"CROSS SECTIONAL STUDY ON ANTIBIOTIC STEWARDSHIP PRACTICES AT A TERTIARY CARE CENTRE"

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ABSTRACT

Introduction: Physicians play an important role in the fight against antimicrobial resistance by their rational practices in usage of antimicrobials and by educating the society regarding usage of antibiotics and its consequences of developing resistance. Antimicrobial resistance is a result of irrational use of the antimicrobials and insufficient infection control policies in curbing this menace. There is growing evidence that hospital based programmes, known as “Antibiotic Stewardship Programmes” which are dedicated to optimize antibiotic use in hospital, can guide clinicians on antibiotic use, improve the frequency of correct prescribing, improve quality of care to patients, reduce development of drug resistance/ treatment failure, prevention of adverse effects of drugs, curb the expenses on unnecessary drug usage. Hence cross sectional survey was conducted to understand knowledge, attitude and practice of resident doctors regarding the antibiotic stewardship practices, at Father Muller Medical College Hospital Mangaluru, India, which will guide us in developing strategies for effective implementation of such programmes.

Methodology: Cross sectional questionnaire based survey about knowledge attitude and practice of 60 resident doctors regarding hospital antibiotic stewardship programme. Results: Overall knowledge score showed mean of 14.459(out of max score 20) with SD of 3.921, mean percentage of 72.25%. Attitude assessment showed score of 16.98(out of max score of 20) with SD of 2.795, mean percentage of 84.9% and practice assessment had score of 27.05(out of max score of 40) with SD 5.309 and mean percentage of 67.62%. Relationship
between knowledge, attitude and practice was statistically significant positively correlated at the 0.01 level. **Conclusion:** The findings of the study suggest that the knowledge had positive impact on attitude and practice regarding antibiotic use. Hence there is need for continuous /periodic educational intervention regarding antibiotic stewardship programmes among resident doctors, who are the primary care givers at a tertiary care centre.

**KEYWORDS:** Antibiotics, antibiotic stewardship practices, hospital antibiotic policy, antibiotic programmes, antimicrobial resistance.

**INTRODUCTION**

Antimicrobial resistance (AMR) has become a growing serious health threat worldwide.\(^{[1-6]}\) It has been estimated by CDC that in United States alone more than two million people are sickened by antibiotic resistant infections causing at least 23,000 deaths annually.\(^{[7]}\) India has the highest burden of infectious diseases in the world, with favourable conditions for development of drug resistance. Antimicrobial resistance will lead to failure to control infections and ineffective delivery of health services in the community.\(^{[3]}\)

Antimicrobial resistance is because of irrational use of the antimicrobials and insufficient infection control policies in curbing this menace.\(^{[4]}\) These irrational and overuse of antimicrobials practices fortify emergence of resistant bacteria strains globally and can also lead to adverse drug reactions and economical burden to national health system.\(^{[9,8]}\) A recent study highlighted the need for rationalizing antibiotic use to curb the antibiotic resistance in India.\(^{[3]}\)

Physicians play an important role in the fight against antimicrobial resistance by their rational practices in usage of antimicrobials, and by educating the society regarding usage of antibiotics and its consequences of developing resistance.\(^{[10]}\) To impart knowledge and guide the physicians in this regard many national and international agencies are recommending development of programmes which are effective at local, national and international level.\(^{[8,12]}\) There is growing evidence that hospital based programmes, known as “Antibiotic Stewardship Programmes” which are dedicated to optimize antibiotic use in hospital, can guide clinicians on antibiotic use, improve the frequency of correct prescribing, improve quality of care to patients, reduce development of drug resistance and treatment failure, prevent the adverse effects of drugs and curb the expenses on unnecessary drug usage.\(^{[11]}\)
Our hospital has formulated the Antibiotic Stewardship Programme, including formulation of hospital antibiotic policy. However, the success of such initiatives rely on the behaviour of the prescribers and patients. The continuous process of training, educational interventions and outcome measures of programmes has to be done to assess implementation of programmes.\(^{6,13,14,15}\) Hence cross sectional study was conducted to understand knowledge, attitude and practice of resident doctors regarding the antibiotic stewardship practices which will guide us in developing strategies for the effective implementation of such programmes.

