

Knowledge, Attitudes and Practice Survey about Antimicrobial Resistance and Prescribing Among Physicians in Governmental Hospitals in North of Palestine

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Abstract

Antimicrobials resistance and irrational use of antimicrobials (AMs) are a worldwide problem. The objective of this study is to assess knowledge, attitudes and practices about antimicrobial resistance (AMR) and AM prescribing among physicians in the northern districts of the occupied Palestinian territories. A cross-sectional study using a self-administered questionnaire was conducted at governmental hospitals in the northern districts of the occupied Palestinian territories to assess knowledge, attitudes and practice of physicians about antibiotic prescribing and AMR. This study was conducted in the period starting October 2016 until April of 2017. The average knowledge score was 5 out of 7 (SD \pm 0.17). The vast majority (95.8%) strongly agreed that AMR is a worldwide problem. Although (84.9%) agreed that AMR is a problem in their daily practice, about (69.2%) of them did not know the rate of AMR in their hospitals. Confidence about AMs prescribing was higher among residents than attending physicians (47%, 40%, respectively). With respect to the sources of information, the majority of participants (78.9%) found that the internet is a very useful source of information while more than half (52.4%) sometimes ask their colleagues. The pressure which the patients put on the physicians to prescribe AMs (54.2% in the community versus 25.9% in the hospital setting) and the availability of AMs in hospitals (26%) contributed to AM overuse. The majority of participants (99.4%) were interested in more AMs prescribing educational programs and local AM guidelines (81.3%). This study highlighted the areas of weaknesses that need to be addressed for future AM prescribing interventions such as increasing awareness about local AMR rates, preparation and dissemination of local AM guidelines based on local AMR data, as well as raising the general public's awareness about AMs and AMR and exploring the possibilities of internet-based training.

KEYWORDS: Antimicrobial resistance, Prescribing, Knowledge, attitude and practice survey.

BACKGROUND

Antimicrobial resistance (AMR) has become a worldwide public health concern [1]. It has led to not only increased morbidity and mortality but also a high economic burden. Reasons behind AMR include irrational drug use such as prescribing excessive amounts of antibiotics [1], prescription of antibiotics (AB) for viral infections [2], failure to finish the whole course of AB [3, 4], unsupervised intake of AB [2] and lack of adherence to infection control policies to circumvent the spread of resistant bacteria both in the community and the hospital [2].

The prescribing behavior of physicians is considered one of the most important factors in affecting the consumption of AB and is a potential tool for control and containment of AMR [2]. Their behavior can be analyzed by KAP-surveys, in which physician's knowledge, and attitude regarding antimicrobial resistance and prescribing practice are assessed [2].

Many studies have been performed worldwide to assess physician's knowledge, attitude and practice about AMR [2-7]. No such studies have been conducted in Palestine to tackle this issue [8, 9]. To the best of our knowledge this study is the first in Pales-

tine to assess knowledge, attitudes and practice about antimicrobial resistance and prescribing among physicians in the governmental hospitals in the northern districts of Palestine.

METHODS

Study design and setting

A cross-sectional survey of physicians was conducted at governmental hospitals in the northern districts of Palestine. These governmental hospitals are located in six cities: Nablus (Rafidia Surgical Hospital 200 beds, Al Watani governmental hospital 55 beds), Tulkarm (Thabit Thabit 117 beds), Jenin (Khaleel Sulaiman 163 beds), Qalqiliya (DarweeshNazal 58 beds), Tubas (Turkish 37 beds), and Salbit (Yasser Arafat 50 beds) [10].

Participants and survey instrument

A self-administered questionnaire was distributed in the governmental hospitals in the northern districts of Palestine among physicians in training and specialists who work in the internal medicine, surgery, pediatrics, orthopedic departments and general practitioners who have not been placed in a residency program yet and do not work in a specific department. Physicians from other specialties obstetrics/gynecology, psychiatry, neurology, ophthalmology, radiology, anesthesiology and interns (physicians in training who have completed medical school and have a medical degree, but do not yet have a full license to practice medicine unsupervised) were not included as they rarely prescribe antibiotics during their practice.

