A Study on the Knowledge, Attitude and Practice of Rational Use of Antibiotics among Interns Based on Predesigned Proforma

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ABSTRACT

BACKGROUND

Medical students especially interns in particular prescribe antibiotics on a day-to-day basis. Unscrupulous prescription of these antibiotics can have side effects ranging from as simple as gastro-intestinal upsets to as serious as development of antibiotics resistance. Appropriate knowledge of antibiotics amongst the interns can greatly help to combat this problem. Hence, a study was conducted to assess the knowledge, attitude and practice of rational use of antibiotics among interns based on predesigned proforma.

METHODS

This is a prospective, non-interventional, observational, analytical study conducted among 135 interns who had completed 6 months of their clinical postings in major subjects. It was designed mainly to assess the students' knowledge, attitude and practice towards antibiotic usage. A well-structured questionnaire was developed referring from previously published studies and modified to suite the respondent population. The forms were collected immediately after completion. Data was analysed using simple descriptive statistics to generate frequencies, percentages and proportions.

RESULTS

A total of 135 interns participated in this study. Our study revealed that the knowledge, practice and behaviour towards prescribing antibiotics and awareness of students about antibiotics resistance was not good. 89% of the interns agree that antibiotic resistance is a major global problem; and 33% of the interns were not confident about prescribing antibiotics without taking advice from their seniors, showing that there is a lacuna in their knowledge about antibiotic prescription.

CONCLUSIONS

This study showed that there is a need for interventions (like strict antibiotics policy, scheduled antibiotics sensitization program, and integrated teaching) that support rational use of antibiotics.

KEYWORDS

Antibiotic Resistance, Antibiotics, Questionnaire Survey, Interns, Behaviour

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DOI: 10.18410/jebmh/2020/352

How to Cite This Article:
Joena V. A study on the knowledge, attitude and practice of rational use of antibiotics among interns based on predesigned proforma. J Evid Based Med Healthc 2020; 7(33), 1688-1693. DOI: 10.18410/jebmh/2020/352

Submission 18-05-2020,
Peer Review 23-05-2020,
Acceptance 25-06-2020,
Published 17-08-2020.

BACKGROUND

Ever since the discovery of penicillin by Sir Alexander Fleming in 1928, antibiotics have been considered as the 'miracle cure'.[1] These antibiotics cure infections and make transplantations and cancer treatments safer. However, the effectiveness and easy access to these antibiotics have led to their overuse. The WHO report on surveillance of antibiotic consumption in 2018 analysed 2015 data from 65 countries as measured in defined daily doses per 1000 inhabitants per day. The overall consumption of antibiotics ranged from 4.4 to 64.4 Defined Daily Doses (DDD) per 1000 inhabitants per day.[2]

In most countries, amoxicillin and amoxicillin/clavulanic acid were the most frequently consumed antibiotics.[3] Unscrupulous use of these antibiotics can cause mild side-effects such as gastrointestinal disturbances to more severe ones such as anaphylactic reactions as well as antibiotic resistance.

Appearance of populations of antibiotic-resistant bacteria has become one of the major threats to public health in the 21st century.[4] Patients, pharmacists, and health professionals may contribute to the increase in antibiotics resistance. The WHO has classified antimicrobial resistance as a widespread "serious threat (that) is no longer a prediction for the future, it is happening right now in every region of the world and has the potential to affect anyone, of any age, in any country."[5]

Some health care professionals concentrate only on treating present symptoms without concern about antibiotics resistance. Others prescribe broad-spectrum antibiotics to attain the patient's satisfaction even if antibiotics are not indicated. Dentists prescribe antibiotics for treatment and prevention of odontogenic and non-odontogenic infections.[4] The literature provides evidence of inadequate practices by healthcare professionals, manifested by over-prescribing antibiotics due to inadequate knowledge or social factors.

Internship is a period of medical apprenticeship under the supervision of a consultant. The intern is expected to learn clinical skills, perform some clinical procedures and demonstrate a good clinical judgement to arrive at patient management decision. Interns are therefore the most junior doctors in a tertiary hospital.

