

Improving Antimicrobial Prescribing Safety with 'Ask Eolas': A Simulation Study of AI-Driven Clinical Decision Support

William Waldock

NIHR North West London PSRC

Authors: William J. Waldock, Mark Gilchrist, Hutan Ashrafi, Ara Darzi, Bryony Dean Franklin

Background: Inappropriate antimicrobial prescribing contributes to antimicrobial resistance (AMR) and avoidable patient harm. Artificial intelligence (AI)-powered Clinical Decision Support Systems (CDSS) could improve prescribing safety, but concerns around usability, trust, and explainability limit adoption. 'Ask Eolas' is an AI-driven CDSS combining a Large Language Model (LLM) with Red-Amber-Green (RAG) risk stratification and confidence scoring to support safer, more transparent prescribing decisions. Developed in response to earlier service evaluations, Ask Eolas addresses key barriers to CDSS use, including accessibility, inclusiveness, and cultural sensitivity.

Objectives: This study evaluated the impact of Ask Eolas on antimicrobial prescribing accuracy, safety, and clinician confidence using simulated clinical cases. We also explored whether AI-supported recommendations could enhance trust and usability in antimicrobial stewardship and assessed accessibility and equity considerations in system design.

Methods: Sixty NHS clinicians across medicine, surgery, pharmacy, and microbiology completed 100 simulated prescribing scenarios using Ask Eolas. Cases reflected real-world prescribing complexity, diverse patient demographics, and culturally appropriate considerations. Primary outcome: guideline-concordant prescribing. Secondary outcomes: prescribing error rates, usability (System Usability Scale, SUS), cognitive load (NASA Task Load Index), and clinician confidence. AI transparency features—including visible confidence scores, RAG risk stratification, and explainable recommendations—were assessed for their impact on trust and decision quality. A public involvement workshop (6th February 2025) informed terminology, accessibility features, and equitable application, ensuring inclusivity for neurodivergent users and diverse populations.

Results (Preliminary): Early results suggest Ask Eolas improves prescribing safety, increasing guideline adherence and reducing errors compared to unaided decision-making. Participants reported high usability (mean SUS 85/100), lower cognitive burden, and improved confidence. Transparent AI features enhanced trust, particularly among users unfamiliar with AI tools. Participants valued multi-modal interaction (text, voice, visual), simplified language, and cultural sensitivity. Further analysis will assess subgroup differences, health equity impacts, and usability improvements informed by public feedback.

Conclusion: Ask Eolas shows promising potential to improve antimicrobial prescribing safety through AI-assisted, transparent, and accessible decision support. By embedding public involvement, cultural sensitivity, and equitable design, it supports safer, more inclusive antimicrobial stewardship, contributing to efforts to reduce AMR-related harm.

Improving Antimicrobial Prescribing Safety with 'Ask Eolas': An Iterative User Testing Study of AI-Driven Clinical Decision Support

William J. Waldock (1), Mark Gilchrist (1,2), Hutan Ashrafiyan (1), Ara Darzi (1,3), Bryony Dean Franklin (1,2,3,4)

(1) Imperial College London; (2) Imperial College Healthcare NHS Trust; (3) NIHR North West London Patient Safety Research Collaboration; (4) UCL School of Pharmacy

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Background

- Inappropriate antimicrobial prescribing contributes to antimicrobial resistance (AMR) and avoidable patient harm.
- AI-powered clinical decision support systems (CDSS) could improve prescribing safety, but usability, trust, and explainability concerns limit adoption.
- 'Ask Eolas' is an AI-driven CDSS combining a large language model (LLM) with Retrieval-augmented Generation (RAG) to support safer and more transparent prescribing.
- It addresses key CDSS barriers including accessibility, inclusiveness, and cultural sensitivity.

Aims

- To evaluate the impact of Ask Eolas on antimicrobial prescribing accuracy, safety, and clinician confidence using simulated clinical cases.
- To explore whether AI-supported recommendations can enhance trust and usability in antimicrobial stewardship, and assess accessibility and equity considerations in system design.

Methods

- Sixty NHS prescribers (medicine, nursing, pharmacy, and microbiology) completed 100 simulated prescribing scenarios using Ask Eolas.
- Scenarios reflected real-world prescribing complexity, diverse patient demographics, and culturally appropriate considerations.
- **Primary outcome:** guideline-concordant prescribing;
- **Secondary outcomes:** prescribing error rates, usability (System Usability Scale, SUS), cognitive load (NASA Task Load Index), and clinician confidence.
- AI transparency features and explainable recommendations were assessed for their impact on trust and decision quality.
- A public involvement workshop informed terminology, accessibility features, and equitable application to ensure inclusivity (e.g. for neurodivergent and diverse users).

Metric	Trust Guidelines	Eolas App	Ask Eolas
Appropriate Prescription Rate (%)	68%	81%	92%
Average Decision Time (min)	6.1	4.8	3.2
Confidence in Prescribing (0–100)	74	83	89
Cognitive Load (NASA-TLX, 0–100)	61	44	28
System Usability Scale (SUS)	58	76	84

Preliminary Results

Improved prescribing safety: Ask Eolas increased guideline adherence and reduced prescribing errors compared to unaided decision-making, supporting safer antimicrobial stewardship practices.

High usability and lower cognitive load: Participants rated the tool highly usable (mean SUS 84/100) and cognitively light, indicating smooth integration into clinical workflows without added burden.

Increased clinician confidence: The system empowered users, particularly junior prescribers, by providing structured, transparent recommendations that enhanced decision-making confidence.

Transparent AI built trust: Features such as explainable outputs significantly boosted trust, especially among those unfamiliar with AI tools.

Inclusive, accessible design: Multi-modal interaction (text, voice, visual), simplified language, and culturally sensitive framing were particularly valued, improving accessibility for neurodivergent users and diverse clinical settings.

Impact of public involvement: Design improvements based on co-design workshops contributed to inclusive terminology and equitable usability, showcasing the importance of public and patient involvement in tool development.

Next steps: Further analysis will explore subgroup variations, impacts on health equity, and refinements guided by ongoing user and public feedback.

Conclusion

- Ask Eolas shows promise to improve antimicrobial prescribing safety through AI-assisted, transparent, and accessible decision support.
- Embedding public involvement, cultural sensitivity, and equitable design supports safer, more inclusive antimicrobial stewardship, contributing to reducing AMR-related harm.

Key Patient Safety Insights

- AI-supported, transparent prescribing tools (such as 'Ask Eolas') can improve guideline adherence, reduce errors, and support equitable, patient-centred antimicrobial stewardship.
- Public and user involvement ensures AI tools are accessible, culturally sensitive, and aligned with real-world patient safety needs.