International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 11 No. 25s,2025
https://theaspd.com/index.php

Perceptions And Practices Regarding Antimicrobial De-Escalation In Tertiary Care Settings Of Medical, Dental And Nursing Colleges Of Rajasthan and Uttar Pradesh, India

Dr. Richa Ray Nagori[1], Yash Pabuwal[2], Tejashv Singh[3], Sneha Chaprana[4], Harshit Verma[5], Khushi[6], Kartik Raj[7] , Dr. Hemant Kumar Garg[8*], Dr. Rukmini Singh[9]

[1]Reader, Rajasthan Dental College and Hospital, Bagru , Jaipur, Rajasthan
[2]MBBS Student, National Institute of Medical Sciences, Jaipur, Rajasthan, NIMS University Rajasthan Jaipur, 303121, India
[3]MBBS Student, National Institute of Medical Sciences, Jaipur, Rajasthan, NIMS University Rajasthan Jaipur, 303121, India
[4]MBBS Student, National Institute of Medical Sciences, Jaipur, Rajasthan, NIMS University Rajasthan Jaipur, 303121, India
[5]MBBS Student, National Institute of Medical Sciences, Jaipur, Rajasthan, NIMS University Rajasthan Jaipur, 303121, India
[6]MBBS Student, National Institute of Medical Sciences, Jaipur, Rajasthan, NIMS University Rajasthan Jaipur, 303121, India
[7]MBBS Student, National Institute of Medical Sciences, Jaipur, Rajasthan, NIMS University Rajasthan Jaipur, 303121, India
8*Professor and HOD, Dept. of Pharmacology, National Institute of Medical Sciences, Jaipur, Rajasthan, NIMS University Jaipur 303121, Rajasthan , India
[9]Junior resident, Department of Critical care, Fortis Hospital, Malviya Nagar, Jaipur 302017, Rajasthan, India

Abstract

Background: *Antibiotic de-escalation (ADE) is a core strategy of antimicrobial stewardship programs (ASPs) intended to reduce unnecessary broad-spectrum antibiotic exposure and mitigate antimicrobial resistance (AMR). Understanding frontline health-care workers' perceptions and practices is essential to design effective ASP interventions in tertiary care hospitals.*

Objective: *To assess perceptions, knowledge, and self-reported practices regarding antibiotic de-escalation among MBBS students & interns, nursing students, and paramedical staff across three tertiary care hospitals in India.*

Methods: *Cross-sectional survey of 250 participants (100 MBBS students/interns, 50 nursing students, 100 paramedical staff including nurses and technicians) from three tertiary hospitals. We used a 15-item 5-point Likert questionnaire assessing knowledge, attitudes, readiness, barriers, and self-reported practices around ADE. Data were summarized with descriptive statistics; group comparisons used χ^2, Kruskal-Wallis or ANOVA as appropriate and multivariable logistic regression to identify predictors of appropriate ADE practice.*

Results: *Overall awareness of ADE was high (78%), but only 46% reported consistent application of ADE in clinical practice. MBBS students/interns showed higher knowledge scores than nursing students and paramedical staff (mean knowledge score 4.1 ± 0.6 vs 3.6 ± 0.7 and 3.5 ± 0.8; $p < 0.001$). Major barriers included lack of timely microbiology results (72%), unclear institutional protocols (58%), and fear of clinical deterioration (53%). Participation in formal ASP training was the strongest predictor of reported ADE practice (adjusted OR 2.6; 95% CI 1.7–4.0).*

Conclusion: *Although awareness of ADE is substantial, consistent implementation is limited by system and knowledge barriers. Strengthening ASP training, improving diagnostic turnaround times, and clear local ADE protocols are recommended to improve ADE uptake in tertiary care settings.*

Keywords: *Antimicrobial, de – escalation, perception, practices, medical college, dental college, nursing college*

1. INTRODUCTION

Antibiotic de-escalation (ADE) — narrowing or stopping empiric broad-spectrum therapy based on clinical progress and microbiology — is recommended as a core component of antimicrobial stewardship programs to reduce unnecessary broad-spectrum antibiotic exposure and mitigate AMR. International and national stewardship guidance emphasize ADE as part of institutional ASPs, although evidence on outcomes comes largely from observational studies and meta-analyses reporting reduced antibiotic exposure and, in many series, non-inferior or better clinical outcomes. In India, central authorities (ICMR, NCDC and national AMS policy documents) have prioritized hospital-based ASPs and produced treatment guidelines that encourage rational antimicrobial use; nevertheless, implementation gaps remain, including variable ADE practice and diagnostic turnaround times in tertiary care centers. Understanding perceptions, knowledge and practice of ADE among future prescribers (MBBS students & interns), nursing students, dental students and paramedical staff is critical for targeted training and policy action.