They have been found responsible for a significant number of prescribing errors. Globally, prescribing-related errors are common and have resulted in a significant patient morbidity and mortality.[6]

Looking into the fact that the majority of prescription related errors in hospital environment are made by junior doctors, there is a need to educate the interns and develop an intervention that will improve their prescription qualities. Many studies have evaluated the teaching of undergraduate medical students and its impact on the prescribing ability of junior doctors. Hence, this study was conducted with the objective to assess the knowledge, attitude and practice of rational use of antibiotics among interns based on predesigned proforma.

METHODS

It was a prospective, non-interventional, observational, analytical type of study. In this study, interns who had completed 6 months of their clinical postings in major subjects (General Medicine, General Surgery, Obstetrics and Paediatrics) were included in this study. It was designed mainly to assess the students' understanding of antibiotics. A well-structured questionnaire was developed referring from previously published studies and modified to suite the respondent population. The questionnaire was modified from the KAP study conducted in china among the medical students, [7] KAP study in Chennai[8] and KAP studies in Congo.[9]

Informed consent was taken from all the participants after explaining the study protocol.

Questionnaire was given to interns after their working hours in the hospital and a total time of 20 minutes was given to them to answer the questions without using any references, notes or assistance.

The questionairre had 4 sections

1. The first section consisted of 10 questions, regarding knowledge of interns regarding rational antibiotic use and antibiotic resistance. A scoring out of 10 is used to grade their knowledge. (0 - 3: poor, 4 - 7: moderate, 8 - 10: Good). Each right answer was given a score of one and wrong answer was given a score of zero.
2. The second section evaluated the intern's attitude regarding rational antibiotic use and antibiotic resistance. A five-point Likert[10] scale with responses ranging from strongly agree to strongly disagree was used.
3. The third section had 4 questions that analysed the practices of antibiotic use in interns in their current period of internship.
4. The part on the perception and awareness of medical student had 3 questions relating to the intern's knowledge and attitude of antibiotic use.

The questionnaire had multiple choice answer which the respondents were allowed to choose one answer which according them was the most appropriate. The data was analyzed by using simple descriptive statistics to generate frequencies, percentages and proportions.

RESULTS

A total of 135 interns participated in the study. This study revealed that a majority of subjects [n=116, 85.93%] used antibiotics to treat bacterial infections. Amongst the study population majority [n = 125, 93.28%] said that common cold did not require the prescription of antibiotics. This study also reveals that a majority [n = 121, 89.63%] would choose antibiotics based on Infective organism and sensitivity. A majority of the participants [n = 105, 77.78%] felt that duration of antibiotic therapy depended on the Infective organism. Among the study population majority [n = 105, 78.36%] felt that rational of antibiotic therapy does not include the use of newer antibiotics. Among the study

population, all the participants [n=135, 100.00%] knew what was hospital-acquired nosocomial infection. Among the study population, majority [n=94, 70.15%] answered empirical antibiotic therapy means based on prevailing sensitivity patterns. Among the study population majority [n=111, 82.84%] had factors contribute to antibiotic resistance except was combination of antibiotics.

Parameter	Summary
1. Antibiotics are used to treat:	
Bacterial infection	116 (85.93%)
Injury	1 (0.74%)
All of the above	18 (13.33%)
2. Which of the following conditions does not require antibiotics:	
sinusitis	9 (6.72%)
Common cold	125 (93.28%)
3. How do you choose antibiotic for an infection:	
Infective organism and sensitivity	121 (89.63%)
Clinician decision	13 (9.63%)
None	1 (0.74%)
4. Duration of antibiotic therapy depends upon:	
Clinical improvement	23 (17.04%)
Infective organism and severity of infection	105 (77.78%)
Clinician decision	5 (3.70%)
None	2 (1.48%)
5. Rational antibiotic use includes all except:	
Correct choice	9 (6.72%)
Right dosage and duration	16 (11.94%)
Cost effectiveness	4 (2.99%)
Always use newer antibiotics	105 (78.36%)
6. Nosocomial infection means:	
Hospital acquired	135 (100.00%)
7. Empirical antibiotic therapy means:	
Giving high dose	7 (5.22%)
Antibiotic for severe infection	21 (15.67%)
Organism –specific	12 (8.96%)
Based on prevailing sensitivity patterns	94 (70.15%)
8. All factors contribute to antibiotic resistance except:	
Overuse	7 (5.22%)
Self-medication	3 (2.24%)
Incorrect choice and duration	13 (9.70%)
Combination of antibiotics	111 (82.84%)
9. Definitive antibiotic therapy means:	
Choosing from a guideline	9 (6.77%)
Giving first line antibiotics	14 (10.53%)
Antibiotic based on prevailing sensitivity patterns	33 (24.81%)
Organism-specific therapy	77 (57.89%)
10. For which infection culture and sensitivity is a must?	
Pneumonia	45 (33.83%)
UTI	84 (63.16%)
Diarrhoea	4 (3.01%)

