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ORIGINAL ARTICLE

Development of Competency Framework Assessment Tool Regarding Antibiotic Prescription in Dentistry

QAISER ALI BAIG[1], SUALEHA ABBAN[2], MUHAMMAD MOHSIN KAMAL[3], MUHAMMAD USMAN MUNEER[4], MOMIN BIN FIAZ[5], MAHA TANVIR[6]

[1]*Associate Professor, Community & Preventive Dentistry Department, Dow International Dental College.*
[2]*GP Dentist.*
[3]*Assistant Professor, Community & Preventive Dentistry Department, FMH College of Medicine & Dentistry, Lahore*
[4]*Professor, Department of Prosthodontics, Avicenna Dental College, Lahore.*
[5]*Demonstrator, Oral Pathology Department, Avicenna Dental College, Lahore.*
[6]*Demonstrator, Community & Preventive Dentistry Department, FMH College of Medicine & Dentistry*
Correspondence to Dr. Qaiser Ali Baig. Email: qaiser.ali@duhs.edu.pk, Cell: 03002203316

ABSTRACT

--9+ generate competency framework questionnaire for antibiotic prescriptions, assess framework of four major components including safety, professionalism, improvements, and collaborations and to find association between demographic factors and competency framework for prescription writing.

Methods: the study was convenient in sampling technique, cross sectional, analytical in design which includes fresh dental graduates from Pakistani Dental Schools. A self-complete questionnaire was generated, piloted, validated and tested for reliability. Data were analyzed using SPSS.

Results: The mean competency score of the sample was ten point nine eight (SD±three point three) out of a total score of nineteen. The highest score obtained was nineteen and minimum zero among individuals. The competency levels were also scored different among dental schools with few institutions scored better in all categories than other when split up in public or private sectors. Many of the house surgeons (n=237) showed command on antibiotic prescription and are also aware of antibiotic misuse. However, they consider it not feasible to prescribe via remote media (N=one hundred and ninety-four) like online prescriptions.

Practical implication: This study will have a broad impact on the antibiotic prescription routine among the dentist and it will help improve to improve competency on antibiotic prescription among dental undergraduates with a framework focusing more on evidence based community practices and in line with the significance of tackling solutions for drug resistant microorganisms that can lead to more complex situations.

Conclusion: It is concluded that a need is found to improve competency on antibiotic prescription among dental undergraduates with a framework focusing more on evidence based community practices

Keywords: Antibiotics, antimicrobial resistance, dental curriculum, competency.

INTRODUCTION

Antibiotics are drugs that are used to kill or inhibit bacterial infection causing organisms, used when the infection will not clear without the use of antibiotics , might infect others ,take too long to get better itself or have the capability to cause more serious complications[1]. Antimicrobial resistance (AMR) a serious cause of threat to public health worldwide caused by overuse or misuse of antibiotics endangers the treatment and prevention of various infections and threatens the increase in antimicrobial resistant microorganisms called "superbugs"[2]. According to a data published in Journal of the American Medical Association (JAMA) by the Centre of Disease Control and Prevention (CDC) as low as 30% of the prescribed antibiotics in the United States are unnecessary, most of which are prescribed for respiratory conditions caused by viruses[3]. In a report the data concludes that each year around 268.6 million antibiotics were prescribed in the outpatient prescription in the United States which is equal to 849 antibiotics prescription per 1000 patients[4].

Most of the dental and periodontal diseases are best managed by oral hygiene, preventive and restorative measures. The use of antibiotics in dentistry is infrequently employed, often for oro-facial infections[5]. Abscesses should be first treated by draining by an incision, if present in the soft tissue or draining through the root canal or extraction of the effected tooth. If local measures are unfruitful the healthcare practitioner may prescribe antibiotics such as amoxicillin, phenoxymethylpenicillin, metronidazole as first line antibiotics to prevent the spread of infection and systemic involvement. If unresponsive to the first line of antibiotics drugs such as clindamycin, co-amoxiclav and clarithromycin can be prescribed, however the doses should be correlated with the local formulary recommendations[6].