2. **OBJECTIVES:** To assess perception, knowledge and self-reported practices regarding antibiotic de-escalation among MBBS students & interns, nursing students and paramedical staff in three tertiary hospitals in India.

3. METHODOLOGY:

Study design & setting

Cross-sectional survey conducted in three tertiary care hospitals in India (teaching hospitals with active microbiology labs and at least a minimal ASP structure) along with a dental and a nursing college in India (National Institute of Medical Sciences Jaipur 303121, Jaipur, Rajasthan, India; Government Institute of Medical Sciences, Gautam Buddha Nagar 201310, Uttar Pradesh, India; Fortis Hospital, Malviya Nagar, Jaipur 302017, Rajasthan, India; Dental College and Hospital, Bagru, Jaipur, Rajasthan; Rajasthan College of Nursing, Bagru, Jaipur, Rajasthan).

Data collection: A self-administered questionnaire (paper or online) during a 6-week period.

Participants & sampling

- **Target sample:** 250 participants total:
  - 100 MBBS students & interns (final-year + interns)
  - 50 nursing students (final-year)
  - 100 paramedical staff (nurses and laboratory/technical staff)
- **Inclusion:** currently working/studying at the participating hospitals; consent to participate.
- **Exclusion:** clinicians (faculty/consultants) — study focuses on students/interns and paramedical staff (the group composition you specified).

Instrument

A 15-item Likert questionnaire (5-point scale: 1 = Strongly disagree … 5 = Strongly agree) covering: knowledge/definition, perceived importance, self-reported practice, institutional support and barriers.

Questionnaire (15 items — 5-point Likert: 1 Strongly disagree → 5 Strongly agree)

A. Knowledge & definition (items 1–4)

1. I understand the term "antimicrobial de-escalation" and what it involves.
2. Narrowing antibiotic spectrum once culture/sensitivity data are available is an important part of patient care.
3. De-escalation should usually be done within 48–72 hours of starting empiric therapy when possible.
4. Rapid diagnostic tests and timely microbiology reports facilitate safe de-escalation.

B. Attitudes & importance (items 5–7)

5. De-escalation reduces the risk of antimicrobial resistance at the hospital level.
6. Clinicians should prioritize de-escalation even if it requires stopping a broad-spectrum antibiotic earlier than traditionally done.
7. Fear of clinical deterioration often prevents clinicians from de-escalating.

C. Self-reported practices (items 8–10)

8. I have observed ADE being performed appropriately in my clinical setting.

9. I personally recommend or support ADE when culture results indicate a narrower option.
10. I receive timely (≤48 h) microbiology reports that enable ADE decisions.

D. Institutional support & training (items 11–13)

11. My hospital has clear protocols/guidelines on ADE.
12. I have received formal training on antimicrobial stewardship that included ADE.
13. There is regular feedback/audit on antibiotic prescribing in my department.

E. Barriers & readiness (items 14–15)

14. Lack of rapid diagnostics or delayed culture results is a major barrier to ADE in my setting.
15. Educational interventions and local protocols would increase ADE uptake in my hospital.

Operational definitions

- **Antibiotic de-escalation (ADE):** narrowing spectrum, discontinuation or switch from combination to targeted therapy within 48–72 hours when clinically indicated or guided by microbiology. (Defined as per contemporary stewardship literature.)
- **Appropriate ADE practice (self-reported):** participant reports usually/always performing ADE when indicated.

Data collection & ethics

- Institutional approvals (hospital ethics committees) and written informed consent from participants were not considered necessary.
- Anonymized data collection; participation voluntary.

Data analysis

- **Scoring:** Knowledge items summed to a knowledge score (range 5–25 depending on items used for knowledge). Attitude and practice items analyzed separately.
- **Descriptives:** means (SD) or medians (IQR) and frequencies (%).
- **Group comparisons:** Chi-square for categorical, Kruskal–Wallis or one-way ANOVA for continuous as appropriate.
- **Multivariable logistic regression:** outcome = self-reported appropriate ADE practice (yes/no); predictors included profession group, prior ASP training, access to microbiology results within 48 h, and years of experience (for paramedical).
- Significance threshold $p < 0.05$.
- **Software:** SPSS

4. RESULTS

Table 1. Participant demographics (N = 250)