Table 1. Descriptive Analysis of Knowledge Component Variables in Study Population (N=135)

Attitude Component	Strongly Agree	Agree	Not Sure	Dis-agree	Strongly Disagree
Self-medication is advisable		4 (2.99%)	(6.72%)	39 (29.10%)	82 (61.19%)
Skipping of one or two doses does not cause resistance	4 (2.99%)	30 (22.39%)	22 (16.42%)	52 (38.81%)	26 (19.40%)
Combination of antibiotics does not prevent antibiotic resistance	6 (4.48%)	35 (26.12%)	35 (26.12%)	34 (25.37%)	24 (17.91%)
Cost of antibiotic should be considered in the rationale prescribing	37 (28.03%)	71 (53.79%)	20 (15/15%)	3 (2.27%)	1 (0.74%)
Antibiotic resistance is an serious global problem	89 (66.42%)	39 (29.10%)	3 (2.27%)	2 (1.49%)	1 (0.74%)
Hospital antibiotic policy is useful for rational use of antibiotic	34 (25.37%)	62 (46.97%)	29 (21.97%)	4 (3.03%)	3 (2.27%)

Table 2. Descriptive Analysis of Attitude Component Variables in Study Population (N=135)

Among the study population majority [n=77, 57.89%] were answered definitive antibiotic therapy means organism specific antibiotic therapy. Among the study population majority [n = 84, 63.16%] were answered for UTI infection culture and sensitivity is must. (Table 1)

Among the study population, majority [n=82, 61.19%] strongly disagreed that self-motivation was advisable. Among the study population majority of majority [n=52, 38.81%] participants disagreed that skipping of one or two doses does not cause resistance. Among the study population majority [n=35, 26.12%] participants agreed that combination of antibiotics does not prevent antibiotic resistance and [n=35, 26.12%] participants were not sure. Among the study population majority [n=71, 53.79%] participants agreed that cost of antibiotic should be considered in the rationale prescribing. Among the study population majority [n=89, 66.42%] participants strongly agreed that antibiotic resistance is a serious global problem. Among the study population [n=62, 46.97%] agreed that hospital antibiotic policy is useful for rational use of antibiotic. (Table 2)

Parameter	Summary
1. Commonly prescribed antibiotic used in OPD in ur hospital	
Penicillins	22 (16.42%)
Cephalosporins	102 (76.12%)
Fluoroquinolones	7 (5.22%)
Others	3 (2.27%)
2. Optimal duration of antibiotic prescribed	
1-3 days	4 (2.96%)
3-5 days	86 (63.70%)
6-10 days	44 (32.59%)
>10 days	1 (0.74%)
3. Aspects of antibiotic that u advice the patient	
Side effects	11 (8.27%)
Duration and frequency of antibiotic	28 (21.05%)
To complete the regimen	92 (69.17%)
Not sure	2 (1.50%)
4. Ur reference for antibiotic prescription	
Books	88 (65.19%)
Random	2 (1.48%)
Suggestion by seniors	42 (31.11%)
Internet	3 (2.22%)

Table 3. Descriptive Analysis of Practice Component Variables in Study Population (N=135)

