

A cross sectional study to assess knowledge, attitude and practice of rational antibiotic prescription among resident doctors

Anatte Antony*, Seema P. Mohamedali, Anuradha M.

Department of Pharmacology,
Government Medical College,
Kozhikode, Kerala, India

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***Correspondence to:**

Dr. Anatte Antony,
Email: anattesept13@gmail.com

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ABSTRACT

Background: Irrational prescription is a major contributor to the antimicrobial resistance. Resident doctors are the major focus of interventional programs aimed at rational prescription of antibiotics. So, their knowledge, attitude and practice regarding rational antibiotic prescription need to be assessed to plan future strategies.

Methods: A questionnaire based cross sectional study among interns and resident doctors of a Government Medical College was conducted. Questionnaire consisted of questions to assess knowledge, attitude and practice of resident doctors in rational antibiotic prescriptions and multiple-choice questions to assess practice of hospital antibiotic policy.

Results: 80 participants were enrolled in the study. All participants responded to yes or no questions and 47 answered multiple choice questions. 40% were aware of the current hospital antibiotic policy and 29% knew the term antibiotic stewardship. Only 15% were confident in their knowledge on antimicrobial resistance. 87.5% think there is no use in prescribing an antibiotic in common cold. 36.3% overprescribes antibiotics in their daily practice. Only 32.5% practiced de-escalation. 90% were educating patients regarding correct use of antibiotics. 90% send samples for culture and sensitivity but only 22.2% waited for results to start antibiotics.

Conclusions: There is a need for approaches that includes implementation of antibiotic policy and to plan for effective teaching programs regarding antibiotic resistance and importance of rational prescription of antibiotics which can improve the quality of antibiotic prescription and minimize antibiotic resistance.

Keywords: Antibiotic resistance, Antibiotic stewardship, Hospital antibiotic policy, Rational antibiotic prescription

INTRODUCTION

Rational prescription of antibiotics is defined as patients receiving appropriate antibiotic in right dose, and for right duration, with lowest cost to them and community. The irrational use of antibiotics has contributed to the growing problem of antibiotic resistance, which has become one of the most serious and growing threats to public health.¹ The Center for Disease Control and Prevention (CDC) estimates more than two million people are infected with antibiotic-resistant organisms globally, resulting in

approximately 23,000 deaths annually.² The bacterial disease burden in India is among the highest in the world; consequently, antibiotics play a critical role in limiting morbidity and mortality in the country. This has led to increasing use of newer antibiotics and ultimately ended up with increased prevalence rates of multi-drug resistant bacteria.³ Various strategies have been proposed for rational use of antibiotics such as formulary restriction or replacement, antibiotic stewardship programs, feedback activities, prescription auditing, development of a hospital antibiotic policy based on local cumulative antibiogram

etc. Antimicrobial stewardship has been defined as “the optimal selection, dosage, and duration of antimicrobial treatment that results in the best clinical outcome for the treatment or prevention of infection, with minimal toxicity to the patient and minimal impact on subsequent resistance”.⁴ It is a hospital based multidisciplinary approach involving clinicians, infectious disease specialist, epidemiologist, microbiologist, pharmacologist, nurses, lab technicians etc.

The aim of development of a hospital antibiotic policy is to ensure rational prescription of antibiotics in the hospital to minimize the morbidity and mortality due to antimicrobial-resistant infection; and to preserve the effectiveness of antimicrobial agents in the treatment and prevention of communicable diseases. The antibiotic policy is essentially for prophylaxis, empirical and definitive therapy. It is developed based a local cumulative antibiogram.⁵ A good knowledge on rational antibiotic prescription and hospital antibiotic policy among resident doctors in a tertiary care hospital plays an important role in reducing antimicrobial resistance in a region. The purpose of this study was to assess the knowledge, attitude and practice of resident doctors about hospital antibiotic policy.