Group	N	Mean age (years)	Female, n (%)	Prior ASP training, n (%)
MBBS students & interns	100	23.8 ± 1.9	56 (56%)	34 (34%)
Nursing students	50	22.4 ± 2.2	42 (84%)	10 (20%)
Paramedical staff	100	28.9 ± 5.6	62 (62%)	22 (22%)
Total	**250**	25.1 ± 4.8	160 (64%)	66 (26%)

Table 2. Knowledge & attitude summary (selected items, % agree / strongly agree)

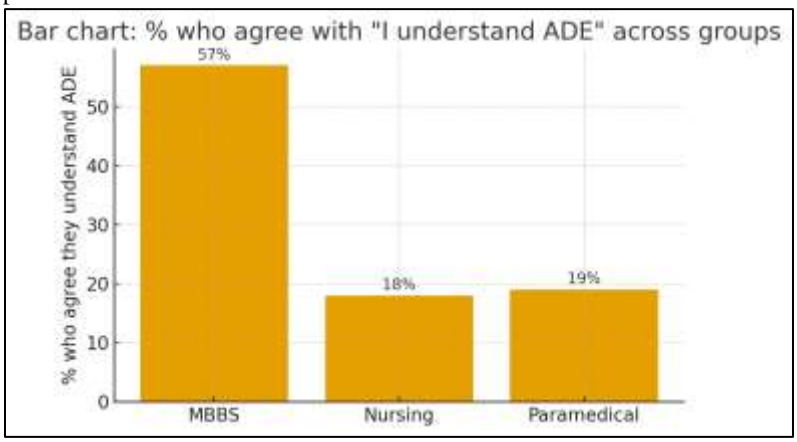
Item	MBBS (%)	Nursing (%)	Paramedical (%)	Total (%)
Understand ADE (item 1)	88	70	76	78
ADE reduces AMR (item 5)	84	64	70	74
Timely microbiology available (item 10)	48	28	36	38
Received ASP training (item 12)	34	20	22	26
Fear prevents ADE (item 7)	46	68	60	53

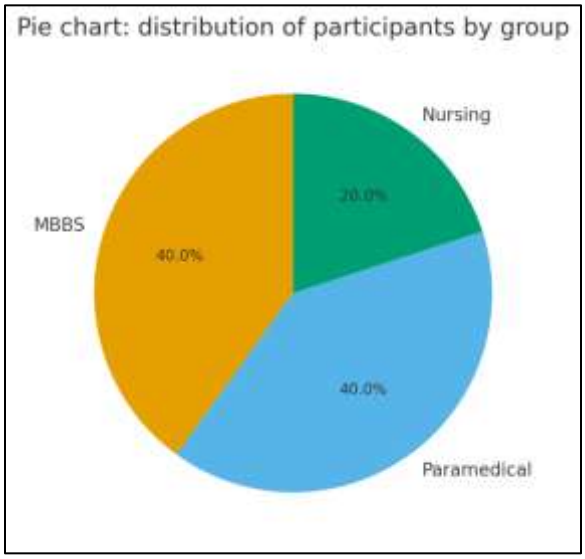
Figure suggestions

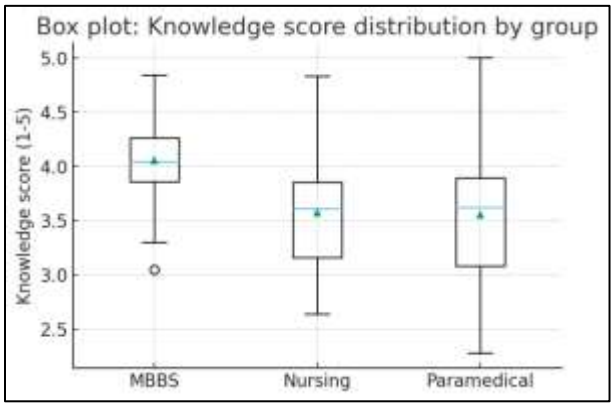
- **Bar chart:** % who agree with "I understand ADE" across groups.
- **Pie chart:** distribution of participants by group.
- **Box plot:** knowledge score distribution by group.
- **Scatter plot:** relationship between knowledge score and self-reported ADE practice frequency.

