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Article · November 2017

DOI: 10.1016/j.jtumed.2017.09.001

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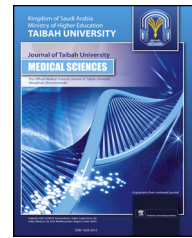


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Original Article

## Perceptions and practice of physicians and pharmacists regarding antibiotic misuse at primary health centres in Qatar: A cross-sectional study

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Received 18 July 2017; revised 5 September 2017; accepted 6 September 2017; Available online ■ ■ ■

### المخلص

**أهداف البحث:** إن الاستخدام غير الملائم للمضادات الحيوية هو قضية صحية عالمية حرجية. وعدم الإشراف على وصف المضادات الحيوية هو ممارسة تعرض المجتمع إلى استخدام أدوية لا مبرر لها، وتسهم في حدوث مقاومة لمضادات الميكروبات. تقيم هذه الدراسة إدراك وممارسة الأطباء والصيادلة في مراكز الرعاية الصحية الأولية في قطر تجاه سوء استخدام المضادات الحيوية.

**طرق البحث:** في هذه الدراسة المستعرضة، تطوع ٢٢٦ طبيباً و٨٢ صيدلانياً في مراكز الرعاية الصحية الأولية. جمعت البيانات باستخدام تقنية أخذ العينات العنقودية متعددة المراحل. بالإضافة إلى ذلك، تم استخدام استبيانين ذاتية مستقلة للأطباء والصيادلة على التوالي.

**النتائج:** كان معدل الاستجابة ٨.٩٧% و ١٠٠% للأطباء والصيادلة على التوالي. واعتبر كل من الأطباء (٧.٩٠%) والصيادلة (٨.٨٧%) سوء استخدام المضادات الحيوية قضية صحية عامة رئيسية. ولمنع سوء استخدام المضادات الحيوية، ركز معظم الأطباء والصيادلة على تثقيف المرضى وكذلك الممارسة الجيدة لتعليم.

**الاستنتاجات:** قدمت هذه الدراسة أدلة جديدة عن إدراك وممارسة المهنيين الصحيين المتعلقة بوصف المضادات الحيوية في مراكز الرعاية الصحية الأولية في قطر.

**الكلمات المفتاحية:** مقاومة المضادات الحيوية؛ الصيادلة؛ الأطباء؛ الرعاية الصحية الأولية؛ قطر

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Peer review under responsibility of Taibah University.



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### Abstract

**Objectives:** The inappropriate use of antibiotics is a critical global health issue. The lack of antimicrobial stewardship exposes the community to unwarranted medication and contributes to the development of antimicrobial resistance. This study evaluated the perceptions and practice of physicians and pharmacists at primary healthcare centres of Qatar with respect to antibiotic misuse.

**Methods:** In this cross-sectional study, we recruited 226 physicians and 82 pharmacists in primary health care centres. A multistage cluster sampling technique was used for data collection. Separate self-administered questionnaires were administered to physicians and pharmacists.

**Results:** Response rates for physicians and pharmacists were 97.8% and 100%, respectively. Both physicians (90.7%) and pharmacists (87.8%) perceived antibiotic misuse as a major public health issue. To prevent antibiotic misuse, most physicians and pharmacists reported a focus on patient education as well as good practices in their work.

**Conclusion:** This study provides novel evidence on the perceptions and practices of health professionals concerning antibiotic prescription in primary healthcare settings of Qatar.

**Keywords:** Antibiotic resistance; Pharmacists; Physicians; Primary healthcare; Qatar

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## Introduction

Deaths owing to infectious diseases represented roughly 16% of all deaths worldwide in 2015 compared with about 35% in 1970.<sup>1</sup> Over the years, antibiotics have saved countless lives and eased the suffering of millions. However, pathogenic bacteria are becoming resistant to antibiotics at an alarming rate due to the widespread misuse of antibiotics in human and animal health, aquaculture, agriculture, and household products.<sup>2</sup> Moreover, the enormous growth of global trade and travel has led to the concurrent spread of infectious diseases as well as resistant microorganisms across continents.<sup>3</sup> In recent history, the pharmaceutical industry has produced new antibiotics to replace old ones. However, a single antimicrobial takes one to two decades to develop, with research and development costs reaching half a billion US dollars.<sup>4</sup>

