



AWARENESS TOWARDS ANTIMICROBIAL STEWARDSHIP AMONG UNDERGRADUATE MEDICAL STUDENTS

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KEYWORDS

Antimicrobial stewardship (AMS), Awareness, Educational intervention, pre-test, Post-test.

ABSTRACT:

Background: Antibiotics are a valuable resource and their discovery has saved countless lives. The overwhelming and untenable use of antimicrobials (AM), contributes to the emergence of antimicrobial resistance (AMR). Against this background, WHO implemented Antimicrobial stewardship (AMS) - an initiative to refine the usage and prescription of antibiotics. The aim of this study is to analyze the awareness regarding AMS among undergraduate medical students.

Methods: Following approval from IEC, a survey was conducted among 132 third-year MBBS students at Melmaruvathur Adhiparasakthi Institute of Medical Sciences and Research. Written informed consent was obtained. Pre-test assessment was done. Perception program on antimicrobial stewardship: A competency-based approach recommended by WHO was given to the study participants and the questionnaires regarding the same were used. Post-test response was documented. An overall assessment was done by comparing the scores obtained during pre-test and post-test. Frequency and proportions were determined with descriptive statistics. 25–75% interquartile ranges (IQR) of scores were compared using the non-parametric Mann–Whitney test.

Results: 93 out of 132 students, completed both pre-test and post-test. The average score increased by 48.7% from pre-test to 73.7% post-test. Overall, most participants (56.9%) strongly agreed with the statement that ASP is mandatory in our hospital. Regarding the perception, at patients request, I would prescribe antibiotics - 41.9% of the participants strongly disagreed. There was a marked variability in IQR (2 to 3) corresponding to the fact, that Emergence of antimicrobial resistance is inevitable and ASP will help optimize treatment outcomes.

Conclusion: The post-test scores of the participants showed a significant increase, demonstrating that knowledge was enhanced through the ASP sensitization program. Initial Steps can be taken in every academic year of the medical undergraduates, to participate in basic components of an antimicrobial stewardship program

INTRODUCTION

Antimicrobials are a precious resource whose discovery has saved millions of lives¹. The excessive, inappropriate use of antimicrobial has contributed to the escalation and dissemination of antimicrobial resistance (AMR) ². Taking this into consideration, around 1990 WHO established a universal action plan - “optimize the use of antimicrobial medicines” – a practical guidance on how to implement antimicrobial stewardship (AMS) program in the human health sector at the national and health-care facility level in low- and middle-income countries (LMICs). Antimicrobial Stewardship (AMS) pertains to the judicious selection,



dose, and duration of antimicrobial therapy that achieves optimal therapeutic outcomes while minimizing adverse effects on patients and reducing the risk of eventual resistance³.

Aims of AMS program:

- To optimize the use of antibiotics;
 - To promote behavior change in antibiotic prescribing and dispensing practices;
 - To improve quality of care and patient outcomes; to save on unnecessary health-care costs;
 - To reduce further emergence, selection and spread of AMR and
 - To build the best-practices capacity of health-care professionals regarding the rational use of antibiotics^{4,5}.
- Medical students are future health-care professionals, who can curtail the AMR by practicing AMS. Hence, there is a need to analyse their awareness towards AMS.

Objectives:

To analyse the Knowledge and perception towards Antimicrobial Stewardship among undergraduate medical students

MATERIALS AND METHODS:

Setting and Participants: 132 third-year MBBS students of Melmaruvathur Adhiparasakthi Institute of Medical Sciences and Research

Intervention: Perception program on AMS: A competency-based approach recommended by WHO was modelled and delivered as lecture by the principal investigator. (openWHO.org) A closed ended questionnaire in English was used.

Outcomes Measured: Pre-test and Post-test assessment was done to know the awareness regarding AMS. An overall assessment was done by comparing the scores obtained during pre-test and post-test to know the improvement in the knowledge of AMS.

Analysis of Outcomes: Seven yes or no questions pertaining to AMS knowledge had only 1 correct answer and were worth 1 point each. Responses to the remaining 14 questions were rated on a Likert scale from 1 to 5 (1 - strongly disagree, 2 - disagree, 3 - don't know, 4 - agree, 5 - strongly agree). The scores pertinent to each choice were then summed to yield an overall score which therefore ranged from 5 to 70. SPSS 21.0 was used for data analysis. Descriptive statistics was used to obtain frequency and proportions. 25–75% interquartile ranges (IQR) of scores were reported and compared using the non-parametric Mann–Whitney test.

Ethical Approval and Informed Consent: This study was approved by IEC of Melmaruvathur Adhiparasakthi Institute of Medical Sciences and Research (Reg.No.ECR/1487/Inst/TN/2020 MAPIMS/IEC/52/2023). Written informed consent was obtained.