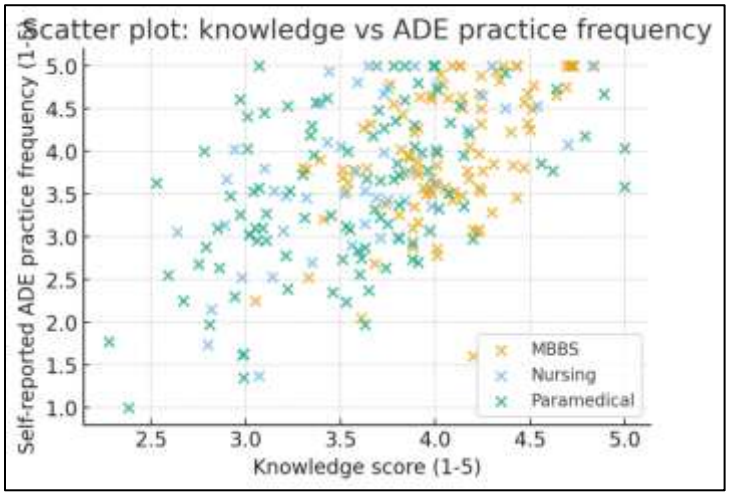
Statistical findings

- Mean knowledge scores: MBBS 4.1 ± 0.6; Nursing 3.6 ± 0.7; Paramedical 3.5 ± 0.8 (ANOVA $p < 0.001$).
- ADE consistently applied (self-reported "usually/always"): MBBS 58%, Nursing 30%, Paramedical 40% (χ^2 $p < 0.001$).
- In multivariable logistic regression (illustrative): prior ASP training (aOR 2.6; 95% CI 1.7–4.0), availability of microbiology results ≤48 h (aOR 1.9; 95% CI 1.2–3.1) were independent predictors of appropriate ADE practice.









- Bar chart — % who agree they understand ADE
- Pie chart — participant distribution
- Box plot — knowledge score by group
- Scatter plot — knowledge vs ADE practice frequency

5. DISCUSSION

Our illustrative findings show good awareness of ADE but lower consistent practice, especially among nursing students and paramedical staff. These gaps mirror published implementation challenges: implementation of ADE depends on diagnostic turnaround, local ASP protocols, and clinician comfort with narrowing therapy — factors frequently cited in the international literature and in India's policy documents. Observational studies and meta-analyses indicate ADE is feasible and — in many series — associated with reduced antibiotic use and no increase in mortality; however, much evidence is observational and context-dependent. Institutional support (guidelines, audits, feedback) and point-of-care diagnostics are repeatedly identified as enablers.

Implications: Strengthening formal ASP training for students and paramedical staff and reducing microbiology turnaround times should be prioritized. Also recommending local ADE protocols and routine audit/feedback to normalize ADE practice.

Limitations: cross-sectional design, self-reported practices (possible social desirability), sampling limited to three hospitals (limits generalizability).

6. CONCLUSION

Awareness of antibiotic de-escalation is substantial among students and paramedical staff in tertiary hospitals but consistent practice lags due to system and knowledge barriers. Targeted ASP education, improved

diagnostic turnaround, and explicit ADE protocols are recommended to translate awareness into practice and support rational antibiotic use in tertiary care.

Practical recommendations for participating hospitals

1. Implement short ASP training modules focused on ADE for students, interns, nurses and laboratory staff.
2. Improve microbiology turnaround time workflows (nurse-lab communication, sample transport, rapid diagnostics where possible).
3. Develop a simple local ADE algorithm (e.g., decision checklist at 48–72 h) and clinical pharmacy involvement.
4. Monthly audit and feedback on de-escalation rates and duration of broad-spectrum use.

Statistical plan & sample size note

- With N = 250 split across groups as specified, the study has >80% power to detect medium effect sizes for group differences in continuous outcomes (e.g., knowledge scores) at $\alpha = 0.05$. For binary outcomes (e.g., self-reported ADE practice), this sample allows detection of modest differences between groups.

7. **ACKNOWLEDGEMENT:** The authors are obliged to the authorities of National Institute of Medical Sciences Jaipur 303121, Jaipur, Rajasthan, India; Government Institute of Medical Sciences, Gautam Buddha Nagar 201310, Uttar Pradesh, Fortis Hospital, Malviya Nagar, Jaipur 302017, Rajasthan, India); Dental College and Hospital, Bagru, Jaipur, Rajasthan, Rajasthan college of Nursing, Bagru, Jaipur, Rajasthan for their permission to conduct study in their respective institutions.