Globally, 700,000 people die every year owing to antibiotic resistance; this number is projected to reach 10 million deaths annually by 2050 unless effective action is taken.<sup>5</sup> In the Eastern Mediterranean Region, the burden of antimicrobial resistance in terms of morbidity, mortality, and financial cost remains vague as official figures are not yet available, according to the World Health Organisation.<sup>6</sup>

Healthcare professionals, including physicians and pharmacists, have a key role in the emergence of antibiotic-resistant bacteria by prescribing multiple courses of antibiotics, long durations of treatment, first-line treatment with broad-spectrum antibiotics, and antibiotic treatment of viral respiratory tract infections.<sup>7</sup> The reasons that prompt physicians to overprescribe antibiotics for viral respiratory infections include diagnostic uncertainty, sociocultural and economic pressures, and concerns about malpractice litigation.<sup>8,9</sup> A study by Baadani et al. assessed the knowledge, perceptions, and attitudes of 212 physicians toward antimicrobial prescription in Riyadh, KSA. It was found that there is a considerable level of training deficiency, with a need for physician education regarding the prescribing of antimicrobials.<sup>10</sup>

According to the Centers for Disease Control and Prevention (CDC) in the United States, one out of every three antibiotic prescriptions is unnecessary.<sup>11</sup> It is estimated that in Qatar, there are 300,000 antibiotic prescriptions each year at the primary healthcare level.<sup>12</sup> Hence, early measures to optimize prescribing patterns to reduce inappropriate use are crucial. There are multiple factors influencing the prescribers and dispensers of antibiotics, which vary depending on geographical region, social circumstances, and the prevailing healthcare system. In Qatar, no previous studies have

attempted to uncover the perceptions and practices of physicians and pharmacists in the primary healthcare (PHC) setting regarding antibiotic misuse. Thus, we conducted this study to inform stakeholders of the current situation and guide future interventions for these healthcare professionals, to limit antibiotic resistance.

## Materials and Methods

### *Description of the study area and population*

The study was conducted in Qatar, located to the east of the KSA. Primary healthcare services in the country are mainly provided through 21 PHC centres with an average of 1 physician for approximately 3900 people and 1 pharmacist for 14,000 people.

The participants in this study included physicians (general physicians, paediatricians, otolaryngology specialists, and family physicians) as well as pharmacists who were employed at the primary healthcare centres. Physicians working in administrative positions were excluded from the study because they were not involved in the clinical care of patients and antibiotic prescription.

### *Type of study, sample size, and data collection*

#### *Type of study*

This was a cross-sectional study that employed a multi-stage sampling technique. In the initial step, primary healthcare centres were divided into two groups; the first group included 10 primary healthcare centres outside Doha (the capital of Qatar) and the second included 11 centres within Doha. A total of six primary health centres were then randomly chosen, three from each group. Subsequently, proportionate random sampling was conducted to select interviewees from the chosen centres, depending on the size of the population served at each centre.

#### *Sample size*

The sample size was estimated using EPI Info version 2.3. In addition, the 50% rule was applied to estimate the perceptions and practices of antibiotic misuse among physicians and pharmacists in Qatar. The precision was set at 5% with a 95% confidence interval (CI) and design effect of 1.88. The inflation rate was taken as 20% to compensate for non-response. Subsequently, all physicians and pharmacists who met the eligibility criteria were enrolled. A list of those working in each PHC centre was obtained from the PHC administration, for simple random sampling.

#### *Data collection*

Separate questionnaires were developed for physicians and pharmacists. Each questionnaire was a modified self-administered, structured, and validated survey in the English language. The questionnaire included two parts, the first collected demographic data (sex, job description, and number of patients consulted per week) and the second queried data about the perceptions and practices of respondents with respect to antibiotic misuse.

*Data analysis*

The collected data were coded and entered in a PC using SPSS for Windows version 15 (SPSS Inc., Chicago, IL, USA). Subsequently, the frequency distributions were determined; the chi-square test was used to test for significance.