In our study, we used a previously validated questionnaire [11] which contains 38 items. The survey started with information about the professional profile of participants as well as the frequency of antimicrobial (AM) prescription (5 questions), physicians awareness about the extent of AMR (7 questions), places from which they obtain their information and the availability of programs of continuing education in their working places about AMs (3 questions), self-confidence and seeking inputs (5 questions), factors leading to AM prescription (4 questions) and the acceptability and appropriateness of potential interventions (5 questions). Questions used a 4 or 5 –point Likert scale. Seven questions were used to assess basic

knowledge about AB, they include: clinical indication, spectrum, administration and pharmacological characteristics of AMs. We used three cases to assess physicians' ability to select the proper agent to treat acute diarrhea, an upper respiratory tract infection and sepsis in a patient with renal failure; one question assessed the knowledge about the safe use of AMs during pregnancy, and three questions covered the spectrum of and pharmacological characteristics of AMs. Finally, physician's awareness about the extent of antimicrobial resistance was assessed by asking about knowledge of AMR rates within participating hospitals, participants were asked to estimate the rates of AMRs of two common pathogens, *Klebsiella pneumoniae* resistance to cephalosporin and *Pseudomonas aeruginosa* resistance to ciprofloxacin.

Ethical considerations

The study was approved by An-Najah National University Institutional Review Board (IRB). Permission was obtained from Palestinian Ministry of Health and the medical and administrative managers of each hospital prior to collecting any data. Verbal consent was obtained from each participant.

Statistical analysis

A sample size of 166 was calculated using Roasoft sample size calculator (<http://www.raosoft.com/samplesize.html>) considering a total population of 289 physicians. Subjects were recruited by a non-probability convenient method. Data were analyzed using the software SPSS version 21. (SPSS, Inc., Chicago, IL, USA). Descriptive statistics were used as appropriate and the appropriate statistical analysis tests (parametric and/or non-parametric) were used. A 95% confidence level was applied. P value of <0.05 was always considered statistically significant.

Proportions were calculated for categorical variables and their significance was assessed by the Chi square test. Means and standard deviations were calculated for continuous variables. Unless otherwise stated, we used Likert items by combining the data into two categories, "strongly agree/agree", "very useful/useful" and "very confi-

dent/confident" versus the remaining options of the scale.

RESULTS

Demographics and professional profile

All participants (166 physicians) responded to the questionnaire (response rate 100%). Most of them (98.8%) thought that knowledge of antibiotics is important in their medical career currently and in the future, and about (89.2%) were prescribing AMs more than once a day. Professional profile of the participants is shown below (Table 1).

Knowledge on AM use and AMR rates

The mean score of the questions about the knowledge of AMs was 5 out of 7 ($SD \pm 0.17$). About (89.2%) of participants correctly answered that there was no need for antibiotic use for the case of acute diarrhea, while about (51.2%) agreed to give amoxicillin for upper respiratory tract infection. Regarding the question about dose adjustment of antibiotics in a patient with renal impairment, about (65.1%) answered correctly that the patient with sepsis must receive an adjusted dose of ceftriaxone and gentamicin. As for the safety of antibiotic use in pregnancy, those who answered correctly reached (94.6%), stating that amoxicillin is the safe drug. When asked about which antibiotic has the best activity against anaerobes, (88.0%) of the participants answered correctly. About (74.1%) of participants knew that MRSA is not susceptible to cephalosporins. About half of the participants (51.2%) realized that among the choices given, ceftriaxone was the most effective in crossing the blood brain barrier, however (39.2%) of them incorrectly answered it vancomycin (Figure 1).

Two questions measured the knowledge of AMR rate and revealed that (74.1%) of participants did not know the rate of resistance of *Klebsiella pneumoniae* to cephalosporin, and (64.5%) of them did not know the rate of resistance of *Pseudomonas aeruginosa* to ciprofloxacin in their hospitals.

Awareness about the current scope of AMR

The majority of participants (95.8%) were aware that AMR is a problem. A larger proportion of attending physicians (98.4%) strongly agreed and agreed that AMR is a

problem at a worldwide and national level compared to (96.1%) of residents. Approximately (86.4%) of attending physicians strongly agreed AMR is a problem in their daily practice compared to (82.5%) of residents. There was an agreement that antibiotics are overused in the hospitals and the community (91.5%, 98.8%, respectively) (Figure 2).