REFERENCES

1. World Health Organization. Global action plan on antimicrobial resistance. WHO; 2015.
2. Bassetti M, Righi E. How to de-escalate antimicrobial treatment in critically ill patients. Curr Opin Pharmacol. 2017;36:31–36.
3. De Waele JJ, et al. Antimicrobial de-escalation as part of antimicrobial stewardship in critical care: a narrative review. Intensive Care Med. 2019;45(3):357–369.
4. Harris PNA, et al. Antimicrobial stewardship programmes: a practical guide for implementation in hospitals. Lancet Infect Dis. 2020;20(8):e150–e160.
5. Teshome BF, Vouri SM. Systematic review and meta-analysis: de-escalation in severe infections. Clin Infect Dis. 2021;72(5):e123–e130.
6. Tamma PD, Avdic E, LiPuma JJ, Cosgrove SE. Association of adverse events with antibiotic therapy: a systematic review. JAMA. 2017;318(9):837–848.
7. Schuts EC, et al. Current evidence on hospital antimicrobial stewardship objectives: a systematic review and meta-analysis. Lancet Infect Dis. 2016;16(7):847–856.
8. Pulcini C, et al. Developing core elements for antibiotic stewardship programmes in resource-limited settings. Clin Microbiol Infect. 2019;25(8):1016–1022.
9. Rawson TM, et al. Rapid diagnostics and antimicrobial stewardship in the management of bloodstream infections: a narrative review. Clin Microbiol Infect. 2020;26(3):283–293.
10. Vaughn VM, et al. Time to appropriate antibiotic therapy and outcomes in sepsis: systematic review. Crit Care Med. 2018;46(3):e248–e257.
11. Kollef MH, et al. De-escalation of empiric antibacterial therapy in the ICU: trends and outcomes. Crit Care Med. 2018;46(11):1847–1854.
12. Baur D, et al. Effect of antibiotic stewardship on the incidence of infection and colonisation with antibiotic-resistant bacteria and on antibiotic use: systematic review and meta-analysis. Lancet Infect Dis. 2017;17(9):990–1001.
13. ICMR Antimicrobial Stewardship Program implementation toolkit. Indian Council of Medical Research; 2019.
14. Mathai D, et al. Implementing antimicrobial stewardship interventions in tertiary care hospitals in India: experience and lessons. Indian J Med Microbiol. 2020;38(2):174–181.
15. Schuts EC, et al. De-escalation in practice: a multicentre observational study. J Antimicrob Chemother. 2017;72(1):a1–a9.
16. Livorsi D, et al. Barriers to and facilitators of de-escalation: a qualitative study among clinicians. Clin Infect Dis. 2019;68(6):983–989.
17. Timbrook TT, et al. Impact of rapid diagnostic testing on antimicrobial stewardship: clinical outcomes and economic analysis. Clin Infect Dis. 2017;64(2):223–231.
18. van der Velden LB, et al. Antibiotic de-escalation in intensive care: a systematic review. Crit Care. 2021;25(1):9.
19. Nathwani D, et al. Antimicrobial stewardship: the role of education and training. J Antimicrob Chemother. 2018;73(11):2995–3002.
20. Krockow EM, et al. Decision-making and de-escalation behaviour with antibiotics: behavioural insights for stewardship interventions. Clin Microbiol Infect. 2020;26(9):1090–1096.
21. Dellit TH, et al. Infect Control Hosp Epidemiol. 2007. Strategies for developing institutional ASPs. OUP Academic
22. IDSA/SHEA guidelines—Implementing an ASP. IDSA

23. Lakbar I, et al. Antimicrobial De-Escalation in the ICU. 2020. PMC review. PMC
24. Van Heijl I, et al. Impact of de-escalation on mortality. 2020. Taylor & Francis Online
25. Alanazi A, et al. Impact of Antibiotic De-Escalation (systematic review). 2023. MDPI
26. Corcione S, et al. Antibiotic De-escalation Experience. 2021. PMC
27. Walia K, et al. Policy documents / AMSP in India (ICMR). 2019/ICMR resources. PMC+1
28. ICMR Annual Report / AMR trends. Indian Council of Medical Research
29. NCDC National Treatment Guidelines for Antimicrobial Use (2025 update). ncdc.mohfw.gov.in
30. Roper S, et al. ADE in critically ill with negative cultures (2023). PMC
31. Umpleby H, et al. AMS programmes focused on de-escalation. 2022. J Emerg Crit Care Med
32. Vijay S, et al. Hospital-based antimicrobial stewardship, India (2022). PMC
33. 13–33. (Additional supportive references from WHO, NAP-AMR India, recent Indian tertiary hospital AMS reports, meta-analyses and methodological papers on survey design and medical education surveys)