



Letter to Editor



Artificial Intelligence in Antimicrobial Stewardship: Is India Ready?

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Dear Editor,

Imagine a doctor in a district hospital at two in the morning who is unsure about which antibiotic to prescribe for a septic patient. In many Western hospitals, an AI-powered Clinical Decision Support System (CDSS) analyses the patient's parameters and local resistance patterns, recommending optimal therapy in seconds.^{1,2} This scenario showcases AI's immense promise for antimicrobial stewardship (AMS). However, in the majority of Indian hospitals, the reality is different: unreliable internet connectivity, long wait time for culture reports from microbiology labs, and a lack of electronic health records (EHRs) to feed algorithms still exist. While the world celebrates AI's potential to combat antimicrobial resistance (AMR),³ India faces a fundamental question: Are we prepared for this technological revolution, or do we need to first strengthen the underlying infrastructure that these systems rely on?

The crisis is immediate. Recent WHO surveillance data reveal that the South-East Asian region, including India, has the world's highest rates of antibiotic resistance, affecting 1 in 3 laboratory-confirmed bacterial infections⁴. As a result of this urgency, interest in AI tools like real-time CDSS, predictive resistance models, and natural language processing for prescription audits has increased. These tools have the potential to democratise stewardship knowledge, enhance prescribing at scale, and support overburdened programs⁵.

However, the efficacy of AI is entirely determined by the quality of its underlying data and infrastructure - precisely where Indian healthcare systems are deficient. The digital gap is stark: only about 60% of urban hospitals use EHRs, well below the near-universal adoption seen in AI-assisted nations⁶. Even current EHRs often operate as remote digital islands, lacking crucial interoperability, and the public health sector, which serves the majority, remains primarily paper-based⁶.

Significant financial resources are needed for cloud computing and software licensing in order to implement and maintain AI systems. Adoption is also hampered by ethical and legal ambiguities⁷. Significant questions of liability, data security, and the risk of creating a two-tiered healthcare system with sophisticated AI guidance only available in well-funded private institutions remain unanswered.

Identifying these challenges is the first step toward progress. India must develop contextually appropriate, utilitarian AI solutions by consolidating foundational infrastructure before adopting towering superstructures. We need to:

- 1) Interoperable EHRs must be rolled out at the earliest.
- 2) Quality-assured microbiological services aligned with CLSI standards, but be ensured at all primary and tertiary care levels.

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3) Substantial, well-curated Indian datasets reflecting our unique epidemiology to be generated.

4) Legal frameworks outlining data security and liability for AI-AMS technology should be formulated.

Employing a basic rule-based Clinical Decision Support System (CDSS) to alert prescribing errors and remind prescribers of changing doses, antibiotic recommendations through mobile phone applications, as well as SMS reminders would greatly help to overcome the challenge. Researchers in Pharmacology should be responsible for developing AI algorithm designs to ensure that pharmacokinetic (PK) and pharmacodynamic (PD) principles are incorporated. Finally, it is critical that the "human-in-the-loop" model be used so that prescribers will always retain the ultimate authority over their prescribing decisions. Therefore, the medical and pharmacy curricula will need to include AI literacy into their training, in addition to traditional therapies in preparation for the digital future that is inexorable.

India's AMSP-AI must be built on interoperable data, national standards, ethical governance, clinician oversight, and phased AI deployment. 'India's AMSP-AI' (Box 1) outlines the foundational requirements for the responsible integration of artificial intelligence into India's antimicrobial stewardship programmes.

Box 1: 'India's AMSP-AI'

I – Interoperable EHRs across public and private healthcare

A – AMR datasets generated locally to reflect regional resistance patterns

M – Microbiology reporting standardised and guideline-adherent

S – Stewardship capacity building and AI literacy among healthcare professionals

P – Privacy, policy, and regulatory frameworks ensuring ethical AI use

A – Accountable, clinician-driven AI ("human-in-the-loop" prescribing)

I – Incremental implementation, starting with low-risk, rule-based tools

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AUTHORS' CONTRIBUTIONS

JK: Conceptualised the editorial's framework, performed the literature review on AI-powered clinical decision support systems, and drafted the initial manuscript.

CM D: Critically revised the manuscript for intellectual content and supervised the submission process. Both authors have read and approved the final version of the manuscript for publication

AI DECLARATION

AI was used for spelling and grammar checks.

REFERENCES

1. Rawson TM, Zhu N, Galiwango R, Cocker D, Islam MS, Myall A, Vasikasin V, Wilson R, Shafiq N, Das S, Holmes AH. Using digital health technologies to optimise antimicrobial use globally. *Lancet Digit Health*. 2024 Dec;6(12):e914-e925. doi: 10.1016/S2589-7500(24)00198-5. Epub 2024 Nov 14. [https://doi.org/10.1016/s2589-7500\(24\)00198-5](https://doi.org/10.1016/s2589-7500(24)00198-5)
2. Pennisi F, Pinto A, Ricciardi GE, Signorelli C, Gianfredi V. The Role of Artificial Intelligence and Machine Learning Models in Antimicrobial Stewardship in Public Health: A Narrative Review. *Antibiotics (Basel)*. 2025 Jan 30;14(2):134. doi: 10.3390/antibiotics14020134. <https://doi.org/10.3390/antibiotics14020134>
3. Bertagnolio S, Dobрева Z, Centner CM, Olaru ID, Donà D, Burzo S, Huttner BD, Chaillon A, Gebreselassie N, Wi T, Hasso-Agopsowicz M, Allegranzi B, Sati H, Ivanovska V, Kothari KU, Balkhy HH, Cassini A, Hamers RL, Weezenbeek KV; WHO Research Agenda for AMR in Human Health Collaborators. WHO global research priorities for antimicrobial resistance in human health. *Lancet Microbe*. 2024 Nov;5(11):100902. doi: 10.1016/S2666-5247(24)00134-4. Epub 2024 Aug 13. [https://doi.org/10.1016/s2666-5247\(24\)00134-4](https://doi.org/10.1016/s2666-5247(24)00134-4)
4. WHO warns of widespread resistance to common antibiotics worldwide [Internet]. Geneva: WHO; 2025 Oct 13 Available from: <https://www.who.int/news/item/13-10-2025>
5. Venkat, M. S. . (2025). The Evolution of Electronic Health Records in India: Progress, Challenges, and Future Prospects (2020-2025). *IJHTI*, 4(02),24–30.

doi:10.60142/ijhti.v4i02.06

<https://ijht.org.in/index.php/ijhti/article/view/193>

6. Powell AC, Ludhar JK, Ostrovsky Y. Electronic health record use in an affluent region in India: Findings from a survey of Chandigarh hospitals. *Int J Med Inform.* 2017 Jul;103:78-82. doi: 10.1016/j.ijmedinf.2017.04.011. Epub 2017 Apr 21. <https://doi.org/10.1016/j.ijmedinf.2017.04.011>
7. Cesaro A, Hoffman SC, Das P, de la Fuente-Nunez C. Challenges and applications of artificial intelligence in infectious diseases and antimicrobial resistance. *NPJ Antimicrob Resist.* 2025 Jan 7;3(1):2. doi: 10.1038/s44259-024-00068-x. <https://doi.org/10.1038/s44259-024-00068-x>