METHODS

This is a cross-sectional, questionnaire-based study conducted among the interns and resident doctors of various clinical departments of a Government medical college, in a period of two months. Sample size was 80. Study group included interns, junior residents and senior residents and excluded doctors from non-clinical departments and those who fail to return filled forms within the stipulated time. After obtaining written informed consent and ensuring confidentiality, the participating doctor was given a questionnaire. The first section of the questionnaire involves the demographic data of the participant such as designation and department. The second section of the questionnaire involves questions to assess the knowledge of the participant about the hospital antibiotic policy and rational antibiotic usage. The third section of the questionnaire consists of questions to study the attitude of the participants towards the antibiotic policy and rational antibiotic use. The fourth section of the questionnaire consists of questions to evaluate the practice of antibiotic prescription. The fifth section consisted of multiple choice questions to assess knowledge and practice of current hospital antibiotic policy. After collecting back, the filled questionnaire, the data were entered in Microsoft excel worksheet. Analysis was done using frequency distribution and chi-square testing with the help of IBM-SPSS.

RESULTS

There were 80 participants enrolled in the study. The first four sections of questionnaire were answered by all participants. Only 47 participants responded to the

multiple choice questions. Among the 80 participants, 59 were junior residents, 11 were interns and 10 were senior residents (Table 1).

Table 1: Distribution of participants based on departments.

Department	Percentage
Dermatology	24%
Paediatrics	23%
General Medicine	17%
Pulmonary medicine	8%
ENT	11%
Orthopaedics	11%
Surgery	6%

Table 2: Response to questions to assess knowledge on hospital antibiotic policy.

Question	Yes	No
Are you aware of the current hospital antibiotic policy?	40%	60%
Have you gone through the antibiotic policy of your department?	32.5%	67.5%
Do you think it meets all aspects involved in prescription of antimicrobials?	15%	85%

Table 3: Response to questions to assess knowledge on rational antibiotic prescription.

Questions	Yes	No
Are you familiar with the term antibiotic stewardship?	29%	71%
Do you feel confident about your knowledge and practice in the area of antimicrobial resistance?	15%	85%
Are you aware of antibiotic escalation and de-escalation?	61.3%	38.7%
Do you think higher antibiotic should be reserved and could be used only after authorization from senior physician?	48.8%	51.2%
Do you think there is advantage in prescribing antibiotics in common cold?	12.5%	87.5%
Do you prefer a broad spectrum antibiotic as a first line option for treatment of infections?	67.5%	32.5%

Knowledge assessment

Knowledge on hospital antibiotic policy

There were 40% of total study population were aware of the hospital antibiotic policy, and among those who were aware 71% read it, and among those who read, 39.13%

think that it meets all aspects involved in the prescription of antimicrobials (Table 2).

Knowledge on rational antibiotic prescription

There were 29% of participants aware of the term antibiotic stewardship and 61.3% knew about de-escalation of antibiotics. 15% were confident about their knowledge and practice in the field of antibiotic resistance. 87.5% knew that there is no advantage in prescribing antibiotic in common cold. 67.5% preferred a broad spectrum antibiotic as empirical therapy (Table 3).

Attitude assessment

There were 35% found that an antibiotic policy helped in reducing antibiotic resistance. 62.5% did not opt to consult a microbiologist before prescribing an antibiotic. 36.3% believed that they over prescribed antibiotics in their daily practice. 90% felt that under diagnosis and over diagnosis contributed to antibiotic resistance. 93.8% thought that over the counter use of antibiotics should be brought under control (Table 4).

Table 4: Response to questions to assess attitude.

Questions	Yes	No
Is hospital antibiotic policy helpful in preventing antimicrobial resistance?	35%	65%
Do you consult a microbiologist before prescribing higher antibiotic?	37.5%	62.5%
Do you feel that you often over prescribe antibiotics in your daily practice?	36.3%	63.7%
Do you feel underdiagnosis /overdiagnosis contributes to inappropriate antibiotic use?	90%	10%
Do you think over the counter dispensing of antibiotic should be brought under control?	93.8%	6.2%

Practice assessment

The 21.3% of participants had a copy of hospital antibiotic policy and among those who had, only 47% referred it before prescribing an antibiotic. 62.5% consulted a senior faculty before prescribing an antibiotic. 32.5% practiced de-escalation. 90% of the participants practiced educating patients about correct use of antibiotics and discouraged over the counter buying of antibiotics. 90% send sample for culture and sensitivity, but only 22.2% waited for results before starting an antibiotic. 20% cross checked drug monograph about a new antibiotic (Table 5).

