat AMR?
8. What kinds of problems are you facing in your work which could hinder the application of AMR GAP?

Sampling

Purposive sampling was pursued in choosing the participants; preliminary criteria relevant to the research objectives were predetermined to guide the selection process [15]. The selection criteria were as following: all participants who are working in the medical field and have direct or indirect effect on the rate of AMR in the hospital. In turn, 20 interviews were conducted for health care workers (HCW) from different medical departments.

All interviews were conducted in Arabic, then translated and transcribed in English. Before the interviews, all participants were informed about the nature, purpose and possible outcomes of the research through the written informed consent.

NVivo Qualitative Data Analysis Software was used for thematic analysis.

RESULTS

The socio demographic characteristics of the 20 HCWs included in the study is shown in (Table 1). This data gives description about the interviewees', age, sex, work department, positions, and years of experience.

Age groups of participants ranged from 25-55 years, where 90% aged from 25-40 years, and 10% > 45 years. Sex distribution was comparable with 45% males and 55% females.

The interviewed participants were from different specialties; 10% from surgical department, 10% from chest department , 15% from ICU, 10% from internal medicine, 20% nurses, 15% laboratory doctors, 15% infection control, and 5% pharmacists.

Their positions differ from 25% juniors, 75% seniors, ranging from specialists to consultants.

The job status of 100% was full-time with years of experience varied from minimum 3 years to more than 20 years of experience in their fields.

In the following results the response of HCW to each of the four objectives of WHO will be analyzed, referencing depend on numbering of interviewee in table 1.

Table 1: Socio demographic characteristics of HCWs

Code	Department	Years of experience	Position	No. of interviewee	Sex
01	Surgical department	>20	Senior professor	1	Male
02	Surgical department	>20	Senior professor	1	Male
03	Chest department	7	Specialist chest physician	1	Male
04	Chest department	15	Consultant chest	1	Male
05	ICU department	15	Consultant ICU Physician	1	Male
06	ICU department	8	Specialist ICU	1	Male
07	ICU department	7	Specialist ICU	1	Male
08	Internal medicine	10	Consultant physician	1	Female
09	Internal Medicine	5	Resident physician	1	Female
10	Surgical department	6	Surgical Nurse	1	Female
11	Surgical department	5	Surgical Nurse	1	Female
12	Surgical department	8	Surgical Nurse	1	Male
13	Surgical department	3	Surgical Nurse	1	Male
14	Lab department	10	Clinical microbiology lab consultant	1	Female
15	Lab department	8	Clinical microbiology lab specialist	1	Female
16	Lab department	11	Clinical Microbiology Lab consultant	1	Female
17	Infection control department	3	Infection control doctor	1	Female
18	Infection control department	3	Infection control doctor	1	Female
19	Infection control department	4	Infection control doctor	1	Female
20	Pharmacist	8	Pharmacist	1	Female

Objective 1; Awareness and understanding of antimicrobial resistance

To know the percent of awareness and understanding of the problem, a question was introduced at the beginning of the interview about their perception of AMR. By analyzing the data, it was clear that 100% of healthcare personnel know the problem and aware of its consequences and this was obvious in their responses "MDR is a huge problem and we all suffer". By probing the question to identify types of prevalent microorganisms, they answer "gram negative organisms are the most common and aggressive bugs". This quote was received from all the interviewees which reflects that the issue became evident. They are afraid of spreading these dangerous bugs in the community.

Assessing Objective 2; strengthening the knowledge through surveillance and research; it is partially done.

By coding the data it was found that, Infection control practitioners and nurses are taking steps to detect and combat the risk. They are making the surveillance to capture the whole picture of MDR and monitoring the change in infection rate rapidly as declared by nurses in the following code "We have the surveillance program collected by nurses to enter data of patients daily then notify infection control doctors. (10-13). However, responses from infection control practitioners shed light on important missing data as stated by (17-19) "This is a great program of

surveillance; nevertheless, the final report usually missing important data because nurses are not well trained for selecting the valued data to enter.