Confidence and seeking of inputs

Among all participants 44% were very sure about the optimal use of AMs. Approximately half (47.0%) of residents revealed they were very confident about the optimal use of antimicrobials compared to attending physicians (40.0%); ($p < 0.002$). Less than half of participants (43.4%) strongly agreed and agreed that it is difficult to select the correct AMs, (26.4% in pediatrics, 25.0% in surgical departments and 19.4% in the medical departments). Around 10.2% of participants strongly agreed and agreed that prescribing AMs for patients who are not in need will not cause them harm.

With regard to seeking inputs, 65.0% of participants reported that they review their decision to prescribe AMs with a senior colleague, 80.5% of them reported that their senior colleague "sometimes" recommend a different AM, while 34.9% of all participants replied that they "never" review their decision with a senior, 27.0% of participants were general practitioners and 25.9% pediatricians while it was less likely between medical doctors 15.5% and between surgical doctors 19.0%.

Sources of information and continuing education

A total of 77 (46.4%) participants stated that they weren't taught about AMs during the academic activities of their departments, 31.2% of participants were from surgical department, 22.1% were GPs, 15.6% from medical department, 19.5% were from pediatrics and 11.6% were from orthopedics. Likewise, 23% of participants had never participated in any course on AMs use during the last year of their practice, more than half were residents (64.1%) compared to 35.9% attending physicians ($p < 0.002$). Regarding source of information, 53.6% of participants

affirmed that they have sufficient sources of information about AMs when they are in need, whereas 45.8% of them considered the available sources were not enough and more sources were needed. (n=102, 61.4%) of participants considered internet sources very useful, specially residents (68.6%, n=70) compared to attending physicians (n=32, 31.4%) ($p<0.002$). When they were asked about the usefulness of information from higher rank colleagues “senior”, 32% of participants answered very useful and useful, though 48.2% of participants were not familiar. Approximately half of the participants (48.2%) considered information from the same rank colleagues as very useful and useful while 9.6 % said they were not.

Factors influencing decisions around AM prescription

Nearly half of the participants (54.2%) strongly agreed and agreed that patient’s demand for AMs affected the doctor’s behavior and increases AMs overuse in the community, while (25.9%) strongly agreed and agreed that patient’s demand contributes to AMs overuse in hospital setting (Figure 3). Almost two thirds (69.3%) of participants said they were aware of the available AMs in their hospitals and only 15.7% said they strongly agreed and agreed that the continuous changing of AMs made them unaware of the available AMs in their hospitals. More than half (56.6%) of respondents strongly disagreed and disagreed that the poor quality of these AMs is the main reason behind their failures.

Acceptability and appropriateness of potential interventions

Almost all participants (99.4%, n=165) strongly agreed and agreed that there is a need to organize educational programs on AMs and (81.3%) confirmed that the development of local guidelines would be more useful than international one. Likewise, (92.2%, n=153) of participants strongly agreed and agreed that local AMR rates should be considered when prescribing AMs. It should be noted that (72.3%) of participants strongly disagreed and disagreed that the need to apply for approval to prescribe restricted AMs caused them to seek an alternative AM. The majority (85.5%) of participants strongly disagreed and disagreed that AMs guideline and committees are an obstacle more than a help to clinical care (Figure 4).

Table (1): Professional profile of the participants.

Characteristic	N (%)
Years of practice	
0-4 years	78 (47)
More than 5 years	88 (53)
Hospital departments	
Medicine	32 (19.3)
General practitioners	27 (16.3)
Surgery	52 (31.3)
Pediatrics	36 (21.7)
Orthopedics	19 (11.4)
Position	
Resident	103 (62)
Attending physician	63 (38)

