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Editorial

GUARDIAN — governance and utilization of antimicrobials through rational drug-integration, advocacy, and nurturing: A pharmacologist's 20 action points

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Antimicrobial resistance (AMR) has emerged as a major public health threat in India, particularly in tertiary care hospitals where high antimicrobial consumption, empirical prescribing, and limited audits drive resistance.[1,2] Despite national initiatives led by the Indian Council of Medical Research (ICMR), National Centre for Disease Control (NCDC), National Medical Council (NMC) and World Health Organization's Global Antimicrobial Resistance and Use Surveillance System (WHO-GLASS), translation of stewardship policies into routine prescribing remains inconsistent.[3-5]

Pharmacologists remain an underutilized but crucial link between stewardship policy and clinical practice. Their expertise in pharmacokinetics/pharmacodynamics (PK/PD), therapeutic drug monitoring (TDM), drug safety and evidence appraisal uniquely positions them to promote rational antimicrobial use across the institution. However, their participation in clinical decision-making and antimicrobial stewardship (AMS) programs has traditionally been limited.[6,7]

The Society of Antimicrobial Stewardship PractIces (SASPI) in India, through its 42-practice-statement consensus on Integrated Antimicrobial Stewardship (IAS), emphasizes multidisciplinary engagement. This editorial outlines 20-actionable points for pharmacologists, highlighting their role in stewardship implementation.[2]

[Box-1] While microbiologists and infection control specialists lead diagnostic and preventive stewardship, pharmacologists must assume leadership in therapeutic and administrative stewardship, connecting antimicrobial use with patient outcomes and surveillance.[2]. Strengthening this role can help bridge the gap between antimicrobial availability, rational use, and measurable stewardship outcomes in India.

1. Antimicrobial Stewardship: Integral Role

Unlike clinicians, whose stewardship focus remains primarily patient-specific, pharmacologists operate at the level of the antimicrobial itself. They can evaluate the safety, PK/PD, rationality of antimicrobials and can ensure rational, optimized, guideline-aligned, and evidence-based antimicrobial usage. This system-level perspective enables pharmacologists to influence prescribing culture, monitor utilization, and safeguard antimicrobial efficacy.[6-7]

Within the IAS framework, twelve practice points directly address pharmacological stewardship and form the operational core of antimicrobial governance in Indian hospitals.[2] These include formal accountability within AMS committees, routine prospective prescription audits with

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feedback, preauthorization of reserve group of antimicrobials aligned with WHO AWaRe classification, Pharmacokinetic/Pharmacodynamic (PK/PD) and TDM-guided dosing strategies, and dose adjustment in critical illness, development of Institutional antimicrobial guidelines, antimicrobial consumption surveillance and point prevalence surveys, IV-to-Oral Switch and Outpatient parenteral antimicrobial therapy (OPAT) governance, antimicrobial "time outs" and de-escalations, bedside consultation services and monitoring of adverse drug reactions due to antimicrobials [Box-1]. Collectively, these measures position pharmacologists as custodians of rational antimicrobial use across the institutions.

2. Diagnostic and Infection Prevention Stewardship: The Supportive Role

At bedside, pharmacologists increasingly bridge diagnostic interpretation and therapeutic decision-making. During stewardship rounds, they can critically assess the clinical relevance of microbiological findings, distinguish colonization from true infection, recommend TDM, and guide escalation or de-escalation. Their ability to recognize drug-induced pyrexia and other non-infectious mimics prevents unnecessary antimicrobial escalation and prolonged antimicrobial therapy.[1,4]

In Infection prevention and control (IPC), pharmacologists reinforce rational medical and surgical antimicrobial *P rophylaxis* (SAP), appropriate SAP timing and duration, and adherence to standard IPC precautions. Their participation in audits and outbreak investigations through pharmaco-surveillance of prescribing patterns, strengths institutional IPC responses and timely modifications in empirical therapy, when required.[2,4]

Stewardship leadership is inherently shared and the effective implementation depends on the collaboration between clinicians, microbiologists, IPC team and hospital administrators, with pharmacologists to ensure rational antimicrobial therapy.

3. Administrative and Educational Stewardship: AMS Mentor

Pharmacologists are central in sustaining IAS. As members of AMS, diagnostic stewardship, and IPC committees, they link antimicrobial use to quality indicators and institutional governance.[1,2] Through department specific policies, prescriber education, and structured induction training for interns, residents, nurses, and newly recruited healthcare workers, they embed stewardship principles into clinical culture.