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In a study conducted in India a preferred prescription of a combination of amoxicillin, clavulanic acid with metronidazole was noticed among BDS practitioner for an anaerobic infection, where 74% prescribed as a 3-day course and 60% pediatric dentist exercised a 5-day course[7]. Another study concluded that 66.6% of dentists 'preferred' amoxicillin for therapeutic and prophylaxis and 50% of endodontists and 40% of general dentist resort to antibiotic prescription during root canal treatment where only operative treatment would have been adequate. The statistics show the lack of antibiotic protocol followed by oral health care practitioners[8].

In 1998, The Path of Least Resistance was published in the Standing Medical Advisory Committee (SMAC) concluded that dentists prescribe 7% of antibiotics in community prescription, in 1993 the number of antibiotic prescription went to 3.3 million and to 3.5 million by 1996[9]. Guidelines for antibiotic prescription published in a report called Combating Antibiotic Resistance, published by American dental Council on Scientific Affair published in 2004 states the importance of an accurate diagnosis ,use of appropriate dosage and antibiotic, prescribing narrow spectrum antibacterial drugs ,avoiding unnecessary antibiotic prescription, tests and patient progress to be monitored when treating empirically, thorough awareness of drug side effects and most importantly educating the patient to complete the full dose of antimicrobial drug therapy[10].

According to the guidelines published as the Professional Competencies of the Newly Qualified Dentist by Australian Dental Council in 2016, the six basic disciplines expected of the newly qualified dentists are professionalism, communication and leadership, critical thinking, health promotion, scientific and clinical knowledge and patient care, which has sub domains of history taking, diagnosis and management planning, clinical treatment and evaluation. Each domain is further explained to effectively evaluate

the performance required for the integration of a guided professionalism as a dentist[11].

The WHO guide to Good Prescribing is fundamentally designed to cater undergraduate medical students who are to enter the clinical education. A publication in British Medical Journal on Educational Interventions to Improve Prescribing Competence: a systemic review states that multiple recommendations for prescription guideline to maintain competency are present, but a small amount of function to actually achieve these competencies[12]. Competencies are developed to give students an exposure to the skills that are required in achieving that professional excellence. Curriculums are designed in such a way that students should get training competitive enough to apply those skills in practical life. Considering the competencies for prescribing antibiotics, few competencies were identified. However comprehensive prescription governance can be used to develop such competencies[13]. Using the guidelines different domains can be identified along with their competencies to inculcate at the curriculum.

The rationale of the study was to identify such competencies and develop a questionnaire that can highlight specific areas where students can be assessed to prescribe antibiotics in different clinical scenarios with all safety, professional and collaborative measures.

METHODOLOGY

The aim of this study is assessment of competencies for antibiotic prescription among dental graduates in Pakistan and to identify and generate competency framework Questionnaire for antibiotic prescriptions and to assess the framework for four (4) major components including SAFETY, PROFESSIONALISM, IMPROVEMENTS and COLLABORATIONS with finding of association between demographic factors and competency framework for prescription writing. The sample size of the study was 329 Dental House Surgeons using a convenient sampling Technique and cross sectional analytical study in design. The data were collected in September 2020 from different dental colleges / hospitals of Karachi and Lahore. The study was approved from ethical Board (FMH-03-2020-IRB-757-M). The inclusion criteria defined was fresh dental graduates who have passed their most recent final exams in Pakistan and are engaged in internship program / house job at different private and public dental hospitals. The exclusion criteria include dental undergraduate students, Dental postgraduate students and consultants.

A self-complete questionnaire was generated and designed for participants. Competencies were developed using guidelines from Royal Pharmaceutical Society[14]. The questionnaire was piloted, validated and tested for reliability. The Questionnaire was designed on Likert scale comprising 6 domains mainly socio-demographics, safety (question 1-7), professionalism (question 8-12), improvement (question 13-15), collaborations in prescription writings (question 16-17) competency of antibiotic stewardship program ASP (question 18-20). Data were analyzed on SPSS® Version 20 and various statistical tests were applied for analysis, association and correlations. Permission was granted by ethical review committee of the institution.

