

A Prospective Cross Sectional Study of Assessment of Knowledge, Attitude and Practice of Antibiotic Stewardship among Healthcare Professionals in a Tertiary Care Hospital

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Abstract: Introduction: Antimicrobial stewardship is nothing but an integrated approach to improve and measure the appropriate use of antimicrobials by promoting the selection of antimicrobial drug regimen with suitable route of administration, dose and duration of therapy.

Materials and methods: This study was a cross-sectional, questionnaire based survey undertaken in a tertiary teaching care hospital in India among the medical and paramedical professionals including interns, residents, lecturers, associate professors and professors. However paramedical professionals and MBBS students were excluded from study. The questionnaire was self-structured and pre-validated by the subject experts for its content and relevance. The questionnaire comprised of 8 questions of knowledge and practice each and 10 questions on attitude. Some questions were yes or no type, others were evaluated on 5-point Likert scale ranging from always to never, rest were multiple choice questions. The questionnaire was distributed to 250 medical health professionals and were asked to complete the questionnaire. The duration of study was of 3 months and study was initiated after the approval from the Institutional Ethics committee.

Results: The total number of questionnaires distributed and completed were 250 (Table 1). The departments included in the study in the chronological order were medicine, surgery, community medicine, pathology, microbiology, ophthalmology, ENT, pulmonary medicine, orthopaedics, anaesthesia, dermatology, dental surgery, pharmacology and casualty medical officers. Knowledge, attitude and practice of participants was evaluated.

Conclusion: The threat of AMA resistance is rapidly progressing and intensifying. The awareness on its seriousness and significance is the first step towards curtailing its progress. Undertaking of instructional and educational campaigns among the general population and health professionals about AMA resistance and its dangerous consequences and steps to limit its spread and developments of resistance.

Key Words: Antimicrobial stewardship, knowledge, practice, ENT, medicine

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I. Introduction

Antimicrobial stewardship is nothing but an integrated approach to improve and measure the appropriate use of antimicrobials by promoting the selection of antimicrobial drug regimen with suitable route of administration, dose and duration of therapy.^{1,2} This minimizes the risk of toxicity and adverse reaction, promotes cost-effectiveness of therapy and restrict the choice for antimicrobial resistant strains. Appropriate selection of antimicrobial drugs is critical to optimize treatment of infections and limit the spread of antimicrobial resistance.³ The treat of AMA resistance is rapidly developing and escalating. The awareness on its seriousness and significance is the first step of approach for hampering its spread. To undertake instructional and educational campaigns among the general population as well as among the health care personnel regarding antibiotic resistance, its dangerous consequences and prevention of its development and spread, to train undergraduate and postgraduate medical, pharmacy and nursing regarding proper prescribing, dispensing and use of antimicrobials, to carry out surveillance studies of knowledge, attitude and practice among the medical and paramedical professionals are various remedial steps suggested to overcome the problem of AMA resistance.⁴ Antimicrobial resistance is a serious global problem of antimicrobial abuse and there is a growing consensus to urgently develop new strategies for prevention of resistance of bacteria to antimicrobial agents.⁵ Improper use of antimicrobials leading to resistance is a because of numerous factors such as prescribers knowledge and experience, diagnostic uncertainty, prescribing on patient's demand, seniors as a role model, drug promotional practices, overload of patients and negligence of proper prescribing, self-medication of patients.⁶ Relatively few studies of knowledge, attitude and practice are published regarding antimicrobial

resistance. So, it is worthwhile to assess the knowledge, attitude and awareness regarding antimicrobial stewardship in the tertiary care teaching hospital.⁴

Aims and objectives of the study was to explore the perceptions of knowledge, attitude and practice of antimicrobial agent use and its resistance in medical professionals in a tertiary teaching care hospital in India.

II. Materials And Methods

This study was a cross-sectional, questionnaire based survey undertaken in a tertiary teaching care hospital in India among the medical and paramedical professionals including interns, residents, lecturers, associate professors and professors. However paramedical professionals and MBBS students were excluded from study. The questionnaire was self-structured and pre-validated by the subject experts for its content and relevance. The questionnaire comprised of 8 questions of knowledge and practice each and 10 questions on attitude. Some questions were yes or no type, others were evaluated on 5-point Likert scale ranging from always to never, rest were multiple choice questions. The questionnaire was distributed to 250 medical health professionals and were asked to complete the questionnaire.⁵ The duration of study was of 3 months and study was initiated after the approval from the Institutional Ethics committee.