**OBJECTIVES**

To evaluate the knowledge attitude and practice in resident doctors on antibiotic stewardship programme at a tertiary care centre.

**METHODOLOGY**

We conducted a survey of preformed questions on knowledge, attitude and practice in antibiotic stewardship practices among 60 resident doctors at Father Muller Medical College Hospital, Mangaluru, Karnataka, India from May 2015 to June 2015.

It was a cross sectional, preformed questionnaire based survey of doctors, at their clinics. Need for the study and confidentiality were explained to the participating doctors and voluntary informed consent was taken. A copy of questionnaire was given to them. They were asked to return filled in forms to the investigator by 48 hours or more if needed. They were assured confidentiality of the identity throughout and the right to know the results of the study after the completion of the same.

Study was approved by Father Muller Charitable Institutional Ethics Committee and all subjects were included after taking written informed consent.

Questionnaire used was customised and formed on knowledge, attitude, practice and opinions on effectiveness of antibiotic policy. It had 60 questions, 20 for knowledge, attitude and practice each. It was verified and authenticated by subject experts in clinical pharmacology.

All the questions were of multiple choice type. Most of them were questions on facts with single best answer, and others were opinions to be chosen from given scale.
INCLUSION CRITERIA
1) Resident doctors of all clinical broad speciality and superspeciality
2) Junior residents
3) Senior residents
4) Dentists
5) Tutors

EXCLUSION CRITERIA
1) Doctors not willing to participate
2) Doctors part of hospital infection control team
3) Doctors from clinical pharmacology
4) Doctors from clinical microbiology
5) Doctors who are part of therapeutic committee, antibiotic auditing etc who can bias the results
6) Doctors who fail to return filled in forms within stipulated time

The appropriate statistical tools such as mean, percentage, Chi Square and ANOVA were used for statistical analysis. The SPSS software version 23 was used for computational purpose.

RESULTS AND DISCUSSION
In our study 41.7% of the participants were females and 58.3% were males. Doctors from all clinical speciality departments were included. Most of them had 1-2 years clinical experience after internship (66.7%), some of them had 2-5 years experience (30%) and few had more than 5 years experience (3.3%).

Knowledge Assessment: 90% of the participants knew about the advantages of having hospital antibiotic policy, 96.7% agreed that antibiotics use should be monitored, 95% knew that all infections need not be prescribed with antibiotics especially viral infections, 31.7% knew that there is no need to do culture sensitivity in every bacterial infections and 91.7% knew that sample for culture and sensitivity should be taken before starting antibiotic. 25% knew about sensitivity pattern of antibiotics for common infections prevailing in their practice, 81.7% knew standard empirical therapy for common infections, 81.7% knew that our hospital has antibiotic policy, 70 % knew the terms antibiotic escalation and 65% about the term de escalation. 20% knew about validity of hospital antibiotic policy and its renewal.
78.3% knew about antibiotic resistance and measures to prevent it, 71.7% knew irrational practices lead to antibiotic resistance. 41.7% knew that resistant drug can become sensitive again, 80% knew that early switching from parenteral to oral antibiotics has advantages, 93.3% knew that antibiotics should not be given over the counter, 91.7% knew that patients also need to be educated regarding antibiotic use to prevent resistance, 66% doctors knew the price of antibiotics they prescribed, 96.7% knew that higher antibiotics use should be reserved and could be used only after authorisation from senior physician. 76.7% knew that adverse effects are possible with antibiotics and has to be reported.