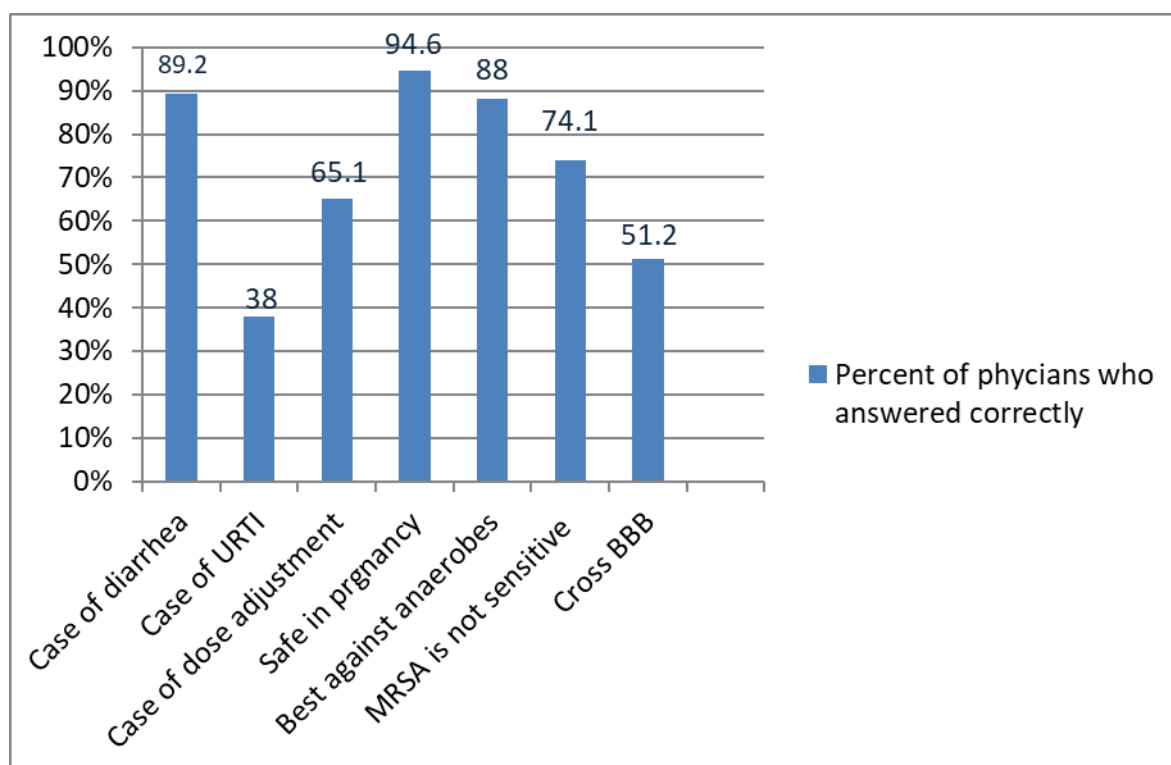


Figure (1): Physicians' knowledge about antimicrobials.