In contrast, by asking other HCW other than infection control practitioners, 100% responded that they didn't know anything about surveillance at all.

Analyzing Objective3; optimizing the use of antimicrobials, it is subjectively implemented.

Digging deep in the interviews, opposite responses were received regarding the availability of unified standards and guidelines for optimum use of antibiotics. 45% of HCW have their own policy of treating and isolating patients as stated by quotes "The physician knows the policy of treatment in MDR and isolate the patient" (12,13), "We give him the sensitive antibiotic according to policy and isolate" (5,7). While 35% do not have any policies for dealing with MDR patients as stated "I do not have antibiotic policies and we treat according to sensitive antibiotic from culture results" (8,9).

Objective 4: reducing the incidence of infection by following infection control measures was partially met.

The response received from physicians was shocking "I don't have a copy of the infection control policies and no one told us about it except few times" (3, 4, 8, 9). Physicians lack the essential knowledge for dealing with MDR, they didn't receive training on infection control and do not know how to manage cases.

In contrast, nurses declared that they had received training on infection control, and they are regularly supervised by regular audits from infection control department (10,11,13).

DISCUSSION

As the problem of multidrug resistance is expanding, the most effective strategy is proper prevention and treatment to prevent spread in communities. Health care workers, front line in hospitals, should be highly educated about MDR management and control. Inadequacy of knowledge and improper application of infection control protocols could lead to prompt spreading of infection.

The aim of this research is to estimate the baseline of awareness among healthcare workers and assess the extent of implementation of WHO objectives to stop spreading of MDR.

To the best of our knowledge, this is the first study that is assessing the behavioral aspects of HCWs in dealing with MDR in Egypt.

Analysis of the study results showed that 100% of HCWs had adequate knowledge about the problem of MDR and its degree of severity. 100% of HCWs are convinced that MDR has detrimental effects on the prognosis of patients and that circulating bugs are extremely aggressive.

On assessing the strength of surveillance and research, the second objective, it was discovered that there is a current system of surveillance operated by infection control practitioners and infection control nurses; however, missing important data. This missing data attributed to lack of proficiency in personnel responsible for data entry, and that they are not trained enough for this job. This missing data will affect the solutions proposed and decision making regarding infections. This could lead to wrong decisions with wrong consequences. On the other hand, HCWs other than infection control practitioners do not know anything about surveillance or how it is running. This lack of communication and gaps between departments in addition to defective training should be fixed to strengthen efforts against MDR.

Another fact was realized due to lack of unified antibiotic policies is that everyone set a different policy in treatment by antibiotics which lead to huge corruption and gap in management in hospital settings. These findings are in agreement with a study done in a primary health care unit in Al Fayoum, Egypt [16]. Difference in antibiotic policies is a great obstacle which could lead to emergence of more aggressive bugs circulating in the hospital environment, and then in the community.

Discrepancy in response of physicians and nurses about education, training and availability of policies in infection prevention and control shed light on the importance of unifying training to all sectors of health care and imposing supervision to physicians and nurses. Focusing on one group of healthcare workers and ignoring others is like wasting time and effort; these findings were in concomitant with Refaei et al study in Minia, Egypt which detect lack of knowledge and training as a major factor in barriers of practice infection control standards[17]. Underpinning these root causes prevalent in developing countries would be the first step in improvement, and solutions should be taken seriously to stop this issue.

Limitations:

There are some acknowledged limitations of the study, the size of the sample is limited; however, broadly distributed to cover most of HCWs involved directly or indirectly in AMR. Responses in the interview depends mainly on the respondents; which could be subjective.

- The authors declare that they have no financial or non financial conflicts of interest related to the work done in the manuscript.
- Each author listed in the manuscript had seen and approved the submission of this version of the manuscript and takes full responsibility for it.
- This article had not been published anywhere and is not currently under consideration by another journal or a publisher.