Overall knowledge showed mean of 14.45 with SD 3.921, range 0-20

**Attitude Assessment:** 65% participants were comfortable in using hospital antibiotic policy, 98.3% feel antibiotic policy should be encouraged, 98.3% wants antibiotic usage be monitored by drug safety physician or clinical pharmacologist, 98.3% had attitude of treating all infectious diseases with antibiotics. 13.3% had attitude of doing culture and sensitivity test in all infections, 93.3% had attitude of taking sample for culture before starting antibiotics, 85% had attitude of escalating to higher drugs if clinical improvement is not seen in few days, 56.7% had attitude to desclate to lower class sensitive drugs when the current higher class drug is also sensitive. 63.3% think that their irrational practice locally will not matter for global resistance development, 96.7% denied the preference of prolonged parenteral antibiotic therapy. 95% wanted to know more on sensitivity and resistance pattern prevailing in our institution from infection control team. 96.7% wanted to know more on empirical drugs to be started, 90% wanted to know more on rational drug therapy practices of selecting particular antibiotic, route. dosage form, dose, drug interactions etc, 88.3% wanted to know more on hospital antibiotic policy, 90% of them were interested to know about reporting when there is adverse drug reaction, 93.3% were against dispensing of antibiotics over the counter for minor ailments by pharmacists, 93.3% wanted to educate patients regarding use of antibiotics, 96.7% preferred to consider cost before selecting antibiotic to particular patient, 96.7% agreed that clinical pharmacologist or drug safety physician has to be involved in regulating and educating prescribers on rational therapeutic practices and patient education. 95% wished to learn more on antibiotic resistance and its preventive actions.

Overall score mean 16.98 and SD 0f 2.795 range 0-20

**Practice Assessment:** 43.3% doctors had copy of hospital antibiotic policy, 41.7% of them were using it in their daily practice, 32.2% wanted to continue use of antibiotic policy. 41.7%
most of the times (4/5) they were correct in choosing antibiotic drugs. 60% of them had experienced that many times (3/5) hospital antibiotic policy helped to choose the correct drug. 63.3% sent many times (3/5) for culture and sensitivity. 53.3% agreed that many times (3/5) they have to escalate to higher antibiotics inspite present lower antibiotic is sensitive. 51.57% prescribers use to descale to lower antibiotic sometimes (2/5) if the lower antibiotic is also sensitive. 91.7% used shorter parental antibiotic and then switched on to oral antibiotics. 51.7% prescribers felt that they had actually considered the antibiotic tailor made to patient for pertaining disease, drug interactions etc. 95% practised the trend of prescribing antibiotic even in viral infections prophylactically. 60% never practice consulting senior physician before prescribing higher antibiotics. 55% said that they had never took help of pharmacologist to choose drugs, 50% never took help of pharmacologist for monitoring adverse drug reaction, 70% had never reported adverse drug reaction. 43.3% had practice of educating patients on antibiotic use. 66.7% practiced considering cost of therapy in choosing drugs. 65% had never attended formal training exclusively in antibiotic stewardship programme. 46.7% participants opined that the hospital antibiotic policy implementation has reduced 50% burden of antimicrobial resistance development in our hospital. 91.7% had agreed that they will teach rational practices learnt to others to curb the menace of antibiotic resistance. Overall practice score is 27.05 SD 5.309 (max score of 40).

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Knowledge, attitude and practice studies help to understand the treating physician’s attitude and lags in understanding the antibiotic use among the prescribers. Our hospital has implemented hospital antibiotic policy and is striving to rationalize the antibiotic use. Our study focused on many aspects regarding antibiotic use, resistance, monitoring, regulation in
clinical practice. Efforts were made to include most of the clinical department residents and to have a wider view of their opinions.

Knowledge questionnaire contained 20 facts, framed as question with yes or no answer type. Overall knowledge appeared to be good with mean of 14.45 out of maximum score 20 with standard deviation of 3.921. Mean percentage of knowledge was 72.25%.

Attitude questionnaire contained 20 questions. Overall most of the residents had good attitude towards antibiotic use. Mean of 16.69 out of maximum score 20 with standard deviation of 2.795. Mean percentage of attitude was 84.9%.