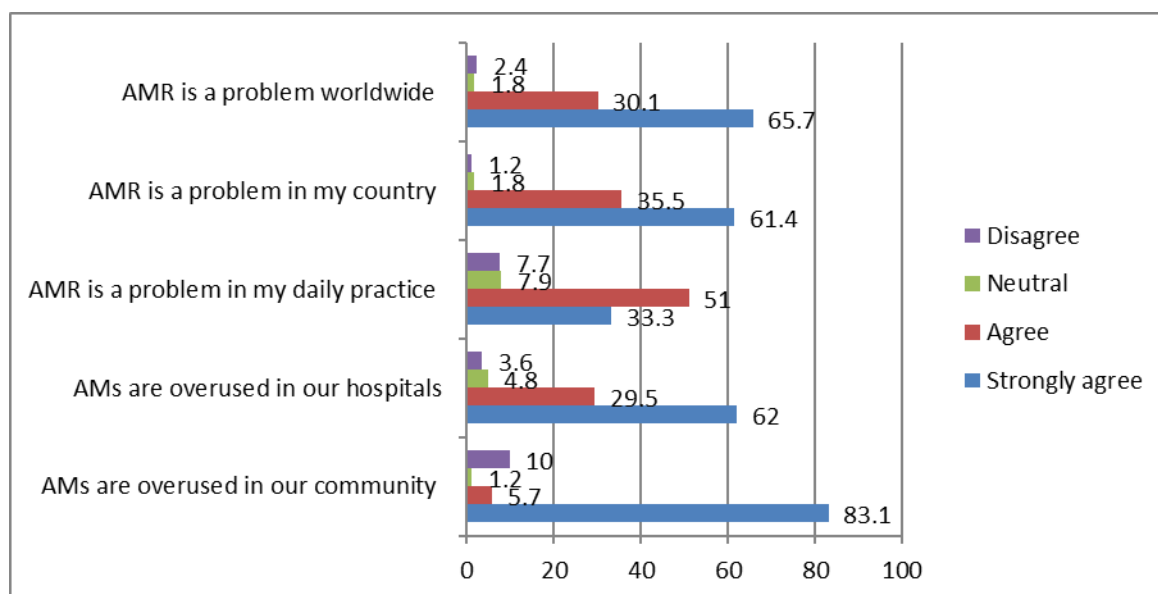


Figure (2): Awareness of the scope of AMR among participants (data represent percentages).
AM: antimicrobial, AMR: antimicrobial resistance.

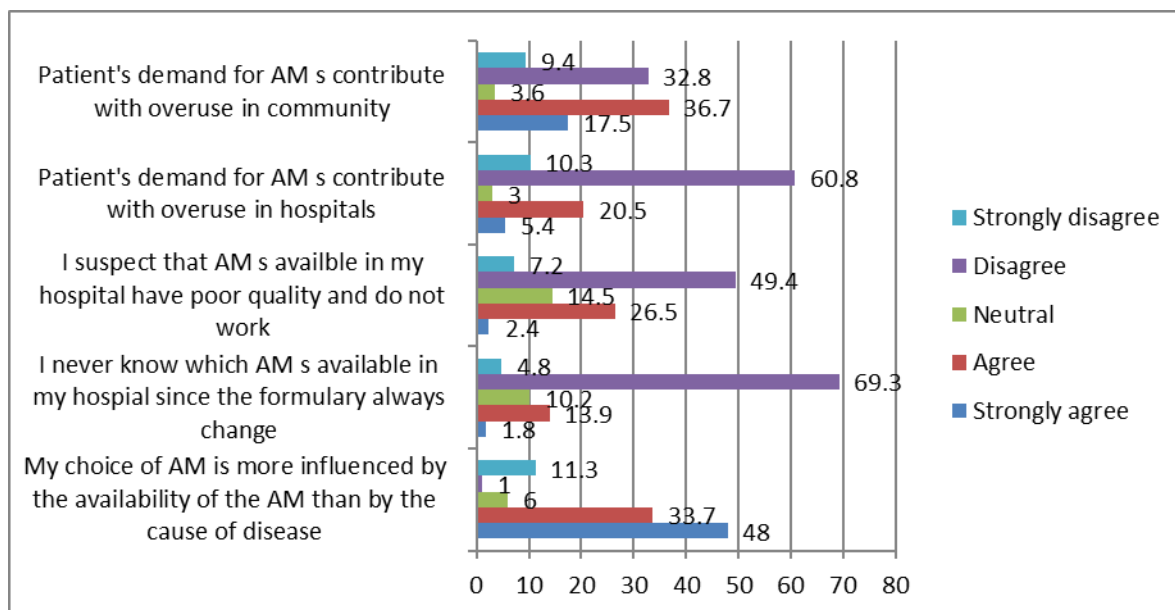


Figure (3): Perceptions of factors influencing the decision on AM prescription. Data represent percentages. AM: Antimicrobial.