Inclusion criteria:

- Interns
- Junior residents
- Senior residents

Exclusion criteria:

- Doctors not willing to participate
- Doctors part of hospital infection control team
- Doctors from clinical pharmacology
- Doctors from clinical microbiology
- Doctors who are part of therapeutic committee, antibiotic auditing etc who can bias the results Doctors who fail to return filled in forms within stipulated time

Statistical analysis

Simple descriptive statistics was used to generate percentages and proportions.

III. Results

The total number of questionnaires distributed and completed were 250 (Table 1). The departments included in the study in the chronological order were medicine, surgery, community medicine, pathology, microbiology, ophthalmology, ENT, pulmonary medicine, orthopaedics, anesthesia, dermatology, dental surgery, pharmacology and casualty medical officers. Knowledge, attitude and practice of participants was evaluated.

Gender wise distribution	Numbers	Percentages (%)
Males	146	58.4
Females	104	41.6
Age wise distribution (in years)		
21-30	109	43.6
31-40	84	33.6
41-50	21	8.4
51-60	24	9.6
>60	12	4.8
Years of experience		
0-5	127	50.8
6-10	51	20.4
11-15	13	5.2
16-20	11	4.4
21-25	16	6.4
26-30	21	8.4
31-35	4	1.6
36-40	7	2.8

Table 1: Demographic characteristics

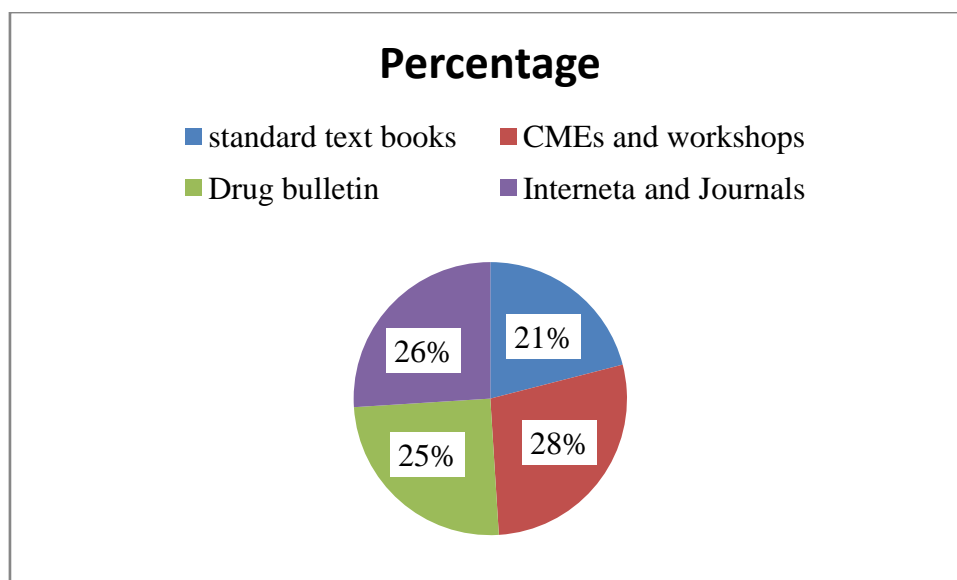


Figure 1: Most preferred way of updating the knowledge

S.No	Questionnaire (N=250)	N (%)
1	Do you know the difference between bacteriostatic and bactericidal Antimicrobial agents (AMAs)?	
	Yes	245 (98)
	No	5 (2)
2	Do you know the difference between broad spectrum and narrow spectrum antimicrobials?	
	Yes	243 (97.2)
	No	7 (2.8)
3	Do you know the term antimicrobial stewardship?	
	Yes	126 (50.4)
	No	124 (49.6)
4	Which of the following mechanisms are for drug resistance?	
	a. Increased entry of antibiotic into pathogen	10 (4)
	b. Decreased export by efflux pumps	32 (12.8)
	c. Alteration of target proteins	152 (60.8)
	d. Release of microbial enzymes that destroy the antibiotic	56 (22.4)
5	Which of the following are responsible for emergence of consequences for drug resistance?	
	a. Drug-resistant pathogen	134 (3.6)
	b. Toxicity to the patient	35 (14)
	c. Requirement of higher AMA	52 (20.8)
	d. Fetal damage	29 (10.4)
6	Drugs used to treat gram negative anaerobes?	
	a. Metronidazole	151 (60.4)
	b. Fluoroquinolones	20 (8)
	c. Imipenem	56 (22.4)
	d. Cotrimoxazole	23 (9.2)
7	Regarding storage of AMAs, which of following is/are correct-	
	a. Storage should be according to brand name	44 (17.6)
	b. Most antibiotics need temperature of 15-20°C	146 (58.4)
	c. Cool storage means refrigeration	32 (12.8)
	d. Short expiry medicines should be kept at back	28 (11.2)

