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INNOVATIONS IN CARDIOMETABOLIC MANAGEMENT

Artificial Intelligence in Medication Adherence: How Far Can This Innovation Take Us?

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MARC MEDICATION ADHERENCE RESEARCH CENTRE

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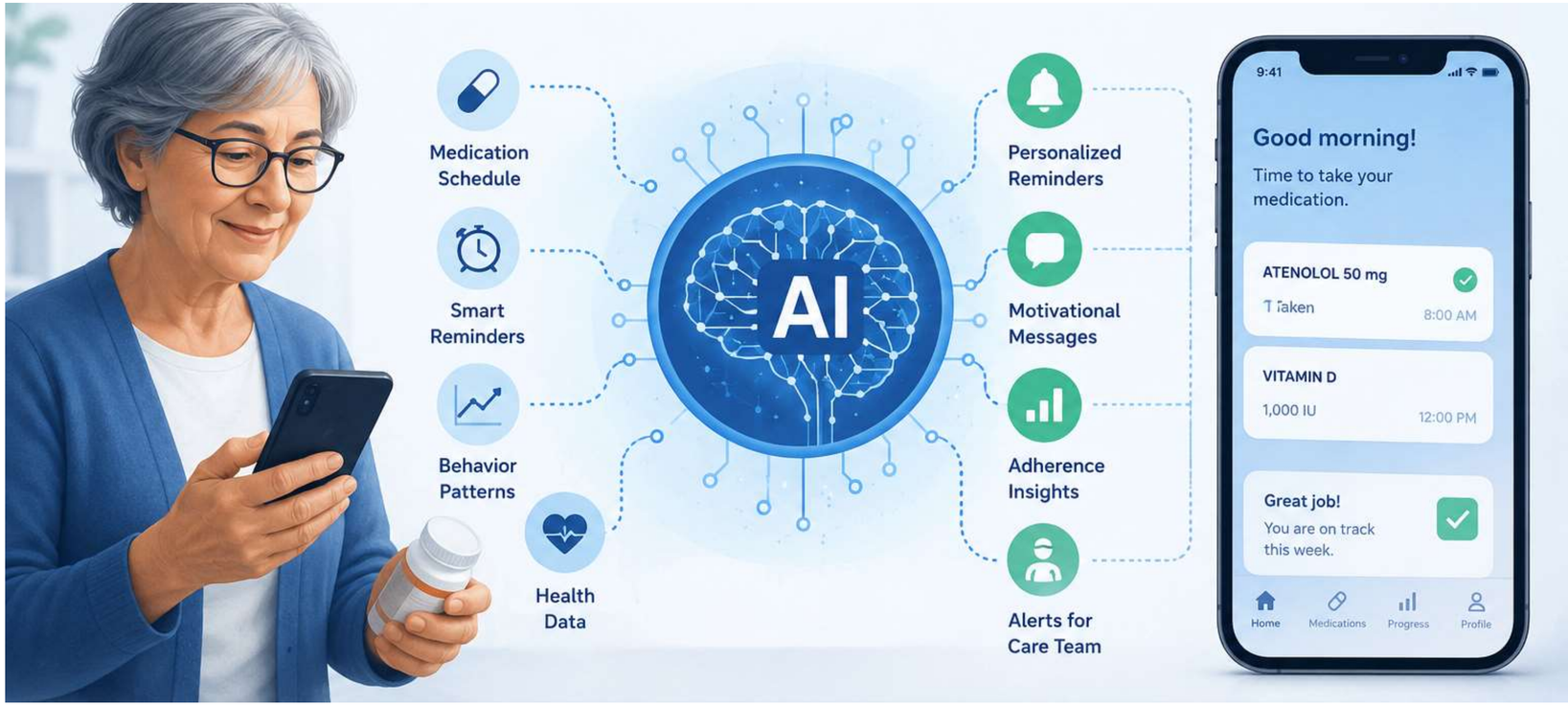
AI in medication adherence

- Conversational AI / chatbots
- AI-enhanced mobile apps
- Smart pill bottles / wearables / IoT devices integrated with AI
- Predictive analytics / adherence risk models
- Machine learning / Big Data analytics
- Generative AI for patient communication