**Results**

The response rate was high for the two groups of respondents, 97.8% (226 of 232) and 100% for physicians and pharmacists, respectively.

*Physicians*

Table 1 illustrates the sociodemographic characteristics of the 226 physicians who participated in the current study. Participants were nearly equally distributed between males (54.4%) and females (45.6%). Most physicians in this study were general practitioners (64.2%), had more than 20 years' experience (46.5%), and saw more than 100 patients per week (81.9%).

Regarding the perceptions of antibiotic misuse, many physicians (90.7%) agreed that the issue poses a major threat to public health. About one-fifth (22%) of physicians expressed concern regarding the obligatory use of antibiotics, and just under half (46.3%) reported being pressured into prescribing antibiotics by patients' parents. A small number of doctors (6.5%) prescribed antibiotics out of fear of losing a patient; one-eighth (12.6%) were concerned about the prescribed daily doses of antibiotics. A similar portion of physicians (12.6%) worried about other causes of increased unnecessary prescription of antibiotics.

Regarding the perception of ways to reduce inappropriate antibiotic use, almost a third (31.9%) of doctors advocated the development of specific diagnostic criteria for common diseases in Qatar. A minority (1.3%) believed that dose reduction would alleviate the problem whereas others (3.1%) supported obligatory prescriptions for antibiotic dispensing. Finally, almost two-thirds (63.7%) of this

group considered patient education about appropriate antibiotic use to be a plausible solution. Consequently, doctors took different courses of action in response to patients' demands for antibiotics, and about a third (29.2%) reported being pressured by patients to prescribe an antibiotic. Moreover, almost half (48.2%) of physicians submitted to such patient requests in the clinic setting. Similarly, 61.5% of doctors agreed to prescribe antibiotics over the phone, and an identical number of physicians (61.5%) entertained patients' requests for a change of antibiotics.

With respect to their role in enhancing patients' knowledge of antibiotic misuse, about two thirds (63.7%) of doctors acknowledged the importance of educating their patients about the appropriate use of antibiotics. Many physicians reported advising their patients about taking antibiotics with meals (80.5%) and enquired about their patient's medication history (90.3%). In addition, most (91.6%) doctors believed that advising their patients would reduce antibiotic misuse.

*Pharmacists*

A total 82 pharmacists participated in the current study; 51.21% of respondents were men and 48.78% were women. Almost one-third (30.5%) of pharmacists had between 10 and 20 years' experience, and most (85.4%) reported attending more than 100 patients per week (Table 2).

Many pharmacists (87.8%) believed that antibiotic misuse represents a major public health issue, similar to their physician colleagues. Nearly one-third (32.9%) confirmed the importance of obligatory prescription for dispensing antibiotics; a similar proportion (39%) reported dispensing antibiotics under patient pressure. Additionally, a mere 6.1% of pharmacists said they feared losing a patient, and 19.5% were concerned about prescribed daily doses and prescription of inappropriate antibiotics for the condition. Finally, a minority (2.4%) of pharmacists worried about other causes of increased unnecessary antibiotic prescription.

On how to reduce antibiotic misuse, more than half (57.3%) of participating pharmacists advocated the development of specific criteria for diagnosing common diseases whereas only 3.7% believed in the importance of dose reduction. Finally, a third (32.9%) of respondents

**Table 1: Sociodemographic characteristics and practice experience of physicians (n = 226).**

Variables	Frequency	Percentage
<b>Sex</b>		
Male	123	54.4
Female	103	45.6
<b>Position</b>		
General practitioner	145	64.2
Resident	24	10.6
Specialist	45	19.9
Consultant	12	5.3
<b>Years of experience</b>		
<10	42	18.6
10–20	79	35.0
>20	105	46.5
<b>Number of patients seen in a week</b>		
<50	13	5.7
50–100	28	12.4
>100	185	81.9

**Table 2: Sociodemographic characteristics and practice experience of pharmacists (n = 82).**

Variables	Frequency	Percentage
<b>Sex</b>		
Male	42	51.2
Female	40	48.8
<b>Experience (years)</b>		
<10	37	45.1
10–20	25	30.5
>20	20	24.4
<b>Number of patients seen in a week</b>		
<50	2	2.4
50–100	10	12.2
>100	70	85.4

considered patient education to be an appropriate solution to the misuse of antibiotics.

