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Transforming Medication Safety with AI Economic Evaluation of an AI-Driven Framework to Reduce Adverse Drug Reactions

A Cost-Effectiveness and Budget Impact Evaluation of I-Medicine — An AI Digital Health Approach to Prevent ADR-Related Hospitalizations.

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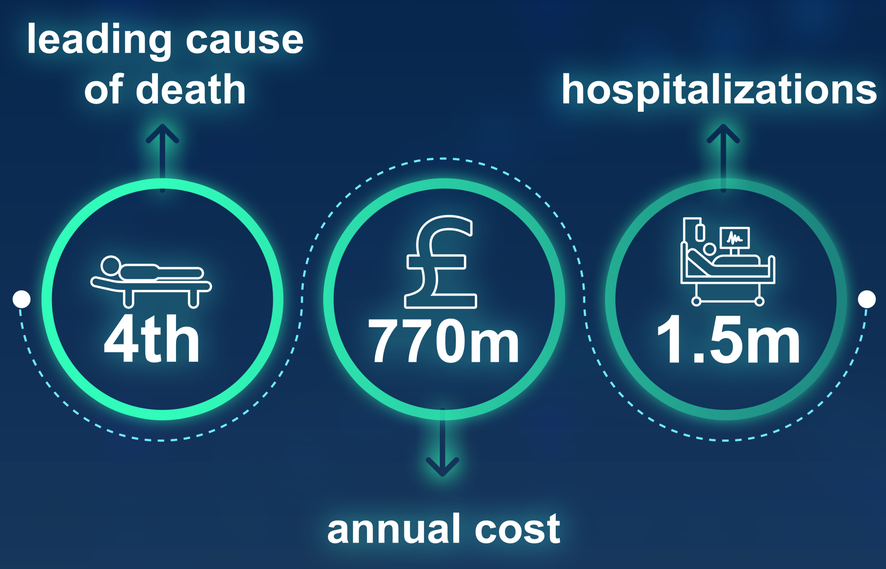
1 Problem—Burden of ADRs

ADRs are hidden epidemic with avoidable healthcare costs.



• ADRs' indirect costs: productivity loss, extended hospital stays, and increased burden on healthcare resources. (can be visualized as an iceberg: visible side= Direct costs, and invisible side= productivity loss, extended hospital stays, and increased burden on healthcare resources)

2 Solution AI Digital Health Framework

I-Medicine leverages artificial intelligence real-time algorithms to identify, predict, and prevent ADRs across clinical and over-the-counter medication use.

The system's functionalities include:

Cause	AI Response
1. Self-medication	1. Real-time misuse alert
2. OTC misuse	2. Interaction verification
3. Prescribing errors	3. Automated flagging
4. Dispensing errors	4. Cross-checking algorithm
5. Data fragmentation	5. Unified digital patient record

3 Evaluation

Cost-Effectiveness Analysis (CEA)

Perspective:

Payer (5-year horizon)

Comparator:

care vs AI-based management

Outcomes: QALYs

Results:

• ICER = £3,500/QALY (below the NICE threshold)

• ADR reduction: 30%, corresponding to fewer hospitalizations.

• Productivity gain: 20% fewer lost workdays.

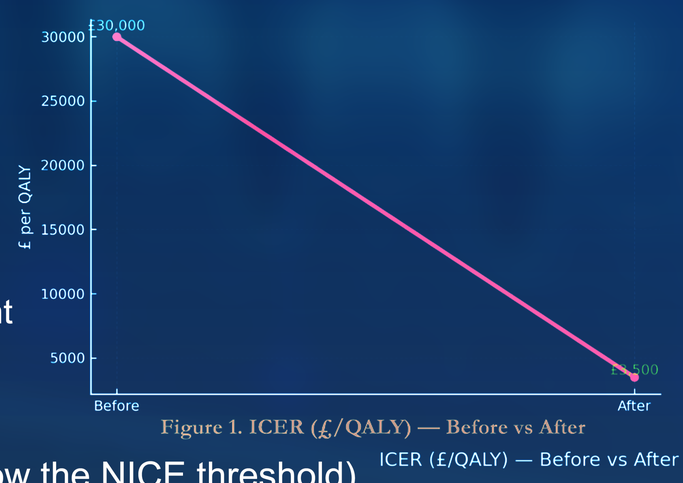


Figure 1. ICER (£/QALY) — Before vs After

Budget Impact Analysis (BIA)

Perspective: Healthcare system budget,

5-year time horizon.

Base Year: 2025

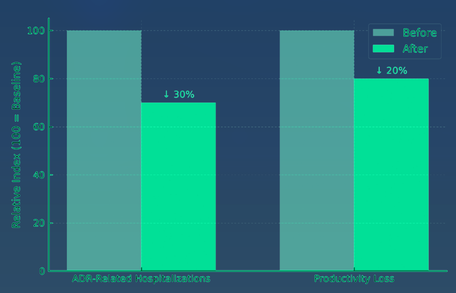
Results:

• Annual healthcare savings: £230 million

• Cumulative savings (5 years): £1.2 billion

• ROI = 3.5 : 1

Up to 7.0 : 1 under full adoption



2. Combined Impact on ADRs and Productivity Loss

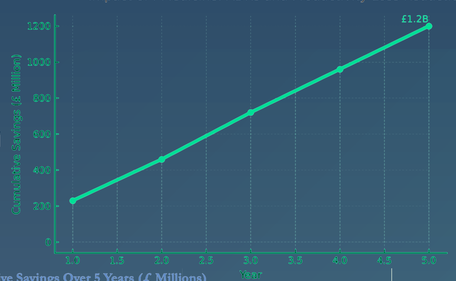
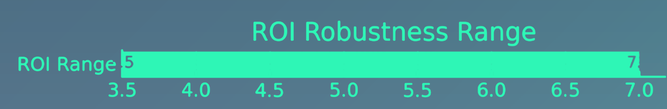


Figure 3. Cumulative Savings Over 5 Years (£ Millions)

Sensitivity and Scenario Analyses

One-way and probabilistic sensitivity analyses demonstrated model robustness with variations in ADR incidence, AI accuracy, and system costs. ROI consistently >3:1 and ICER remained below the NICE threshold in 95% of simulations.



Conclusion

The economic evaluation demonstrates that AI-based medication management is cost-effective and budget-sustaining, offering substantial public health and economic benefits. Integrating predictive analytics into medication safety policies can reduce preventable harm, optimize expenditure, and reinforce health-system resilience.

Scan for I-Medicine's interactive cost-savings model

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References

1. Pirmohamed et al. (2004). BMJ, 329(7456), 15–19.
2. Elliott et al. (2021). BMJ Qual Saf, 30(11), 932–946.
3. NICE (2023). Guide to Methods of Technology Appraisal.
4. WHO (2021). Global Patient Safety Action Plan 2021–2030.
5. Neumann et al. (2014). NEJM, 371(9), 796–797.
6. Topol (2019). Deep Medicine.
7. Hamouda et al. (2022). Value in Health, 25(1), S121.