RESULTS:

Out of 132 students, 93 completed both pre-test and post-test questionnaires. 39 students were unwilling to return the form. The participation rate of females (56.99%) was higher than that of males (43.01%). The mean age of study participants were 20.57 ± 1.18 years.

The statement “Antimicrobials are reviewed at regular intervals” was correctly responded by 35 students (37.6%) in the pre-test and 85 students (91.4%) in the post-test. The improvement in pre and post-test accuracy for Microbiologist and Pharmacologist are guiding while prescribing antimicrobials was 10.7% to 76.3%. As illustrated in Figure 1, the percentage of students reporting antibiotics being prescribed using ASP was greater in the post-test (80.6%) compared to the pre-test (34.4%).

In general, most of the participants (56.9%) unequivocally concurred that ASP is mandatory in our hospital (Table 2). Regarding the perception, at patients request, I would prescribe antibiotics - 41.9% of the participants strongly disagreed. 37.6% do not yet know, if ASP threatens clinicians' autonomy while, 60.2% agreed that ASP helps to optimize the treatment outcomes.



In response to, the adverse effects due to inappropriate antimicrobial use can be decreased by ASP and Emergence of AMR is unavoidable, there was a major change in the IQR (2 to 4.5). The perception that, lack of hand hygiene by healthcare workers causes spread of antimicrobial resistance did not differ much, between the pre-test (IQR:3) and the post-test (IQR:3.5). There was a marked variability (IQR:3 to 4.5) in corresponding to the fact, that ASP will help optimize treatment outcomes. (Table 3)

DISCUSSION:

Education about AMS and its responsibilities is an integral part of second-year pharmacology, and an annual analysis regarding the same, among student's is important; as it can be an useful basis for modifying and improving medical education. The basic aim of this questionnaire was to analyse the awareness of ASP among third-year medical students as, a thorough understanding of antibiotics- its use, abuse and AMR is essential for undergraduate medical students.

On the knowledge-based questions, the overall average test score was 48.7% on the pre-test and 73.7% on the post-test ($P < .0001$) as similar to Bush-Knapp et al⁶. Such differences implicates the effectiveness of the program, and should be considered in curriculum development process. Future physicians need to receive accurate and relevant information about antibiotic resistance. 91.4% of study participants agreed that antimicrobial resistance is an important public health challenge. Such an opinion was observed in several studies by Brahmbhatt KR, Sharma K, Gupta MK and Reena AP in other parts of India (Gujarat, Kerala)⁷⁻¹⁰. Therefore; medical students need to be trained to prescribe consciously and effectively as early as, at the undergraduate level itself.

As reported by Kannepady SS, It may be more advantageous to initiate an OBE (outcome-based education) on antibiotic use to undergraduate medical students at the preclinical stage itself ¹¹. In a previous study by Azevedo et al, more than 55% of his students indicated that, they agreed to prescribe antibiotics for simple viral illnesses. However, in our study, 90.3% people believed the same on pre-test, but significantly changed their perception in post-test (16.1%)¹². This highlights the need for medical education, to focus on improving patient outcomes in addition to increasing knowledge ^{13, 14}.

Medical students do believe that, cause of AMR is due to overuse of antimicrobials. Hence, the rational use of antimicrobials is the essential component of their carrier to prevent the spread of AMR as suggested by Meher, B.K and Chuenchom N^{15,16}. The fundamental component of all ASP, is to enlighten the health care professionals about antimicrobial usage, thereby limiting the emergence of resistance¹⁷⁻¹⁸. This has been achieved in this study where, 41.9% participants believe - antibiotics should not be prescribed at the patient's request.

Although ASP was thought in second year Pharmacology, the undergraduates fail to recollect and practise as they move on to successive academic years. Hence Overall, educational interventions about resistance development, drug selection, ASP and preventive strategies should be revised every year for the undergraduate students.

Limitation:

- 1) Single institution-based study, cannot be generalized.
- 2) The questionnaire components in this study do not represent all components of AMS

CONCLUSION:

After the ASP sensitization program, the participants' performance on the post-test in knowledge-based questions, showed a significant increase compared to the pre-test, suggesting an improvement in knowledge



due to the program. Initial Steps can be taken to motivate the students to participate in basic components of an antimicrobial stewardship program which involves competency and training development.