On analyzing the pattern of response among interns, junior residents and senior residents, it was found that knowledge of hospital antibiotic policy, knowledge about the term antibiotic stewardship and practice of de-escalation

progressively increased during course duration and was more among senior residents. Confidence about practicing rational prescription of antibiotics was similar among interns and junior residents. The practice of proper hand washing technique was more among interns (Table 6).

Table 5: Responds to questions to assess practice.

Questions	Yes	No
Do you have a copy of hospital antibiotic policy of your department?	21.2%	78.8%
If yes, do you refer it before prescribing an antibiotic?	47.1%	52.9%
Do you consult your senior faculty before starting a higher antibiotic?	62.5%	37.5%
Do you deescalate to lower antibiotic if found sensitive?	32.5%	67.5%
Do you educate patients regarding importance of using correct dosage of antibiotic?	88.8%	11.2%
Do you educate patient regarding not to use same prescription for similar symptoms?	82.5%	17.5%
Do you discourage patient from buying antibiotics over the counter?	92.5%	7.5%
Do you send sample for culture and sensitivity in every relevant case before starting antibiotic?	90%	10%
If yes, do you wait for culture and sensitivity results to start an antibiotic for patients in wards?	22.2%	77.8%
Does your choice of antibiotic depends on availability of antibiotic in your hospital?	80%	20%
Do you adhere to proper hand washing techniques before consulting each patients?	51.2%	48.8%
Do you properly adhere to proper isolation techniques for infectious diseases?	76.2%	23.8%
Does your duration of treatment with antibiotics depend on clinical improvement?	75%	25%
Do you cross check the statistical data about the efficacy, safety and spectrum of a newer antibiotic given in a drug monograph?	20%	80%

Regarding the source of information about new antibiotics, half (50%) of the study participants depended on teachers. 16% depended on journals, 6% on colleagues, 3% on pharmaceutical company representatives and 25% depended on all the four sources (Figure 1).

Multiple choice questions

Out of 80 participants, only 47 responded to the multiple choice questions.40.4% preferred to wait for culture and sensitivity reports before starting an antibiotic for a case

acute gastroenteritis. In a paediatric case of an acute suppurative otitis media, only 10% waited for culture reports to start on antibiotics. 7% gave the correct choice of antibiotics for an elective hernioplasty. 15% waited for culture and sensitivity reports to start an antibiotic for chronic osteomyelitis (Table 7).

Table 6: Pattern of positive responses among interns, junior residents and senior residents to key questions.

Key questions	Interns	Junior resident	Senior resident
Are u aware of hospital antibiotic policy?	26.6%	42.8%	44.4%
Are you aware of the term antibiotic stewardship?	20%	25%	77.7%
Are you confident about your knowledge and practice in the area of antimicrobial resistance?	13.3%	11.86%	33.3%
Do you deescalate to lower antibiotic when found sensitive?	33.3%	28.5%	55.5%
Do you adhere to proper hand washing techniques?	80%	44.6%	44.4%

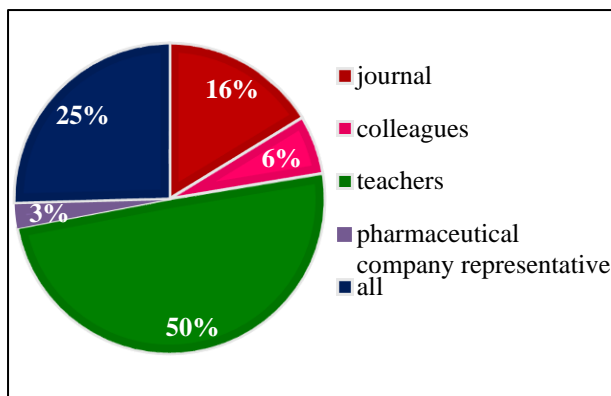


Figure 1: Source of information about new antibiotic.

DISCUSSION

The current study was concentrated to resident groups because they are the major prescribing section in a medical college, also modulations for implementing rational prescription of antibiotics should concentrate on these group. Thus, their knowledge, attitude and practice of rational antibiotic prescription has to be analyzed for implementing effective policies. Majority of the study population were junior residents from major medical specialties like general medicine, paediatrics and dermatology. Major concentration was given to these

departments since majority of antibiotic prescription came from these departments.

Table 7: Response to multiple choice questions.

