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Awareness and Practice of Antimicrobial Stewardship Among Medical Students, Paramedical Students, and Paramedical Staff: A Cross-Sectional Study From Two Indian Medical Colleges

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ABSTRACT

Background: Antimicrobial resistance (AMR) poses a global threat to patient safety and healthcare quality. Antimicrobial stewardship (AMS) programs are essential to curb irrational prescribing and promote responsible antibiotic use. This study assesses the awareness and practice of AMS among medical students, nursing students, nurses, and technical staff in two tertiary care teaching hospitals.

Methods: A cross-sectional survey was conducted among 250 participants: 100 MBBS students, 50 nursing students, and 100 nurses/technical staff. A validated Likert-scale questionnaire assessed knowledge, attitudes, and practices related to AMS. Descriptive statistics and chi-square tests were used to analyze group-wise differences.

Results: MBBS students demonstrated higher awareness scores (mean ± SD: 4.2 ± 0.6) compared to nursing students (3.6 ± 0.7) and nurses/technical staff (3.4 ± 0.8). However, practical adherence to AMS protocols was suboptimal across all groups, with only 38% of nurses reporting routine use of hospital antibiograms. Significant gaps were noted in understanding of de-escalation strategies and documentation practices ($p < 0.05$).

Conclusion: While awareness of AMS principles is moderate to high among students, practical implementation remains limited among paramedical staff. Targeted educational interventions and institutional support are crucial to strengthen AMS practices across healthcare cadres.

Keywords: *Antimicrobial stewardship, medical students, paramedical students, paramedical staff, questionnaire, Likert scale, cross sectional study*

1. INTRODUCTION

Antimicrobial resistance (AMR) is a critical public health challenge, exacerbated by inappropriate antibiotic use in clinical settings. Antimicrobial stewardship (AMS) programs aim to optimize antimicrobial use, improve patient outcomes, and reduce resistance. In India, where antibiotic misuse is prevalent, empowering future healthcare professionals with AMS knowledge is vital.

This study investigates the awareness and practice of AMS among medical and paramedical personnel in two medical colleges, aiming to identify gaps and inform educational strategies.

Methodology

Study Design and Setting

- Cross-sectional observational study conducted in two tertiary care teaching hospitals of two medical colleges, namely, National Institute of Medical Sciences, Jaipur 303121, in Rajasthan, India and Government Institute of Medical Sciences, Gautam Buddha Nagar, Greater Noida 201310 in Uttar Pradesh, India.
- **Duration:** June–August 2025

Participants

- Total sample size: 250
    - MBBS students: 100 (final-year and interns)
    - Nursing students: 50 (3rd and 4th year)
    - Nurses and technical staff: 100 (ICU, OT, and general wards)

Instrument

- Structured questionnaire with 25 items across three domains:
    - Awareness (10 items)
    - Attitudes (5 items)
    - Practices (10 items)
- Likert scale: 1 (Strongly disagree) to 5 (Strongly agree)
- Validated through expert review and pilot testing (Cronbach's $\alpha = 0.84$)

15-Item Likert Scale Questionnaire (Scored out of 15)

Each item is rated on a 5-point scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

Awareness Domain (6 items)

1. I understand the concept of antimicrobial stewardship.
2. I am aware of the consequences of antimicrobial resistance.
3. I know the core components of AMS programs.
4. I am familiar with the hospital's antibiotic prescribing guidelines.
5. I understand the importance of de-escalation in antibiotic therapy.
6. I can differentiate between broad-spectrum and narrow-spectrum antibiotics.

Attitude Domain (4 items)

7. AMS should be a mandatory part of medical and paramedical education.
8. I believe inappropriate antibiotic use contributes to Antimicrobial resistance.
9. I feel confident discussing AMS principles with colleagues.
10. I support regular audits of antibiotic prescriptions.

Practice Domain (5 items)

11. I routinely check antibiograms before prescribing/administering antibiotics.
12. I document the indication and duration of antibiotic therapy.
13. I participate in AMS training or workshops.

14. I follow infection control protocols to reduce antibiotic use.
15. I report suspected cases of antibiotic misuse to the AMS committee.