Practice questionnaire contained 20 questions, multiple choice type. Overall mean was 27.05 out of maximum score 40 with standard deviation of 5.309 and mean percentage of 67.62%. Comparison of knowledge, attitude and practice scores by Pearson correlation reveal that residents having higher knowledge scores had higher scores of attitude and practice. It was statistically significant positively correlated at the 0.01 level (2 tailed).

Most of the doctors appeared to have good knowledge and attitude towards rational use of antibiotics, unlike other studies showing poor knowledge levels.[16]

However, there is a need for continued training programmes to teach the residents about antibiotic stewardship practices. Our study reveals that most of the residents have attitude to learn more regarding sensitivity pattern of infections prevailing in our hospital, hospital antibiotic policy and its use, rational drug use practices including drug selection, dose, duration, route of administration, adverse effects and reporting. Most of the residents admitted the need for the aid of clinical pharmacologist and infectious diseases or clinical microbiologists services in clinical practice.

Similar to Aggarwal et al, our study finds that there is need for further educational interventions regarding antibiotic use.[17]

Our study made us realize the need for further improvements in implementation of antibiotic stewardship practices. In this way we can reduce the development of antibiotic resistance.

**LIMITATIONS:** Since it was a pilot study, sample size was small and questions included were self made. All the responses given were individual opinions of the participants and were
self reported as a result, they may not be true reflection of attitude and practice of resident doctors in general.

CONCLUSION
The findings of the study impart the insight that knowledge had positive impact on attitude and practice regarding antibiotic use. Hence there is need for continuous /periodic educational intervention regarding antibiotic stewardship programmes among resident doctors, who are the primary care givers at a tertiary care centre.

ACKNOWLEDGEMENT
First author is involved in protocol writing, data collection, analysis and interpretation of results. Second author being the subject expert, author for correspondence is involved in each and every step of the study. We acknowledge the statistician Mrs. Sucharitha Suresh who has helped for the statistical analysis. We also acknowledge the enthusiasm and support of resident doctors for being part in the study. Study was investigator initiated, without any financial or any other commitments with any other party. Both the authors declare the none conflict of interest.

REFERENCES


APPENDIX

QUESTIONNAIRE REGARDING ANTIBIOTICS USE

KNOWLEDGE ASSESSMENT

1. Do you know about the advantages or disadvantages of having a hospital antibiotic policy? YES/NO

2. Should antibiotics usage be monitored? YES/NO

3. Do all patients have to be prescribed antibiotics, especially viral infections? YES/NO

4. Do we have to do culture and sensitivity for all bacterial infections? YES/NO

5. When should we take sample for culture and sensitivity testing? BEFORE OR AFTER

STARTING ANTIBIOTICS

6. Do you know about sensitivity pattern of antibiotics for common infections prevailing in your practice? YES/NO

7. Do you know about standard antibiotic empirical therapy to be started for common infections? YES/NO

8. Does our hospital has antibiotic policy? YES/NO

9. Do you know about antibiotic escalation? YES/NO

10. Do you know about antibiotic descalation? YES/NO

11. Do you know about validity period of our hospital antibiotic policy? YES/NO
12. Do you know about antibiotic resistance and measures to prevent it? YES/NO
13. Do irrational antibiotic prescribing leads to antimicrobial resistance? YES/NO
14. Can resistant drug become sensitive again? YES/NO
15. Do early switching from parenteral to oral antibiotics have advantages? YES/NO
16. Can antibiotics be given over the counter? YES/NO
17. Do patients need to be educated regarding antibiotic use? YES/NO
18. Do you know the cost of antibiotics you prescribe? YES/NO
19. Do you know that certain higher antibiotics are reserved and could be used only after authorization from senior physicians? YES/NO
20. Do you know adverse effects are possible with antibiotics and have to be reported to clinical pharmacologists? YES/NO