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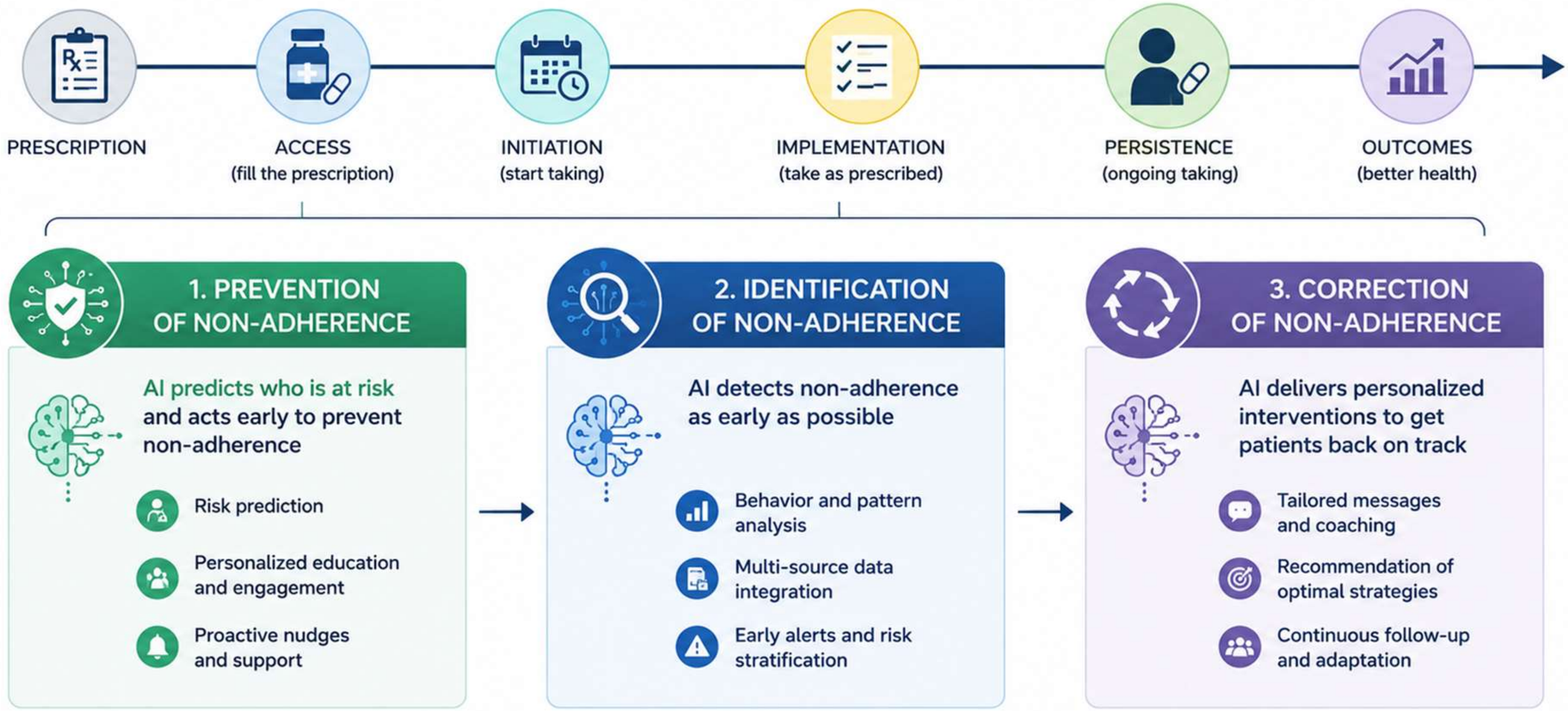
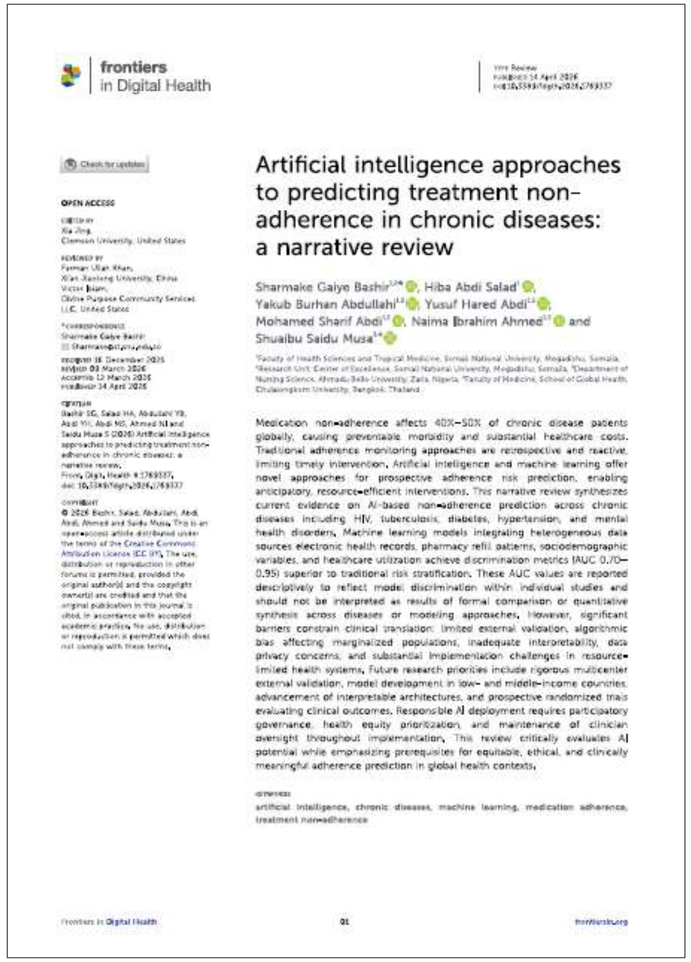
Babel A et al. Artificial Intelligence Solutions to Increase Medication Adherence in Patients With Non-communicable Diseases. Front Digit Health. 2021 Jun 29;3:669869.