Questions	Correct response
A case of acute gastroenteritis, with severe dehydration was started on IV fluids and inj. Ciprofloxacin IV 200 mg Q12H.	
a) Choice of antibiotic is correct	40.4%
b) Choice of antibiotic is wrong	
c) Wait for stool culture reports to start antibiotic	
d) Send for blood and stool culture and start antibiotic	
Culture report in the above case scenario came as negative. What will you do next?	
a) Stop antibiotic	23.4%
b) Continue empirical therapy	
c) Decision based on clinical judgement	
d) Send for another culture	
A 3 year old child with acute suppurative otitis media, on Sy.amoxicillin for 5 days. On examination she was sick looking	
a) Change to syrup cefixime and send home	10%
b) Admit and start on empirical parenteral antibiotics, then change once results on culture and sensitivity comes	
c) Send ear swab and treat accordingly with parenteral antibiotics	
d) Continue syrup amoxicillin	
Antibiotic of choice for an elective hernioplasty is -	
a) Inj. Cefotaxim 1 gm IV and continue for 2-3 days	7%
b) Inj. Cefaperazone + sulbactam 1.4 gm IV and 2 doses post operatively	
c) Inj.cefotaxim 1 gm IV and continue for 2 doses post operatively	
d) Inj. Cefuroxime 1.5 gm IV and continue for 2 doses post operatively	
Antibiotic therapy for chronic osteomyelitis is -	
a) Parenteral vancomycin and piperacillin- tazobactam	15%
b) Parenteral ceftriaxone + vancomycin	
c) Parenteral ceftriaxone + oral linezolid	
d) Wait for culture and sensitivity reports	

correct answers according to hospital antibiotic policy are given in bold letters

Less than half (40%) of the study population was aware of the advantages of having a hospital antibiotic policy in the institution. Comparing to a previous similar study by Malavika Singh et al, 90% were aware of the advantages of hospital antibiotic policy.⁶ Awareness about the

antibiotic stewardship and de-escalation of antibiotics were less among the interns, but it progressively increased during the course duration. Only 15% of the population were confident about their knowledge and practice in the field of antimicrobial resistance. In the previous study by Malavika Singh et al, 78.5% of the study population were confident in their knowledge and practice. 87.5% were aware that there is no advantage in giving antibiotics to viral conditions like common cold. Comparing with a previous similar study by Poonam Patel et al conducted in interns and first year post graduate students, where 92.26% preferred to prescribe an antibiotic in rhinitis with fever, shows that the current study population has a good knowledge that viral infections does not require an antibiotic.⁷

On assessing the attitude, only 35% believed that hospital antibiotic policy (HAP) helps in reducing antimicrobial resistance, but in the study by Malavika Singh et al, 86.2% thinks HAP is helpful. 63.7% of study population believes that they do not over prescribe antibiotics in their daily practice and in a study by Hrishikesh Kashyapa et al, among resident physicians, 88.46% consider they do not overprescribe antibiotics.⁸ 90% of study population thinks that over-diagnosis and under-diagnosis contributes to inappropriate antibiotic use and over the counter dispensing of antibiotic should be brought under control.

On assessing the practice, only 21.3% of study population had a copy of hospital antibiotic policy and among those who had, only 47.05% referred to it before prescribing an antibiotic. The residents practicing hospital antibiotic policy is found to be less compared to the previous study by Malavika Singh et al, where 87.5% of study population had the copy. Majority (62.5%) consulted a senior faculty before prescribing an antibiotic, this is comparable to previous study data by Pallavi Kulkarni et al were 72% consulted seniors before prescribing an antibiotic.⁹ In this study 67.5% agreed using a broad spectrum antibiotic for empirical therapy, 61.3% were aware of de-escalation, but only 32.5% practiced de-escalation, when comparing with the similar study by Malavika Singh et al, were 75% practiced de-escalation, shows that there is a gap between knowledge and practice of this study population.

Around 90% of participants send samples for culture and sensitivity in relevant cases. But, among those who send, only 22.22% waited for the results before starting an antibiotic. Majority were interested in educating the patients regarding correct use of antibiotic, not to use the same prescription of antibiotic for similar illness without consulting a physician and not to buy antibiotic over the counter. For majority, their choice of antibiotic depended on availability in the hospital. More than half of the study population adhered to proper hand washing and isolation techniques to prevent cross infections. Only 20% cross checked a drug monograph that gives information about new antibiotic. Regarding information about new antibiotic, majority depended on teachers.