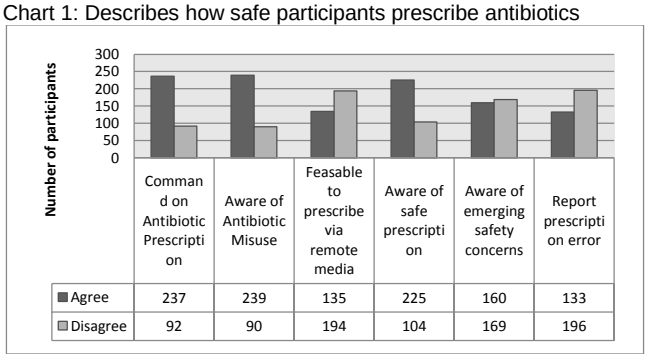
RESULTS

The questionnaire was validated, the value of Kaiser-Meyer-Olkin (KMO) was 0.679, where Bartlett's Test of Sphericity was significant (p-value <0.001). In exploratory factor analysis, Seven (7) components were extracted with Kaiser Eigenvalues greater than 1 accounting for 11.35% of variance. The Cronbach's alpha value was generated for internal consistency and reliability for 18 items scale. The study sample consist of 329 respondents, amongst them 83(25.2%) were Males and 246 (74.8%) were Females. The mean age of participants was 23.9 years (S.D±2.3). The data were collected from different institutions.

The mean competency score of the sample was 10.98 (SD±3.3) out of a total score of 19. The highest score obtained was 19 and minimum zero among individuals. The competency levels were also scored different among dental schools with few institutions scored better in all categories than other when split up in public or private sectors.

Participants responded positively among writing prescription in a safe mode. Various questions were asked regarding command on antibiotics, awareness of antibiotic misuse, remote media prescription, safe prescription, emerging safety concern on antibiotic misuse and report prescription error (Chart 1). The competencies that are associated with genders and statistically significant were shown in Table 1.

Chart 1: Describes how safe participants prescribe antibiotics



Competency	Categories	Male	Female	P-Value
Are you aware of antibiotic misuse	Aware	73 (22.2%)	166 (50.5%)	P<0.0001
	Not Aware	10 (3.0%)	80 (24.3%)	
Aware of Illegal/ un-licensed drugs	Aware	47 (14.3%)	107 (32.5%)	P<0.05
	Not Aware	36 (10.9%)	139 (42.2%)	

DISCUSSION

Antibiotics are the medicines need to be prescribes with great carefulness. Dental Surgeons prescribing antibiotics should hold a good command and knowledge. The mean competency scores in this study was found to be 10.9, however it could have been better if a holistic approach with evidence based practices were followed using any antibiotic stewardship program.

Misuse is also another important aspect in this part of the word. Many consume antibiotic without prescription and in inappropriate dosage. The effect of these antibiotics is reducing day by day because of such misuse. A study conducted in Lahore showed almost half of population (53%) is self-medicating for different dental conditions[15]. This shows a huge amount of population not visiting doctors or dentist due to any reason and self-medicating themselves with antibiotics.

During COVID-19 many doctors were prescribing medicines via remotely means however still many believe that this is not an appropriate means of doing check-ups and prescribing medicines particularly in dentistry[16].

It was also asked that do you critique/act upon your colleague/friends prescription if you find it in-correct, many students responded yes 213(64.7%) however in a Systematic review it was observed that very low level of criticism is present among colleagues due to the reason that they don't want to harm good colleague relationship[17]. Being student it is easy to critically evaluate and give opinion on other prescriptions but in later part of professional life it becomes difficult.

None of the student was aware of current Dental hospital antibiogram and all antibiotics are prescribed purely on clinical conditions and observations. There is no Dental Hospital / community based antibiotic stewardship program implemented so

practices are more clinical based and less evidence based in a holistic approach. There are a number of limitations in the study: The sample size was representative in this study however; a need for data collection at national level is more desired. Secondly in Dentistry, there are limited antibiotics being prescribed but a more comprehensive evaluation of entire prescribing list of antibiotics are needed in another continuation of such study with a development of community based antibiotic stewardship plan.

CONCLUSION

Therefore it is concluded that a need is found to improve competency on antibiotic prescription among dental undergraduates with a framework focusing more on evidence based community practices and in line with the significance of tackling solutions for drug resistant microorganisms that can lead to more complex situations.

Conflict of Interest: There was no conflict of interest found in this study

Authors' Contribution: QAB: Concept & Design of Study, Principal Author and Final Approval of version MK: Manuscript writing, SA: Statistical analysis, **UM:** Revisiting Critically, **MK:** Quality insurer & Data Collection, **MBF:** Interpretation of results, **MT:** Referencing

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