Table 2: Knowledge of the participants

S.No	Questionnaire (N=250)	N (%)
1	What precautions do you take to prevent AMA resistance?	
	a. Use of AMAs when necessary after AST	169 (67.6)
	b. Using > 1 AMAs at a time	46 (18.4)
	c. Using newer AMAs for long duration	-
	d. Use of broad spectrum AMAs for mild short-term illness	35 (14)
2	Which criteria do you use for selection of AMAs?	
	a. Clinical judgement	127 (50.8)
	b. Empirical therapy	55 (22)
	c. Clinical and experimental evidence	68 (27.2)
	d. Lucrative practices	-
3	What is/are the basis of choosing a proper dosing schedule?	
	a. As per Pharmacokinetic variability	165 (66)

	b.	Integrating microbial PK-PD studies	43 (17.2)
	c.	As per minimum inhibitory concentration of pathogen	34 (13.6)
	d.	According to post-antibiotic effect	8 (3.2)
4		How frequently you follow the suggestions given by Hospital Infection Control Committee (HICC)?	
	a.	Always	155 (62)
	b.	Often	54 (21.6)
	c.	Sometimes	35 (14)
	d.	Seldom or never	6 (2.4)
5		When do you use empirical therapy?	
	a.	Life-threatening infection	104 (41.6)
	b.	Recurrent local wound infection	26 (10.4)
	c.	Community acquired infections	85 (34)
	d.	Failure to respond to initial therapy	35 (14)
6		Why do you insist combination therapy?	
	a.	To accelerate rapidity of microbial activity	42 (16.8)
	b.	To enhance therapeutic efficacy	76 (30.4)
	c.	To prevent resistance to monotherapy	104 (41.6)
	d.	To reduce severity or incidence of ADR	28 (11.2)
7		Does risk of ADR increase with post-treatment suppressive therapy (secondary prophylaxis)?	135 (54)
	Yes		115 (46)
	No		
8		When do you are secondary prophylaxis?	
	a.	For all surgical patients	60 (24)
	b.	For all AIDS patients	65 (26)
	c.	For all post-transplant patients	71 (28.4)
	d.	For all patients with major disease	54 (21.6)
9		How do you prevent super-infections?	
	a.	Use of specific AMAs	200 (80)
	b.	Use of AMAs to treat self-limiting illness	-
	c.	Use of narrow spectrum AMAs	28 (11.2)
	d.	Use of AMAs for prolong period	22 (8.8)
10		Most common reason for misuse of AMAs	
	a.	Conflicting advertising claims of superiority to newer AMAs	79 (31.6)
	b.	Prescribing AMAs without prior antibiotic sensitivity test (AST) (Impatient for AST report)	86 (34.4)
	c.	Strong clinical suspicion of an infection	43 (17.2)
	d.	According to availability of AMAs and following opinion of senior doctors	42 (16.8)

Table 3: Attitude of the participants

S.No	Attitude of the participants (n=250)	N (%)
1	Do you prescribe AMAs on demand of patients?	
	Yes	15 (6)
	No	235 (94)
2	Do you explain the patient about use and ADRs of AMAs?	
	Yes	239 (5.6)
	No	11 (4.4)
3	Do you advice simple rapid lab tests before starting AMA therapy?	
	a. Always	62 (24.8)
	b. Often	71 (28.4)
	c. Sometimes	82 (32.8)
	d. Seldom or Never	35 (14)
4	Do you advice culture-sensitivity in all severe cases if not responding to AMA?	
	a. Always	174 (69.6)
	b. Often	25 (10)
	c. Sometimes	29 (11.6)
	d. Seldom or Never	22 (8.8)
5	When do you switch from I/V to oral AMAs?	
	a. Tachycardia >12 hours or febrile > 24 hours	23 (9.2)
	b. Clinical improvement	201 (80.4)
	c. No ongoing problems with absorption	26 (10.4)
	d. Suitable oral AMA available	-
6	Average duration of AMA treatment that you prescribe for community-acquired pneumonia-	
	a. 3-5 days	65 (26)
	b. 7-14 days	157 (62.8)
	c. 24-28 days	-
	d. >28 days	28 (11.2)