Ethical considerations: Not deemed necessary

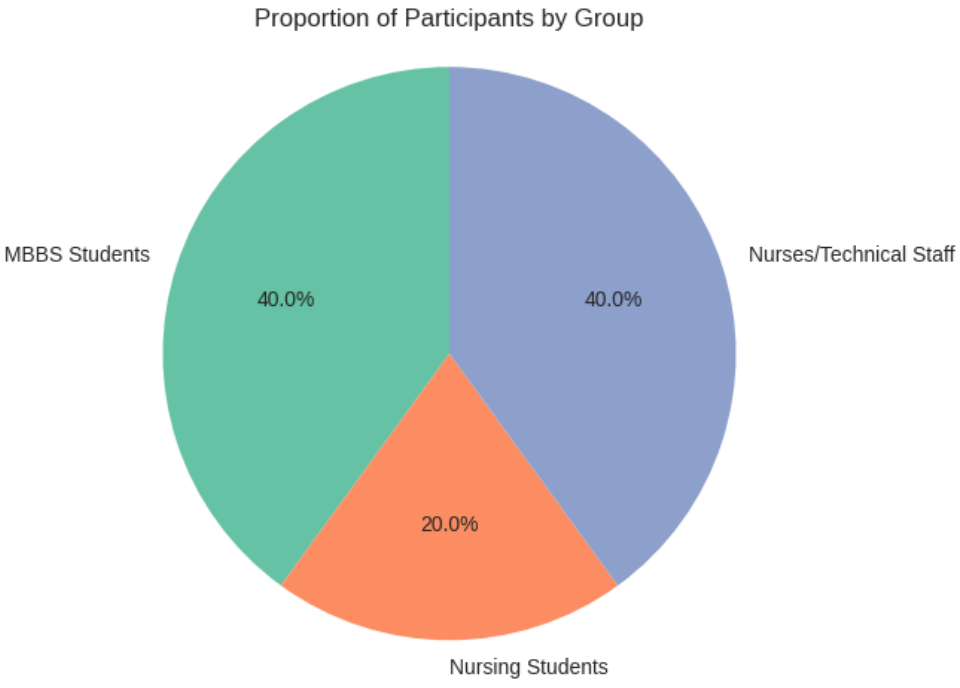
Data Analysis

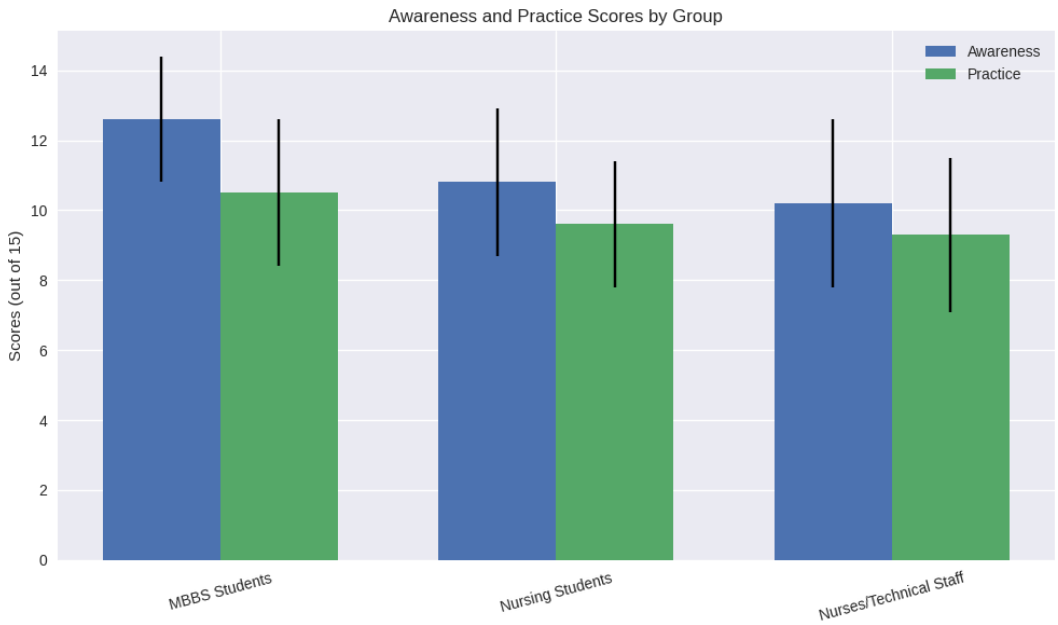
- Descriptive statistics (mean, SD, frequency)
- Chi-square test for categorical comparisons
- ANOVA for group-wise mean differences
- Software: SPSS v26