Among the study population majority [n=102, 76.12%] said that the commonly prescribed antibiotic used in OPD in their hospital were cephalosporins. Among the study population of majority [n=86, 63.70%] prescribed antibiotics for an optimal duration of optimal duration of 3 to 5 days. Among the study population majority [n=92, 69.17%] advised the patients to complete the regimen. Among the study population majority [n=88, 65.19%] referred books for antibiotic prescription. (Table 3)

Parameter	Summary
1. You are confident of prescribing antibiotics for a disease without your senior doctors' advice	
Yes	45 (35.43%)
No	33 (25.98%)
Not Sure	49 (38.58%)
2. Clinical posting that is helpful in prescribing the correct dosage of antibiotic	
Medicine	82 (65.08%)
Surgery	9 (7.14%)
OBG	2 (1.59%)
Paed	33 (26.19%)
3. Self-grading of knowledge of antibiotic use age 9 out of 10	
Good	22 (17.60%)
Moderate	96 (76.80%)
Poor	7 (5.60%)

Table 4. Descriptive Analysis of Self-Assessment Variables in Study Population (N=135)

Among the study population [n=45, 35.43%] were confident of prescribing antibiotics for a disease without their senior doctors' advice while [n=49, 38.58%] were not

sure. Among the study population majority [n=82, 65.08%] said that medicine clinical posting was helpful in prescribing the correct dosage of antibiotic. Among the study population [n=22, 17.60%] had good self-grading of knowledge of antibiotic use age 9 out of 10, [n=96, 76.80%] had moderate grade and [n=7, 5.60%] had poor grade. (Table 4)

DISCUSSION

Antibiotics are probably one of the most successful forms of chemotherapy in the history of medicine. They have saved many millions of lives and placed the majority of infectious diseases that plagued human history for many centuries under control. Initially, on their introduction into clinical practice in the 1940s,[11] antibiotics were extremely efficient in clearing pathogenic bacteria leading many to believe that infectious diseases would become a problem of the past and would be wiped out from all human populations eventually. However, the emergence and rapid dissemination of antibiotic-resistant pathogens, especially multi-drug-resistant bacteria, during recent decades, exposed our lack of knowledge about the evolutionary and ecological processes taking place in microbial ecosystems. It is now evident that microbial populations possess enormous metabolic diversity, from which they may deploy protective mechanisms allowing them to withstand the selective pressures imposed by their natural environment as well as human interventions such as antibiotics.[12]

In this study 85.9% of the interns agreed that antibiotics are prescribed for bacterial infections. One study has reported that more than 60 % of the participants believed that antibiotics should be prescribed for viral illnesses assuming bacterial aetiology.[13] Such wrong beliefs, as confirmed in studies by Afzal khan et al[14] and Azevedo, Maria Manuel et al[15] may lead to inappropriately high rates of antibiotic consumption, which can result in a corresponding increase in the bacterial resistance. In our study, 93.28% of interns were aware that diseases like common cold are not of bacterial aetiology and hence they did not recommend antimicrobial drugs. 77% of the interns agreed that the duration of antibiotic therapy depended on the infective organism and severity of infection. This factor was also emphasized by Perez-Gorricho[16] in a pan-European market research study of 3254 patients designed to determine patient attitudes, expectations and behaviour to antibiotic management of mild–moderate RTIs. 78.86% of the interns confirmed that newer drugs do not come under the criteria for rational use of antibiotics. Extensive promotion of antibiotics may play a role in biased selection of antibiotics and play a role in resistance.

On a daily basis, clinicians are forced to choose an antibiotic for a patient with symptoms and signs of a serious infection before identification of the bacteria and before susceptibility test results are available. Such treatment can be described as initial empirical therapy.[17] In this study 70% of the interns agreed that empirical therapy is based on the prevailing sensitivity patterns. inadequate initial empirical therapy is associated with increases in adverse patient outcomes.[18] Although in vitro synergy tests have shown potential benefits of continued combination therapy, convincing clinical data that demonstrate a need for combination therapy once susceptibilities are known are lacking. Thus, de-escalation to a single agent once susceptibilities are known is recommended for most patients and pathogens[19] also known as definitive antibiotic therapy. Majority (70%) of the interns said that definitive antibiotic therapy also meant organism specific therapy.