REFERENCES

1. Helal SF, El Anany MG, AbdulRahman EM, Hussein AF. Interactions between influenza A hemagglutinin and host cell receptors. Kasr Al Ainy Medical Journal. 2018; 24(3), 101.

2. Hussein AF, Cheng H, Tundup S, Antanasijevic A, Varhegyi E, Perez J, Peet, N. Identification of entry inhibitors with 4-aminopiperidine scaffold targeting group 1 influenza A virus. Antiviral Research. 2020; 104782.

3. Marshall BM, Levy SB. Food animals and antimicrobials: impacts on human health. Clinical microbiology reviews. 2011; 24(4), 718-733

4. Roca I, Akova M, Baquero F, Carlet J, Cavaleri M, Coenen S, Kahlmeter G. The global threat of antimicrobial resistance: science for intervention. New microbes and new infections. 2015; 6, 22-29.

5. Lim C, Takahashi E, Hongsuwan M, Wuthiekanun V, Thamlikitkul V, Hinjoy S, Limmathurotsakul D. Epidemiology and burden of multidrug-resistant bacterial infection in a developing country. Elife. 2016; 5, e18082.

6. Shrestha P, Cooper BS, Coast J, Oppong R, Thuy N DT, Phodha T, Lubell Y. Enumerating the economic cost of antimicrobial resistance per

antibiotic consumed to inform the evaluation of interventions affecting their use. Antimicrobial Resistance & Infection Control. 2018; 7(1), 98.

7. Hussein AF. To what extent the World Health Organization's policies of antimicrobial resistance are implemented in Egyptian hospitals, 2019.

8. Scarafile G. Antibiotic resistance: current issues and future strategies. Reviews in Health Care. 2016; 7(1), 3-16.

9. Li B, Webster TJ. Bacteria antibiotic resistance: New challenges and opportunities for implant-associated orthopedic infections. Journal of Orthopaedic Research. 2018; 36(1), 22-32.

10. Aslam B, Wang W, Arshad M I, Khurshid M, Muzammil S, Rasool MH, Salamat MKF. Antibiotic resistance: a rundown of a global crisis. Infection and drug resistance. 2018; 11, 1645.

11. Podolsky SH, Bud R, Gradmann C, Hobaek B, Kirchhelle C, Mitvedt T, Lie AK. History teaches Us that confronting antibiotic resistance requires Stronger Global Collective Action. The Journal of Law, Medicine & Ethics. 2015; 43(3_suppl), 27-32.

12. Al-Hassan L, Roemer-Mahler A, Price J, Islam J, El-Mahallawy H, Higgins PG, Newport M. The TACTIC experience: establishing an international, interdisciplinary network to tackle antimicrobial resistance. Journal of Medical Microbiology. 2020; 69(10), 1213-1220.

13. Mendelson M, Røttingen JA, Gopinathan U, Hamer DH, Wertheim H, Basnyat B, Balasegaram M. Maximising access to achieve appropriate human antimicrobial use in low-income and middle-income countries. The Lancet 2016; 387(10014), 188-198.

14. Yilmaz K. Comparison of quantitative and qualitative research traditions: Epistemological, theoretical, and methodological differences. European Journal of Education. 2013; 48(2), 311.

15. Guetterman TC. Descriptions of sampling practices within five approaches to qualitative research in education and the health sciences. In Forum qualitative Sozialforschung/forum: qualitative social research. 2015; 16, No. 2.

16. El Sherbiny NA, Ibrahim EH, Masoud M. Assessment of knowledge, attitude and behavior towards antibiotic use in primary health care patients in Fayoum Governorate, Egypt. Alexandria journal of medicine. 2018; 54(4), 535-540.

17. Refeai SA, Kamal NN, Ghazawy ERA, Fekry CM. Perception and barriers regarding infection control measures among healthcare workers in Minia city, Egypt. International Journal of Preventive Medicine. 2020; 11.