Declaration of Conflicting Interests

NONE

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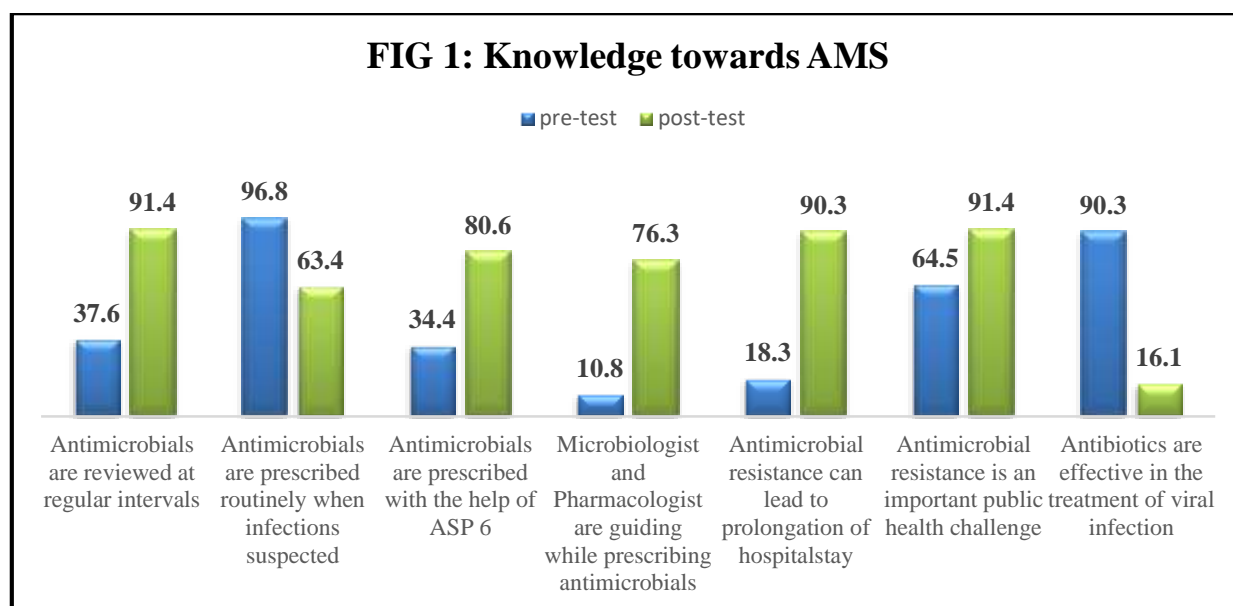


Table 2: Post-test Perception towards ASP in percentage

Questionnaire	Scores				
	1	2	3	4	5
ASP is mandatory in our hospital	2.1	2.1	4.3	34.4	56.9
The adverse effects due to inappropriate antimicrobial use can be decreased by ASP	1	3.2	11.8	48	35.4
ASP threatens clinicians' autonomy	3.2	23.6	37.6	32.2	3.2
Initially, treat all infections, with broad spectrum antibiotics	29	29	6.4	32.2	3.2
It is difficult to avoid the emergence of antimicrobial resistance	3.2	22.5	16.1	44.0	13.9
Antibiotics can be discontinued, if the symptoms of illness are settled	19.3	30.1	5.3	34.4	10.7
Antibiotic resistance is not exacerbated by skipping one or two doses of an antibiotic regimen.	21.5	39.7	18.2	17.2	3.2
The overuse of antimicrobials is the root cause of antimicrobial resistance.	5.3	9.6	5.3	50.5	29
Inappropriate hand hygiene by healthcare workers spreads antimicrobial resistance	4.3	13.9	13.9	53.7	13.9



During hospital stay, a patient is likely to contract multidrug-resistant organism.	1	4.3	10.7	63.4	20.4
Use of broad-spectrum antibiotics increases antimicrobial resistance	4.3	6.4	15	46.2	27.9
ASP will help optimize treatment outcomes	3.2	1	7.5	60.2	27.9
At patients request, I would prescribe antibiotics	41.9	39.7	8.6	7.5	2.1

Table 3: Comparison of pre-test and post-test results

Questionnaire	IQR	
	Pre-test	Post-test
ASP is mandatory in our hospital	2	5
The adverse effects due to inappropriate antimicrobial use can be decreased by ASP	3	4.5
ASP threatens clinicians' autonomy	2	3
Initially, treat all infections, with broad spectrum antibiotics	2	2.5
It is difficult to avoid the emergence of antimicrobial resistance	2	3
Antibiotics can be discontinued, if the symptoms of illness are settled	4	3
Antibiotic resistance is not exacerbated by skipping one or two doses of an antibiotic regimen.	3	2.5
The overuse of antimicrobials is the root cause of antimicrobial resistance	3	4.5
Inappropriate hand hygiene by healthcare workers spreads antimicrobial resistance	3	3.5
During hospital stay, a patient is likely to contract multidrug-resistant organism.	3	4
Use of broad-spectrum antibiotics increases antimicrobial resistance	3	4
ASP Will help optimize treatment outcomes	3	4.5
At patients request, I would prescribe antibiotics	3	1.5