Most pharmacists (95.1%) reported dispensing antibiotics in the previous week. Moreover, the majority (84.1%) reported receiving requests for a change of antibiotics from patients; only half (52.4%) entertained such requests. Nearly all pharmacists (95.1%) advised patients on the importance of completing the full course of antibiotics.

To reduce antibiotic misuse, most pharmacists reported advising patients about taking antibiotics with meals (93.9%) and enquired about the patient's medication history (82.9%). Almost three-quarters (74.4%) of participating pharmacists believed that advising patients would reduce the misuse of antibiotics. Finally, about 6% of pharmacists supported the enforcement of regulations whereas only 3.7% believed that reducing the dosage of antibiotics would prevent its misuse.

To enhance patient knowledge of antibiotic misuse, almost all pharmacists (98.8%) explained the dosage and duration of antibiotic use to their patients. A similar proportion (92.7%) further elaborated the preparation of certain antibiotics. However, almost two-thirds (67.1%) of participants discussed possible side effects of the dispensed antibiotic with patients; a similar percentage (69.5%) discussed the chosen antibiotic with the prescribing doctor.

## Discussion

The judicious prescription of antibiotics has become a central focus of professional and public health measures to combat the spread of resistant organisms. Despite overwhelming evidence that the overuse of antibiotics is detrimental, some healthcare providers are still needlessly prescribing antibiotics.

### Physicians

We investigated different events occurring during clinical encounters between physicians and patients. We found that about a third (29.2%) of physicians felt they were often under pressure by patients to prescribe antibiotics. Physicians who are overworked, underinformed, or pressured tend to overprescribe antibiotics and thereby contribute to the spread of resistance. A study by Smith et al. revealed that physicians' perceptions of parental expectations for antibiotics were the most significant predictor of antibiotic prescription for conditions of presumed viral aetiology.<sup>13</sup>

Patients often expect to be prescribed antibiotics and this pressure can be difficult for physicians to ignore. However, research has shown that physicians' communication with patients influences their satisfaction more than the actual receipt of antibiotics, especially when patients are asked by their physician to contact them if symptoms do not improve.<sup>14</sup> Therefore, these findings suggest that educating patients about their diagnosis and course of treatment may result in reduced demand for unwarranted antibiotics.

Despite being pressured by patients for antibiotic prescriptions, only 48.2% of the physicians in this study fulfilled such requests; this proportion was even lower for telephone requests for prescriptions (14.2%) and change of antibiotics (61.5%). Research conducted by Fletcher-Lartey et al. in

Australia cited meeting patient expectations to be one of the main triggers of antibiotic overprescription by general practitioners; other contributing factors were uncertainty about the diagnosis, poor communication between physician and patient, and time limitations.<sup>15</sup> Additionally, a study by Mangione-Smith et al. focused on the interplay between parental expectations, physician communication, and patient satisfaction regarding the antibiotic prescription process.<sup>16</sup> In that study, although only 1% of parents verbally requested an antibiotic from their child's physician, a third (34%) of physicians still perceived an expectation for antibiotics. In addition, parents who received a contingency plan from their doctor instead of antibiotics (e.g., if the child did not improve, then an antibiotic would be prescribed) were more satisfied than those not offered a contingency plan.<sup>16</sup>

We probed physicians' perceptions about ways to combat antibiotic misuse. Up to two-thirds of physicians queried (63.7%) believed in educating patients about the appropriate use of antibiotics. A recent paper by Wang et al. that surveyed patient records in Chinese primary healthcare facilities found that inappropriate training and education of the healthcare staff contributed to antibiotic overprescription as well as antibiotic resistance.<sup>17</sup> Therefore, for healthcare professionals to be able to educate their patients about antibiotics, they themselves must be fully knowledgeable about the benefits and consequences of antimicrobials.