7	Ideal duration of surgical prophylaxis (pre, during, post-surgical) that you suggest-	
a.	1 hour before incision	
b.	24 hours after surgery for clean wounds	125 (50)
c.	At the time of ocular surgeries (intra-operational)	54 (21.6)
d.	12 hours after traumatic wound	35 (14)
		36 (14.4)
8	Have you created awareness regarding AMA resistance among fellow colleagues, patients and students?	
	Yes	217 (86.8)
	No	33 (13.2)

Table 4: Practice followed by the participants

Figure 1 showed 54% of participants preferred way of updating the knowledge by Internet, Journals, CME's and workshops.

In Table 2, 98% of participants knew the difference between bacteriostatic and bacteriocidal AMAs and narrow and broad spectrum AMAs however the term antimicrobial stewardship was known to 50.4% of participants. Other knowledge related multiple choice questions were fairly answered by the participants.

Table 3 showed optimistic attitude of the participants towards use of AMAs. 50.8% of participants relied on clinical judgement and clinical and experimental evidence for selection of AMAs. 62% of participants always followed suggestions given by HICC.

Table 4 showed sufficiently good practice of the participants in this study. 95% of participants do not prescribe AMAs on demand of patients and always explained uses and ADRs of AMAs. 85.66% participants have created awareness amongst their colleagues, patients and students.

IV. Discussion

In this study, we found that, most of the health care professionals are males and of age group 21-30 years with majority of experience upto 5 years. These findings coincide with the findings of Tegagn GT et al study.^{6,7}

As far as knowledge of AMA resistance is concerned all health professionals and residents had fair knowledge regarding AMA resistance. However, 56% of participants did not know the term 'Antimicrobial stewardship' which indicates paucity of implementation strategies and education regarding various stewardship programs across the country. Most preferred way of updating knowledge for participants were CME's and workshop followed by internet and journal and standard text book unlike Yang K et al, for which most common way was text books and other guides (80.2%).⁸

However, physicians decisions may be influenced by severe factors such as lack of updated information, pressure from patients, families.¹⁰ The patient related factors also encourage resistance like improper use- small doses, incomplete schedule, days, self medications- single AMA dosing, demand for higher antibiotics, injectable preparations, costly medicines; insistence of rapid recovery. Physician factors such as using AMAs for viral illness and non-specific diarrhoeas; use of drugs not related to disease use of chloroquine/ ciprofloxacin for any fever. selection of wrong drug - use of erythromycin for urinary tract infection; incorrect dose- underdoses /overdose; incorrect duration of treatment, prolonged post surgical use of AMAs or stoppage of AMAs as soon as relief is obtained; unnecessary use of drug combinations, amoxycillin + cloxacillin for staphylococcal infections; imprecise diagnosis- medication is given to cover all possible causes of illness-blanket covering.⁹

As most of health professionals in the hospital follow the suggestions given by Hospital Infection Control Committee (HICC) and use empirical therapy for life threatening infections. These presenting health professionals use more than one AMA for mixed severe infections and practice secondary prophylaxis fairly well. However, absence of computer assisted programmes especially in government hospitals create obstacle in the smooth working of stewardship programme.

V. Conclusion

The threat of AMA resistance is rapidly progressing and intensifying. The awareness on its seriousness and significance is the first step towards curtailing its progress. Undertaking of instructional and educational campaigns among the general population and health professionals about AMA resistance and its dangerous consequences and steps to limit its spread and developments of resistance. Issues like hand hygiene, restrictions on schedule H1 and X uses should be discussed thoroughly and implemented. Prescription audits and data collection from manufacturers, prescribers and bulk users of antibiotics should be routinely monitored. Adequate training should be given to UGs and PGs about antimicrobial chemotherapy and its usage. It should be part of their curriculum- proper prescribing, dispensing and usage of AMA so as to promote judicious use of AMA.

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