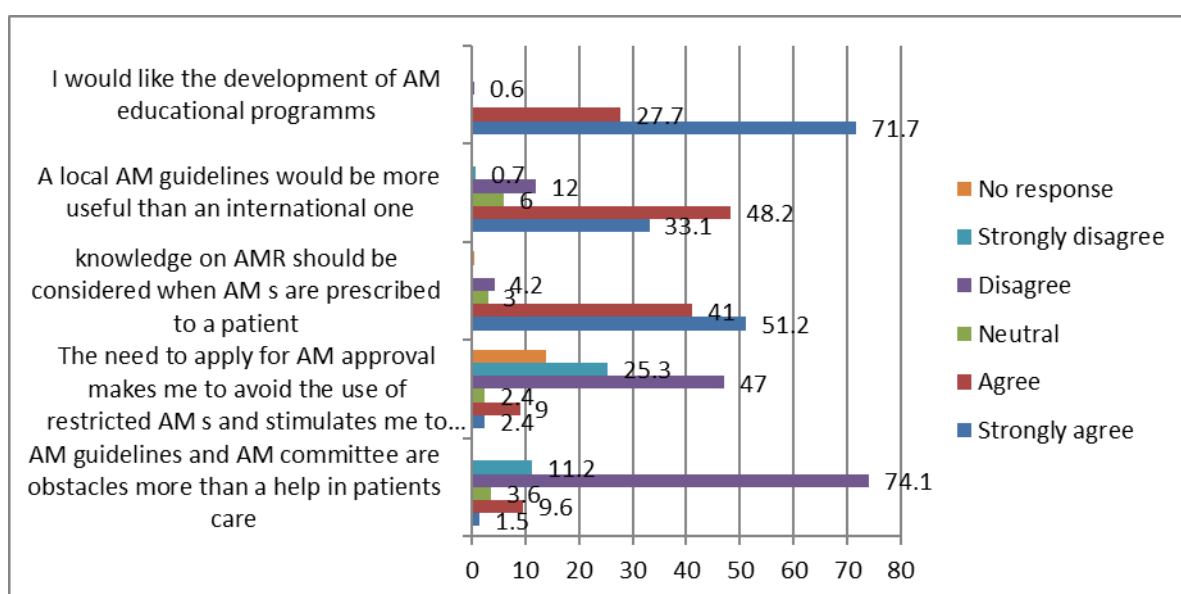


Figure (4): Acceptability and appropriateness of potential interventions on AM prescribing among participants. Data represent percentages. AM: antimicrobial, AMR: antimicrobial resistance.

DISCUSSION

Antimicrobial resistance is a global health problem that is associated with increased mortality and morbidity. In an effort to assess the knowledge, attitudes and practice of physicians about antibiotic prescribing and AMR, we conducted this study at the governmental hospitals in the northern districts of the occupied Palestinian territories.

The results of this study show that general knowledge of AMs was good. 89.2% of participants correctly said there was no need to treat watery diarrhea, while half of respondents incorrectly answered there is a need to treat upper respiratory tract infections. A similar trend was found in a study conducted in Malaysia which showed that 49.2% of prescriptions were for self-limiting conditions[12]. Another study done in the

outpatient clinics in Jordan showed that 83% of prescribed antibiotics were for respiratory tract infections [13].

Although the participants' overall knowledge about AMs was appropriate, 74% of them did not know the rate of local resistance of *klebsiellapneumoniae* to cephalosporin. This finding is similar to a study done in DR Congo which revealed a poor estimation of the local resistance rate of *S. typhi* and *Klebsiella pneumonia* [14]. The Palestine Ministry of Health should push forward towards improving local microbiology laboratories and encourage them to prepare annual antibiograms in the governmental hospitals, the main health care provider, and spread the results to prescribers.

The majority of participants were highly aware that AMR is a problem at three levels (worldwide, national, and in their daily practice). These results correspond to the findings of three other surveys done in Brazil, Spain and India [15-17]. On the other hand, clinicians' perception of AMR in US was variable; about (94.8%) strongly agreed and agreed that it was a problem nationally but about (65.3%) in their own practice [6].

Furthermore, this study showed that there is an overuse of antibiotics in the hospitals and community which plays a main role of AMR. In Ethiopia, a study showed that the two most important factors for AMR development were patient's poor adherence to prescribed antimicrobials (86%) and overuse of antibiotics (80%) [18].

This study revealed that half of participants were very confident about the optimal use of AMs. However, a study in Lima and Peru showed that residents were less confident than the attending physicians [11]. Moreover, more than half of the participants seek information about antibiotics from their senior colleagues and (80%) of them sometimes recommended a different AM. In France and Scotland, availability of advice

from an infectious disease specialist and microbiologist was highly valued [19].