### Pharmacists

Pharmacists have an integral role in the rational use of antibiotics. In the current study, most pharmacists reported dispensing antibiotics in the previous week and the majority received requests for a change of antibiotic by patients; however, only half of pharmacists agreed to these requests. Most pharmacies in the developing world dispense antibiotics on patient demand. A study by Gebretekle and Serbessa conducted among community pharmacies in Addis Ababa, Ethiopia revealed that nonprescription sales of antibiotics occurs frequently and the trend is on the rise. These results are attributable to commercial interests, consumer pressure, and weak regulations.<sup>18</sup> Furthermore, a paper by Raúl and Claude argued that qualitatively and quantitatively suboptimal therapy provided to a large number of patients by a large number of pharmacists, without the advice and follow-up of a competent physician, has important ecological consequences.<sup>19</sup>

The present study also revealed that nearly all pharmacists explained the proper dosage and duration of antibiotics to patients; however, only two-thirds communicated the associated side effects. Consumer demand for information on prescription drugs has increased over the past few years, which has heightened people's expectations from pharmacists. A study by Sabry et al. described the pattern of antibiotic dispensing at community pharmacies in Egypt. Those authors found that almost two-thirds of the antibiotics dispensed were prescribed by a doctor; the rest were self-prescribed or recommended by a pharmacist. Additionally, it has been found that more than a third (39%) of the antibiotics dispensed on a pharmacist's recommendation or self-

prescribed by patients are for inappropriate indications.<sup>20</sup> This highlights the responsibility of pharmacists to educate patients about the misuse of antibiotics and to practice stewardship in that manner.

The pharmacists participating in this study believed that providing patients with advice on antibiotic misuse, developing specific diagnostic criteria for common diseases, and patient education were the best strategies for reducing antibiotic misuse. However, a pilot study by Klepser et al. in the United States focused on the effects of collaborative practices between pharmacists and physicians with respect to antibiotic misuse. That study revealed that this model of antibiotic stewardship holds promise to curb the misuse of antibiotics and ultimately combat antibiotic resistance.<sup>21</sup> An interventional study by Finkelstein et al. involving the use of educational programs for physicians and patient families reported similar results.<sup>22</sup> These programs entailed meetings with physicians to explain the prescribing recommendations of the US Centers for Disease Control and Prevention. Brochures on antibiotic use were also sent to patients' families and educational documents were provided in patient waiting areas. That study concluded that such outreach interventions succeeded in reducing antibiotic use among children in the primary healthcare setting, with placed special emphasis on the importance of raising public awareness toward antibiotic misuse.<sup>22</sup>

This study provides novel evidence of health professionals' perception and practice with regard to antibiotic prescription in the primary healthcare setting of Qatar. Possible limitations of the study include the cross-sectional study design, which made it difficult to determine any causative relationships.

## Conclusion

This study revealed that most physicians and pharmacists provide patients with adequate instructions and advice regarding proper antibiotic use. According to physicians and pharmacists, the most important ways to minimize inappropriate antibiotic use include developing careful criteria for the diagnosis of common diseases and educating patients about appropriate indications for antibiotics.

## Conflict of interest

The authors have no conflicts of interest to declare.

## Ethical approval

The Institutional Review Board of Hamad Medical Corporation approved this study. The Primary Health Care Corporation also approved the research protocol. A written informed consent was obtained from the study participants, and they were assured of the confidentiality of the information.

## Funding

None.

## Authors' contributions

All persons designated as authors qualify for authorship and deny the presence of any plagiarism in the article. AA, RES, and NAS conceived and designed the study. All authors participated in the implementation process and data collection. AA, IEE, and MAC participated in the survey adaptation and finalization. MAC and NAS performed the statistical analysis. RES, IEE, and NAS performed the primary interpretation of the study findings. NAS and MAC validated the primary study findings. AA and MAC wrote and finalized the manuscript. All authors reviewed and approved the manuscript. All authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