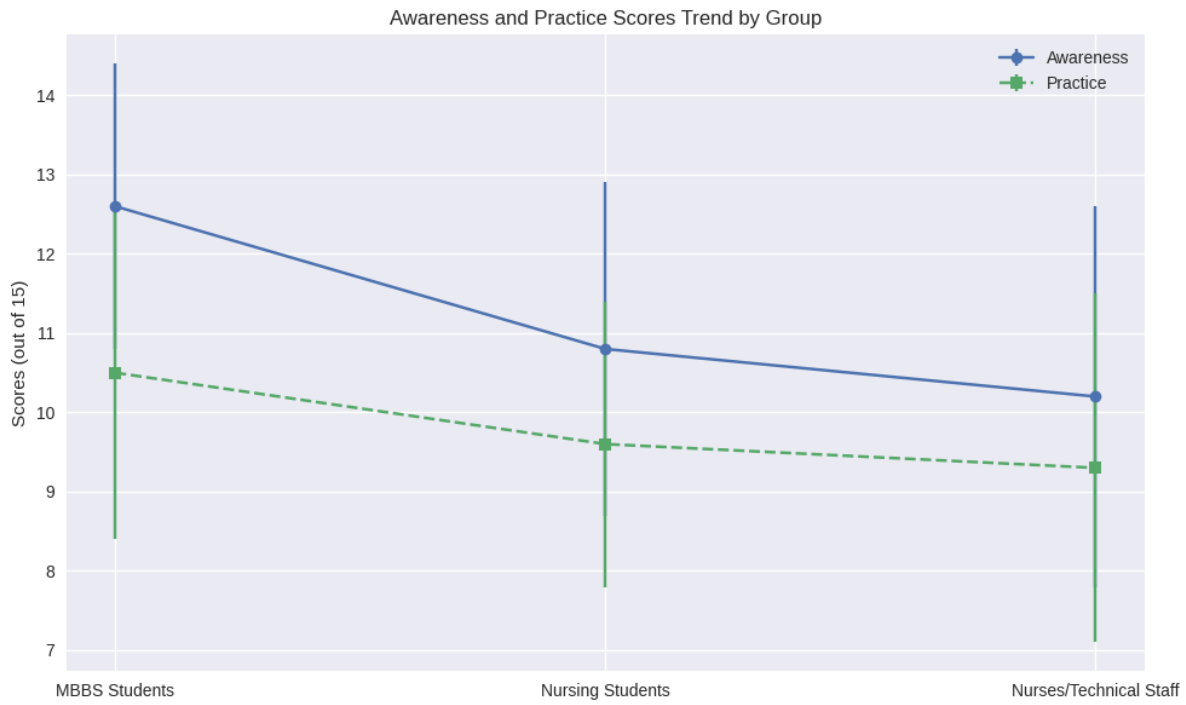
2. RESULTS

Group	Awareness Score (Mean ± SD)	Practice Score (Mean ± SD)	% Reporting Routine AMS Use
MBBS Students	4.2 ± 0.6	3.5 ± 0.7	52%
Nursing Students	3.6 ± 0.7	3.2 ± 0.6	44%
Nurses/Technical Staff	3.4 ± 0.8	3.1 ± 0.7	38%

- **Key Findings:**
  - 72% of MBBS students correctly identified AMS core components.
  - Only 31% of nurses were aware of hospital-specific antibiotic guidelines.
  - Documentation of antibiotic indication and duration was practiced by just 42% of staff.







3. DISCUSSION

The study reveals a concerning gap between AMS awareness and its practical application, especially among paramedical staff. While MBBS students show promising knowledge levels, their practice scores suggest limited clinical integration. Barriers include lack of training, absence of feedback mechanisms, and limited access to stewardship tools.

These findings align with prior studies in Indian settings (e.g., Sharma et al., 2023; ICMR AMS guidelines), emphasizing the need for curriculum reform and interprofessional AMS training.

4. CONCLUSION

AMS awareness is relatively high among medical students but poorly translated into practice across all groups. Institutional commitment, continuous education, and integration of AMS into daily workflows are essential to combat AMR effectively.

5. RECOMMENDATIONS

- Incorporate AMS modules into undergraduate and paramedical curricula.
- Conduct regular workshops and audits for nursing and technical staff.
- Establish AMS committees with multidisciplinary representation.
- Promote use of antibiograms and feedback systems.

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