There were 47 participants responded to the multiple choice questions. First question was on the need for starting an antibiotic in a well-controlled diabetic lady with acute gastroenteritis with severe dehydration. 60% preferred starting an antibiotic in this case. But according to HAP, it is advised to wait for stool culture report to start an antibiotic. The data is comparable with the previous study by Poonam Patel et al, were 44.19% preferred giving an antibiotic to acute gastroenteritis. Second question was if the culture report came as negative and what to do next. Only 23% considered stopping the antibiotic, if started before. According to WHO database on quantitative medicinal use in developing countries, 54% of acute diarrhea cases were unnecessarily treated with antibiotics.¹⁰

Third case scenario was a case of acute suppurative otitis media which was managed with amoxicillin and presented now with persisting symptoms. According to HAP, it was to be managed by sending of ear swab for culture and sensitivity and then start antibiotics accordingly. But only 10% gave the right answer. The unwillingness of residents to wait for culture and sensitivity reports may be attributed to the delay in receiving the reports. Fourth case scenario was a case of surgical prophylaxis for an elective hernioplasty. According to HAP, the surgical prophylaxis for an elective procedure is inj. cefuroxime 1.5 gm IV with induction and 2 doses post operatively. Only 7% gave the right answer. This might be due to the reason that, the choice of antibiotic by residents depended on the availability of antibiotic in the hospital. Fifth scenario was a case of an uncontrolled diabetic presenting with a chronic osteomyelitis. According to HAP the correct answer is to wait for culture and sensitivity reports but only 15% made correct answer.

According to the present study data the awareness about the HAP and antibiotic stewardship progressed as the course duration progressed i.e., around 20% among interns to 70% among senior residents. Thus, educational programs ensuring active participation of interns and junior residents which may be continuing medical education, group discussions, lectures, workshops, printed materials like antibiotic formularies or face to face contact programs like counselling can be done. Hands on training on hand washing techniques and isolation techniques to be conducted every year, may help to ensure adherence to these practices among junior doctors. HAP formulated by the infection control committee should be effectively communicated to the junior prescribers. A copy of policy should be made available to all prescribing physicians and it can be pasted in an accessible site in out-patient departments and wards of every department. Also, supervising and monitoring of the prescription and timely feedback with methods to improve prescription can be effective. Limited antibiotic procurement lists, and structured medication order forms are other ways of implementing HAP. Since the choice of antibiotic depend on the availability of antibiotics in the hospital for majority, the essential antibiotic availability should be

ensured. Delayed culture and sensitivity reports are a major contributor for not waiting for results to start antibiotic. This can be minimized by use of automated blood culture systems or other latest technical advances like peptide nucleic acid technology, rapid polymerase chain reaction etc. where results are made available in an hour.

According to the current estimates, if antimicrobial resistance is not tackled effectively now it can result in a death every three seconds by 2050. Inappropriate antibiotic use is a major cause of antimicrobial resistance. WHO has initiated programs for curbing this situation by popularizing antibiotic stewardship programs (ASP). Developing a hospital antibiotic policy is an integral part of ASP. This is a global initiative as exemplified by antibiotic smart use which is a workable model for promoting the rational use of antibiotics in Thailand.¹¹ The study results points that intense enforcement of antibiotic stewardship programs in the institution is the need of the hour.

Limitation of the study is that it is a cross sectional questionnaire based study, response of the participants may be biased. But it can open an insight into areas where further interventions are required. A further prospective study with large sample size, with inclusion of prescription auditing is a future possibility.

CONCLUSION

The upcoming clinicians, that is the residents and interns should be the major focus of strategies to promote rational antibiotic prescription. Various interventional strategies can be, targeted interventions to improve antibiotic use like educational programs ensuring active participation. Managerial strategies to ensure implementing of hospital antibiotic policies like routine antibiotic auditing and feedbacks and ensuring sufficient government expenditure and enforce regulations to ensure timely availability and sensitivity of investigational reports to aid clinicians in their antibiotic choice. The study concludes that there is a need for approaches that includes implementation of antibiotic policy and to plan for effective undergraduate teaching programs regarding antibiotic resistance and importance of rational prescription of antibiotics which can improve the quality of antibiotic prescription and thereby minimizing the antibiotic resistance.

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