## References

1. WHO. *World Health Report. Shaping the future*; 2003.
2. Tenover F, McGowan J. Reasons for the emergence of antibiotic resistance. *Am J Med Sci* 1996; 311(1): 9–16.
3. *Antimicrobial resistance: global report on surveillance*. 1st ed. Geneva: World Health Organization; 2014.
4. Gould I, Meer J. *Antibiotic policies*. 1st ed. New York: Springer; 2005.
5. O'Neill J. *Tackling drug-Resistant infections globally: final Report and Recommendations*. London. UK Government and the Wellcome Trust; 2016.
6. WHO EMRO | Antimicrobial resistance in the Region | Antimicrobial resistance | Health topics [Internet]. Emro.who.int. 2017 [cited 13 April 2017]. Available from: <http://www.emro.who.int/health-topics/drug-resistance/regional-situation.html>.
7. Ventola CL. The antibiotic resistance crisis. *Pharm Ther* 2015; 40(4): 277–283.
8. Bauchner H, Pelton S, Klein J. Parents, physicians and antibiotic use. *Pediatric* 1999; 103: 395–401.
9. Butler C, Rollnick S, Pill R, et al. Understanding the culture of prescribing: qualitative study of general practitioners and patients' perceptions of antibiotics for sore throats. *BMJ* 1998; 317: 637–642.
10. Baadani AM, Baig K, Alfahad WA, Aldalbahi S, Omrani AS. Physicians' knowledge, perceptions, and attitudes toward antimicrobial prescribing in Riyadh, Saudi Arabia. *Saudi Med J* 2015; 36(5): 613–619. <https://doi.org/10.15537/smj.2015.5.11726>.
11. Centers for Disease Control and Prevention. CDC: 1 in 3 antibiotic prescriptions unnecessary [Internet]. 2016. Available from: <https://www.cdc.gov/media/releases/2016/p0503-unnecessary-prescriptions.html>.
12. A M. Antibiotic Prescription cost in Qatar. 2007. Personal communication.
13. Smith RM, Elliott MN, Stivers T, et al. Racial/ethnic variation in parent expectations for antibiotics: implications for Public Health Campaigns. *Paediatric* 2004 May; 113(5).
14. Mangione SR, McGlynn E, Elliot M, et al. Parent expectations for antibiotics, physician-parent communication, and satisfaction. *Arch Pediatr Adolesc Med* 2001; 7(155): 800–806.
15. Fletcher-Lartey S, Yee M, Gaarslev C, Khan R. Why do general practitioners prescribe antibiotics for upper respiratory tract infections to meet patient expectations: a mixed methods study. *BMJ Open* 2016; 6(10):e012244. <https://doi.org/10.1136/bmjopen-2016-012244>.
16. Mangione-Smith R, McGlynn EA, Elliott MN, McDonald L, Franz CE, Kravitz RL. Parent expectations for antibiotics,

- physician-parent communication, and satisfaction. **Arch Pediatr Adolesc Med** 2001; 155(7): 800–806. <https://doi.org/10.1001/archpedi.155.7.800>.
17. Wang J, Wang P, Wang X, Zheng Y, Xiao Y. Use and prescription of antibiotics in primary health care settings in China. **JAMA Intern Med** 2014; 174(12): 1914–1920. <https://doi.org/10.1001/jamainternmed.2014.5214>.
  18. Gebretekle G, Serbessa M. Exploration of over the counter sales of antibiotics in community pharmacies of Addis Ababa, Ethiopia: pharmacy professionals' perspective. **Antimicrob Resist Infect Control** 2016; 5(1).
  19. Raúl E, Claude C. Antibiotic use in developing countries. **Infect Control Hosp Epidemiol** 2000;(21): 394–397.
  20. Sabry N, Farid S, Dawoud D. Antibiotic dispensing in Egyptian community pharmacies: an observational study. **Res Soc Adm Pharm** 2014; 10(1): 168–184.
  21. Klepser M, Adams A, Klepser D. Antimicrobial stewardship in outpatient settings: leveraging innovative physician-pharmacist collaborations to reduce antibiotic resistance. **Health Secur** 2015; 13(3): 166–173.
  22. Finkelstein J, Davis R, Dowell S, Metlay J, Soumerai S, Rifas-Shiman S, et al. Reducing antibiotic use in children: a randomized trial in 12 practices. **Pediatrics** 2001; 108(1): 1–7.

**How to cite this article:** Alkhuzaei AMJB, Salama RE, Eljak IEI, Chehab MA, Selim NA. Perceptions and practice of physicians and pharmacists regarding antibiotic misuse at primary health centres in Qatar: A cross-sectional study. *J Taibah Univ Med Sc* 2017; ( ):1–6.