In this study 61% of the interns strongly agreed that self-medication is not advisable. 38.81% of the interns disagreed to the statement that skipping one or two doses of the antibiotics does not cause antibiotic resistance and 89% of the interns strongly agreed that antibiotic resistance is a serious global problem. There was a confusing response to the statement whether combination drug therapy reduces antibiotic resistance, 26.12% of the population agreed and another 26.12% of the interns were not sure. These answers to the statements show us that the interns were still confused in the subject of antibiotic prescription and it side effects. Incorrectly prescribed antibiotics also contribute to the promotion of resistant bacteria. Studies have shown that treatment indication, choice of agent, or duration of antibiotic therapy is incorrect in 30% to 50% of cases.[20]

This study also gave a significant finding that the commonly prescribed drug was cephalosporins (72%). The cephalosporin antibiotics have become a major part of the antibiotic formulary for hospitals in many countries. They are prescribed for a wide variety of infections every day due to their lesser allergenic and toxicity risks as well as a broad spectrum of activity. The broad-spectrum capability of these drugs, however, encourages rapid overgrowth of some microorganisms that are neither eliminated nor inhibited by therapy. These organisms not only have pathogenic potential, they may also be multiplying resistant to antibiotics. Others have documented the association of cephalosporins with staphylococci, enterococci, multiply resistant Gram-negative bacilli, yeasts and *C. difficile*.[21]

This study also revealed that the optimal duration of time for which the antibiotics was prescribed was 3 to 5 days by majority of the interns (63.7%). Clinicians have proved that shorter periods are adequate; but it would be good to know what the minimum treatment period should be, especially for methicillin resistant staphylococci and in patients whose long-term prognosis is poor. This is in accordance with a study done by Mateti Prajwala et al[22], where they found that antibiotics like Cephalosporins and fluoroquinolones were found to be the most commonly used antibiotics for the infectious diseases in India. In their project, they found that diseases like pancreatitis, malaria and liver abscess were found to require longer duration of antibiotic therapy and the other diseases like gastroenteritis, typhoid fever, UTI, pneumonia can be cured with shorter duration (3-7 days) of antibiotics without any relapse. We also found in our study that the interns advised the patients to complete their antibiotic regimen most commonly.

In our study we found textbook are the important sources of information followed by senior practice (31.11%), internet (12.22%). This study is in accordance with studies

done by Poonam et al[23] when interns refereed textbooks for antibiotic reference whereas findings by and Thriemer et al[9] in his KAP study found pharmaceutical companies ranked highest for source of information regarding antibiotics. The difference between two studies may be because we include medical student for study while in study of Thriemer et al,[9] doctors are also enrolled. We also find that next to reference to books, interns also took advise from their seniors (35.45%) before prescribing antibiotics, while 38.53% were still confused. This emphasizes that proper protocol in antibiotic prescribing must be explained in undergraduate courses and their knowledge must be upgraded on a regular basis.

Limitations and Recommendations

Drawing conclusions, based on a convenience sample which involved only one batch of medical interns from one single tertiary hospital was the limitation of this study. This study provides an important insight regarding their knowledge, attitudes, perceptions, and practices, which can be considered, in order to plan for an effective undergraduate curriculum regarding antibiotic resistance and usage.

CONCLUSIONS

Medical students are the future of the medical fraternity. Along with imparting knowledge to them, they can be moulded, and a behavioural change can be brought with regard to prescription of antibiotics. Maybe every 3 to 5 years, the medical practitioners should upgrade their knowledge of antibiotic prescription. All the medical and paramedical staff must combat this global problem called 'antibiotic resistance'.

Financial or Other Competing Interests: None.