The present survey revealed that the internet is the most useful source followed by information from colleagues of the same rank and seniors, the same results were found in a study done among physicians in a teaching hospital in eastern India [17]. In Lima and Peru, for example, the Sanford guidelines was the first ranked source [11], while in developing countries, the internet source use is less as it is not always available, and other alternative which are less reliable take place. For example, in DR Congo the information from pharmaceutical companies ranked the highest in terms of accessibility [14]. A very small percentage recognized text books as an important source. Almost half of participants felt that they do not have enough sources of information about AM, mainly due to lack of local guidelines and reliable laboratory information about susceptibility patterns in their community.

Regarding continuing education, the majority of participants revealed that they weren't taught about AM in the academic activities of their departments during the last year of their practice, and few of them said that they participated in courses related to AB which indicated weak knowledge updating and highlight the need for planned educational programs to address the knowledge gaps and support evidence based AM prescribing practice.

Half of participants identified patient's demand of AM as a key contributing factor for AM overuse to achieve patient's satisfaction in outpatient clinics, while less than quarter agreed that patient's demand contribute in overuse in hospital setting and this is similar to what was found in a survey conducted in Lima and Peru [11] as well as Australia[20]. These finding highlight the need for training physicians to educate patient about the rational use of AB in order to improve their practice, and to emphasize that

the driver of AM use should be the patient's clinical need rather than demand. There should also be educational interventions and campaigns which target the patients, as they influence prescribing decision. This was done in several countries such as Australia, Chile, Europe and Korea and showed a good effect in reduction in AB prescribing [21].

More than half of the participants disagreed that the AMs in their hospitals are of poor quality, and the majority are aware of what kinds of AMs are available in their hospitals as they are not always being changed and if they are changed, the pharmacy will always inform the physicians. Whereas in other places such as tertiary care teaching hospital in Easter Ethiopia and selected hospitals in Lima and Peru the majority of their physicians said that the AMs in their hospitals are of poor quality and that they don't know the AMs that are available in their hospitals as they always change and they considered these as contributing factors that influence their AM prescription [11, 18]. The vast majority of respondents strongly agreed on the need to organize educational programs about AB, and most of them agreed that they should take the general knowledge about AMR into consideration when they prescribe AMs. Most of the doctors said that the development of local guidelines would be more useful than international ones because of different susceptibility pattern of microbes in different regions but (10.8 %) felt that AB guidelines are an obstacle, which is probably because they feel that it limits clinical decision making to some extent.

One of the main limitations of this kind of studies is that participants tend to give socially desirable answers rather than expressing their true practice, in order to minimize this potential bias, anonymous participation was ensured, self-administered questionnaire was used and the case-based questions were presented at the end of the survey.

CONCLUSIONS

This study has produced information about prescribing attitudes and practices of medical doctors from governmental hospitals in north of Palestine. It identified the topics that need to be addressed for the containment of antimicrobial resistance, such the need to publish information about local AMR rates, the development and use of local guidelines, and most importantly emphasize the importance of having regular educational activities regarding appropriate use of antimicrobials.

REFERENCES

- 1) Toska AI GM. Antibiotic resistance and irrational prescribing in paediatric clinics in Greece. *Br J Nurs*. 2015; 24(1): 28-33.
- 2) Machowska A, Stalsby Lundborg C. Drivers of Irrational Use of Antibiotics in Europe. *Int J Environ Res Public Health*. 2018; 16(1): 27.
- 3) Sharma S, Bowman C, Alladin-Karan B, Singh N. Antibiotic prescribing patterns in the pediatric emergency department at Georgetown Public Hospital Corporation: a retrospective chart review. *BMC Infect Dis*. 2016; 16: 170.
- 4) Franco BE, Altagracia Martinez M, Sanchez Rodriguez MA, Wertheimer AI. The determinants of the antibiotic resistance process. *Infect Drug Resist*. 2009; 2: 1-11.
- 5) Rather IA, Kim BC, Bajpai VK, Park YH. Self-medication and antibiotic resistance: Crisis, current challenges, and prevention. *Saudi J Biol Sci*. 2017; 24(4): 808-12.
- 6) Larson EL, Quiros D, Giblin T, Lin S. Relationship of antimicrobial control policies and hospital and infection control characteristics to antimicrobial resistance rates. *Am J Crit Care*. 2007; 16(2): 110-20.