ATTITUDE ASSESSMENT
1. Do you feel comfortable in using hospital antibiotic policy? YES/NO
2. Do you feel antibiotic policy should be encouraged? YES/NO
3. Do you feel that antibiotic usage be monitored by clinical pharmacologist or drug safety physician or Infection control physician? YES/NO
4. Do you feel to know more on how antibiotic resistance could be prevented? YES/NO
5. Do you think all cases getting into hospital should be treated with antibiotics? YES/NO
6. Do you feel in all infectious patient, culture & sensitivity test should be done? YES/NO
7. When you prefer to take sample for culture and sensitivity test? BEFORE/AFTER ANTIBIOTIC USE
8. Do you prefer to escalate the antibiotics to higher group drugs, if clinical improvement is not seen in few days? YES/NO
9. Would you like to descale to lower class sensitive antibiotics when present higher class antibiotic is also sensitive? YES/NO
10. Do you feel that irrational antibiotic usage practice in our hospital locally will not lead to global antibiotic resistance? YES/NO
11. Do prolonged parenteral antibiotic therapy has advantages? YES/NO
12. Do you prefer to know more on sensitivity and resistance pattern of antibiotics prevailing in our hospital from infection control team? YES/NO
13. Do you prefer to know on empirical drugs to be started in common infections in our hospital from clinical pharmacologist? YES/NO
14. Do you prefer to know more regarding antibiotic drug, dose, dosage form, drug interactions etc from clinical pharmacologist? **YES/NO**

15. Do you prefer to know more on hospital antibiotic policy and its implementation? **YES/NO**

16. Do you prefer to know more on reporting, when their is adverse reactions to clinical pharmacologists? **YES/NO**

17. Could antibiotics be distributed over the counter? **YES /NO**

18. Are you interested in educating patients regarding antibiotic use and resistance? **YES/NO**

19. Do you feel cost should be considered while prescribing antibiotics to patient? **YES /NO**

20. Do you feel Clinical Pharmacologist or Drug safety physician could be involved in regulating and educating the prescribers/patients on rational therapies? **YES/NO**

**PRACTICE ASSESSMENT**

1. Do you have copy of hospital antibiotic policy? **YES/NO**

2. Are you using it in your daily practice? **YES/NO**

3. Do you want to continue using the antibiotic policy? **YES/NO**

4. How often are you right in choosing correct empirical antibiotic?

|---------------|--------------------|---------------|--------------|---------|

5. Did it help you in choosing empirical therapy for the particular patient?

|---------------|--------------------|---------------|--------------|---------|

6. How often do you send sample for culture and sensitivity?

|---------------|--------------------|---------------|--------------|---------|

7. How often do you escalate to higher antibiotic, inspite of the present lower antibiotic is sensitive?

|---------------|--------------------|---------------|--------------|---------|

8. Do you de escalate the drug if lower drug is also sensitive?

|---------------|--------------------|---------------|--------------|---------|

9. Which choice you prefer to treat infections?

- Giving prolonged parentral antibiotics
- Giving short course parentral, followed by oral antibiotics
- Giving Oral antibiotics to all, irrespective of disease & severity?
10. Do you choose the drug, tailor made for particular patient? **YES/NO/NOT SURE**

11. Will you prescribe antibiotics to all patients, even in viral diseases? **YES/NO**

12. Do you take advice of senior physician before starting higher antibiotics? **YES/NO**

13. Do you take help of clinical pharmacologist to assist you choosing the drug? **YES/NO**

14. Do you take help of clinical pharmacologist to monitor the adverse effects, other parameters? **YES/NO**

15. Do you report adverse effects of drugs to clinical Pharmacologists? **YES/NO**

16. Do you educate the patient on antibiotic use? **YES/NO**

17. Do you consider cost of the therapy while choosing the drug? **YES/NO**

18. Did you attend any training in hospital antibiotic stewardship practices? **YES/NO**

19. Has antibiotic policy implementation reduced the burden of drug resistance in your view?

| 5. 100% | 4. 75% | 3. 50% | 2. 25% | 1. 0% |

20. Do you teach the rational antibiotic practices learnt to your juniors & friends and bring change in society? **YES/NO**