Beyond individual hospitals, pharmacologists contribute to regional and national surveillance initiatives coordinated by ICMR, NCDC, NAP-AMR, and WHO-GLASS. Their role can also extend into the One Health domain by aligning antimicrobial use governance with public health and environmental perspectives.[9]

Box 1. GUARDIAN Framework: Action points for Pharmacologists

A. Antimicrobial Stewardship

1. Implement hospital-wide prescription review (Empiric, prophylactic and definitive therapy).
2. Conduct prospective audit and feedback.
3. Preauthorization of "Reserve" antimicrobials (WHO AWaRe).
4. Pharmacokinetic/pharmacodynamic (PK/PD) and therapeutic-drug-monitoring (TDM) guided dosing for specific antimicrobials.
5. Develop Institutional treatment guidelines using local antibiograms and aligned with national guidelines.
6. Mandate complete prescription documentation—dose, route, duration, and indication—with periodic compliance audits.
7. Institutionalize IV-to-oral switch and Outpatient Parenteral Antimicrobial Therapy (OPAT) protocols.
8. Enforce antimicrobial "timeout" at 48–72 hours to trigger stewardship review and timely de-escalation.
9. Bedside consultation services for antimicrobial selection.
10. Integrate ADR and serious-adverse-event (SAE) monitoring within AMS audit cycles.
11. Track and periodically report antimicrobial-use (AMU) metrics (Defined Daily Dose (DDD)/Days of Therapy (DOT), Point Prevalence surveys).
12. Participate in bedside stewardship rounds to validate drug selection, dosing accuracy, and duration decisions.

B. Diagnostic & infection-prevention stewardship

13. Correlate pharmacologic interpretation with pathogen relevance, assisting in true infection-versus-colonization decisions and regimen optimization.
14. Support diagnostic-therapeutic feedback loops—empiric initiation, culture confirmation, therapeutic response, and de-escalation.
15. Audit surgical antimicrobial prophylaxis, disinfectant utilization, and outbreak management jointly with microbiology and infection-control committees.

16. Advocate and model standard precautions, emphasizing hand hygiene and safe antimicrobial handling during bedside reviews.

C. **Administrative & educational stewardship**

17. Advocate for an active, integrated IAS program linking Antimicrobial Stewardship (AMS), Diagnostic Stewardship (DSP), and (Infection Prevention and Control) IPC functions under hospital governance.
18. Define pharmacologist accountability for education, execution, monitoring, and data-driven stewardship within AMS committees.
19. Lead structured, multidisciplinary education and induction programs—targeted learning for clinicians, nurses, and other healthcare workers.
20. Present stewardship outcomes and AMU/AMR dashboards to hospital leadership for continuous system-level improvement.

4. GUARDIAN Framework: Implementation Challenges

The key barriers in the implementation includes workforce constraints with limited availability of trained pharmacologists or clinical pharmacologists, training gaps in antimicrobial stewardship principles, and institutional resistance to prescription oversight and de-escalation practices. In addition, limited access to TDM and PK/PD expertise restricts individualized dosing and optimization of antimicrobial therapy.

Despite the challenges, a phased or tiered implementation approach can help adoption of the framework. Basic centres can focus on core AMS strategies such as standard treatment guidelines, local antibiogram, prescription audits and feedback on dosing strategies, IV to oral switch which are low hanging fruits. The advances centres can expand to PK/PD guided dosing, routine TDM, OPAT and advanced AMU/AMR analytics. This stratifies model and hand holding will enable gradual scaling as capacity, expertise and infrastructure improve.

5. Conclusion

To translate stewardship intent into impact, pharmacologists need to be formally positioned as Antimicrobial Guardians within India's AMR response. The GUARDIAN framework offers a practical pathway but its success depends on institutional and system level support. The pharmacologists should be formally included in the AMS teams by the hospital administrators with defined authority for audit, feedback and dosing optimization. The medical colleges should embed antimicrobial stewardship and TDM in the undergraduate and postgraduate curricula with bedside exposure. The policymakers should mandate inclusion of pharmacologists in hospital AMS programs and support tiered, scalable stewardship models with national capacity building for PK/PD and TDM for equitable implementation.

As India operationalizes SASPI's IAS framework, pharmacologists must anchor stewardship in scientific rigor and ethical responsibility to strengthen the national fight against AMR.

6. Authors Contribution

RR, SR, and PKP searched the literature, drafted statistically, critically reviewed, and approved the study.

7. Conflict of Interests

None.

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