REFERENCES

[1] Bennett JW, Chung KT. Alexander Fleming and the discovery of penicillin. Advances in Applied Microbiology 2001;49:163-184.
[2] Organization WH. WHO report on surveillance of antibiotic consumption: 2016-2018 early implementation. 2018.
[3] Haque M. Antimicrobial use, prescribing and resistance in selected ten selected developing countries: a brief overview. Asian J Pharm Clin Res 2017;10(8):37-45.
[4] Abu-Mostafa NA, Al-Mejlad NJ, Al-Yami AS, et al. A survey of awareness related to the use of antibiotics for dental issues among non-medical female university students in Riyadh, Saudi Arabia. J Infect Public Health 2017;10(6):842-848.
[5] Antibiotic Resistance Summit. Vet Rec 2016; 178(9):202.
[6] Oshikoya KA, Senbanjo IO, Amole OO. Interns' knowledge of clinical pharmacology and therapeutics after undergraduate and on-going internship training in Nigeria: a pilot study. BMC Med Educ 2009;9:50.
[7] Huang Y, Gu J, Zhang M, et al. Knowledge, attitude and practice of antibiotics: a questionnaire study among 2500 Chinese students. BMC Medical Education 2013;13(1):163.
[8] Ganesh M, Sridevi SA, Paul CM. Antibiotic use among medical and para medical students: knowledge, attitude and its practice in a tertiary health care centre in Chennai - a scientific insight. Int J Sci Res 2014;3(7):332-335.
[9] Thriemer K, Katuala Y, Batoko B, et al. Antibiotic prescribing in DR Congo: a knowledge, attitude and practice survey among medical doctors and students. PloS One 2013;8(2):e55495.
[10] Joshi A, Kale S, Chandel S, et al. Likert scale: explored and explained. British Journal of Applied Science & Technology 2015;7(4):396-403.
[11] Russell AD. Introduction of biocides into clinical practice and the impact on antibiotic-resistant bacteria. Journal of Applied Microbiology 2002;(Suppl 92):121S-135S.
[12] Aminov RI. The role of antibiotics and antibiotic resistance in nature. Environmental Microbiology 2009;11(12):2970-2988.
[13] Steinberg I. Clinical choices of antibiotics: judging judicious use. The American Journal of Managed Care 2000;6(Suppl 23):S1178-S1188.
[14] Khan AAK, Banu G, Reshma KK. Antibiotic resistance and usage -- a survey on the knowledge, attitude, perceptions and practices among the medical students of a Southern Indian teaching hospital. Journal of Clinical and Diagnostic Research 2013;7(8):1613-1616.
[15] Azevedo MM, Pinheiro C, Yaphe J, et al. Portuguese students' knowledge of antibiotics: a cross-sectional study of secondary school and university students in Braga. BMC Public Health 2009;9(1):359.
[16] Perez-Gorricho B, Ripoll M, PACE Study Group. Does short-course antibiotic therapy better meet patient expectations? International Journal of Antimicrobial Agents 2003;21(3):222-228.
[17] Paterson DL. Impact of antibiotic resistance in gram-negative bacilli on empirical and definitive antibiotic therapy. Clinical Infectious Diseases 2008;47(Suppl 1):S14-S20.
[18] Kollef MH. Inadequate antimicrobial treatment: an important determinant of outcome for hospitalized patients. Clinical Infectious Diseases 2000;31(Suppl 4):S131-S138.
[19] Boyd N, Nailor MD. Combination antibiotic therapy for empiric and definitive treatment of gram-negative infections: insights from the society of infectious diseases pharmacists. Pharmacotherapy: The Journal of Human Pharmacology and Drug Therapy 2011;31(11):1073-1084.
[20] Ventola CL. The antibiotic resistance crisis: part 1: causes and threats. Pharmacy and Therapeutics 2015;40(4):277-283.

[21] Dancer SJ. The problem with cephalosporins. Journal of Antimicrobial Chemotherapy 2001;48(4):463-478.
[22] Prajwala M, Sresta K, Supriya U, et al. A study on optimal duration of antibiotic therapy in various infectious diseases. American Journal of Pharmacy and Health Research 2015;3(8):98-106.
[23] Poonam P, Jay S, Nyati P, et al. A survey on knowledge and attitude of rational use of antibiotics on predesigned proforma among interns and 1st year postgraduate students. Int J Pharm Sci Res 2016;7(8):350-356.