- 7) World Health Organization, Antimicrobial Resistance Centre at the London School of Hygiene & Tropical Medicine. Antibiotic prescribing and resistance: Views from low- and middle-income prescribing and dispensing professionals 2017 [Available from: <https://www.who.int/antimicrobial-resistance/LSHTM-Antibiotic-Prescribing-LMIC-Prescribing-and-Dispensing-2017.pdf>.
- 8) Abu Taha A, Abu-Zaydeh AH, Ardah RA, Al-Jabi SW, Sweileh WM, Awang R, et al. Public Knowledge and Attitudes Regarding the Use of Antibiotics and Resistance: Findings from a Cross-Sectional Study Among Palestinian Adults. *Zoonoses Public Health*. 2016; 63(6): 449-57.
- 9) Zyoud SH, Abu Taha A, Araj KF, Abahri IA, Sawalha AF, Sweileh WM, et al. Parental knowledge, attitudes and practices regarding antibiotic use for acute upper respiratory tract infections in children: a cross-sectional study in Palestine. *BMC Pediatr*. 2015; 15: 176.
- 10) Ministry of Health, Palestinian Health Information Center. Health Status, Palestine, 2018 2019 [Available from: http://site.moh.ps/Content/Books/fE4zsafxsjNVhJntidJnqnnEHUibMuC1NYu66TNEmoNUJ1ZxeRcCm3_Iei1j8d4YesYKxRyEhD6PZqdxzBa4z91pIhALGXoDGEhlEIPai9X9O.pdf.
- 11) Garcia C, Llamocca LP, Garcia K, Jimenez A, Samalvides F, Gotuzzo E, et al. Knowledge, attitudes and practice survey about antimicrobial resistance and prescribing among physicians in a hospital setting in Lima, Peru. *BMC Clin Pharmacol*. 2011; 11: 18.
- 12) Ab Rahman N, Teng CL, Sivasampu S. Antibiotic prescribing in public and private practice: a cross-sectional study in primary care clinics in Malaysia. *BMC Infect Dis*. 2016; 16: 208.
- 13) Al-Niemat SI, Aljbouri TM, Goussous LS, Efaishat RA, Salah RK. Antibiotic Prescribing Patterns in Outpatient Emergency Clinics at Queen Rania Al Abdullah II Children's Hospital, Jordan, 2013. *Oman Med J*. 2014; 29(4): 250-4.
- 14) Thriemer K, Katuala Y, Batoko B, Alworonga JP, Devlieger H, Van Geet C, et al. Antibiotic prescribing in DR Congo: a knowledge, attitude and practice survey among medical doctors and students. *PLoS One*. 2013; 8(2): e55495.
- 15) Guerra CM, Pereira CA, Neves Neto AR, Cardo DM, Correa L. Physicians' perceptions, beliefs, attitudes, and knowledge concerning antimicrobial resistance in a Brazilian teaching hospital. *Infect Control Hosp Epidemiol*. 2007; 28(12): 1411-4.
- 16) Navarro-San Francisco C, Del Toro MD, Cobo J, De Gea-Garcia JH, Vano-Galvan S, Moreno-Ramos F, et al. Knowledge and perceptions of junior and senior Spanish resident doctors about antibiotic use and resistance: results of a multicenter survey. *Enferm Infecc Microbiol Clin*. 2013; 31(4): 199-204.
- 17) Ghosh A, Deb T, Ghosh S. Knowledge, attitudes and practice survey about antimicrobial resistance and prescribing among physicians in a tertiary care teaching hospital in Eastern India. *Int J Basic Clin Pharmacol*. 2016; 5(1): 180-7.
- 18) Abera B, Kibret M, Mulu W. Knowledge and beliefs on antimicrobial resistance among physicians and nurses in hospitals in Amhara Region, Ethiopia. *BMC Pharmacol Toxicol*. 2014; 15: 26.