Targets for AI along drug taking journey



AI prediction of non-adherence in chronic diseases

- AI enables early identification of patients at risk
- Enables prediction of non-adherence **before it occurs**
- Integrates EHR, refill, demographic and utilization data
- Effective across multiple chronic diseases
- Often outperforms traditional risk prediction methods (**AUC 0.70–0.95)**
- Supports targeted and efficient allocation of adherence resources



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Artificial intelligence approaches to predicting treatment non-adherence in chronic diseases: a narrative review

Bashir SG et al. Artificial intelligence approaches to predicting treatment non-adherence in chronic diseases: a narrative review. Front Digit Health. 2026 Apr 14;8:1769337.

AI tools for adherence support in NCD

- Significant improvements in adherence in hypertension, diabetes, allergy, and statin therapy
- Smart devices had up to **96.6%** medication recognition accuracy
- AI programs enabled targeted interventions for high-risk patients
- AI supports pharmaceutical care by:
  - ➢ Optimizing patient selection
  - ➢ Prioritizing pharmacist interventions
  - ➢ Improving resource allocation

Cureus

Open Access Review Article

Artificial Intelligence Tools That Improve Medication Adherence in Patients With Chronic Noncommunicable Diseases: An Updated Review

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Abstract

This systematic review analyzes the use of artificial intelligence (AI) tools to improve medication adherence in patients with chronic non-communicable diseases, with a specific focus on their implementation in pharmaceutical care. Medication non-adherence remains a major barrier to effective chronic disease management, contributing to poor clinical outcomes and rising healthcare costs. AI offers promising, data-driven approaches to address this challenge through tools such as conversational agents, mobile applications, smart devices, and adherence classifiers. These tools enhance patient monitoring, education, and engagement, enabling personalized interventions to promote consistent medication use. The 26 included studies were evaluated based on their methodology, type of AI tool, healthcare setting, and reported impact on adherence outcomes. Most reported improvements in adherence, though variation in assessment methods limits comparability. Ethical, legal, and accessibility issues remain key challenges to wider adoption. Overall, AI represents a valuable and emerging strategy for supporting adherence and optimizing pharmaceutical care in chronic disease management.

Categories: Healthcare Technology
Keywords: artificial intelligence(ai), chronic disease management, digital health tools, medication adherence strategies, pharmaceutical care

Introduction And Background

Medication adherence remains one of the major challenges in the management of chronic non-communicable diseases, contributing to disease progression, increased morbidity and mortality, and elevated healthcare costs. Pharmaceutical care, defined as the set of actions aimed at ensuring comprehensive, integrated, and continuous attention to the medication needs of the population, plays a crucial role in addressing this challenge [1]. Collaborating with physicians and other healthcare professionals, pharmacists are central to improving treatment adherence and achieving better health outcomes. Although the implementation of pharmaceutical care varies globally, this review includes studies from multiple health systems, without restriction to a particular country. Moreover, the integration of pharmacists in adherence programs remains limited in some regions, such as parts of Latin America, where their participation is not fully embedded in national strategies [1].

In parallel, artificial intelligence (AI) has emerged as a transformative force in healthcare over the past five decades, enabling new approaches to disease management, data analysis, and personalized care [2]. AI involves logical algorithms capable of learning from data and making autonomous decisions based on generalizable rules [3,4]. Within the pharmaceutical sector, AI has been increasingly adopted to support innovation and address complex healthcare needs [5].

Since barriers to medication adherence are multifactorial, including behavioral, social, and systemic factors, solutions must also be multifaceted [2]. AI-based tools offer a promising avenue to address these complexities by enhancing patient monitoring, predicting adherence risks, personalizing interventions, and facilitating communication between healthcare providers and patients [6].

This article presents a systematic review of the scientific literature evaluating AI tools designed to improve medication adherence in patients with chronic non-communicable diseases. The review focuses on their implementation in pharmaceutical care, the specific role of pharmacists in their application, and the broader ethical, legal, and accessibility implications. Furthermore, this review classifies AI interventions into four main categories, conversational agents, mobile applications, smart devices, and adherence classifiers, and critically examines their impact on adherence outcomes.

By systematically analyzing the available evidence, this review aims to provide healthcare professionals, researchers, and policymakers with a comprehensive understanding of the current capabilities, benefits, and

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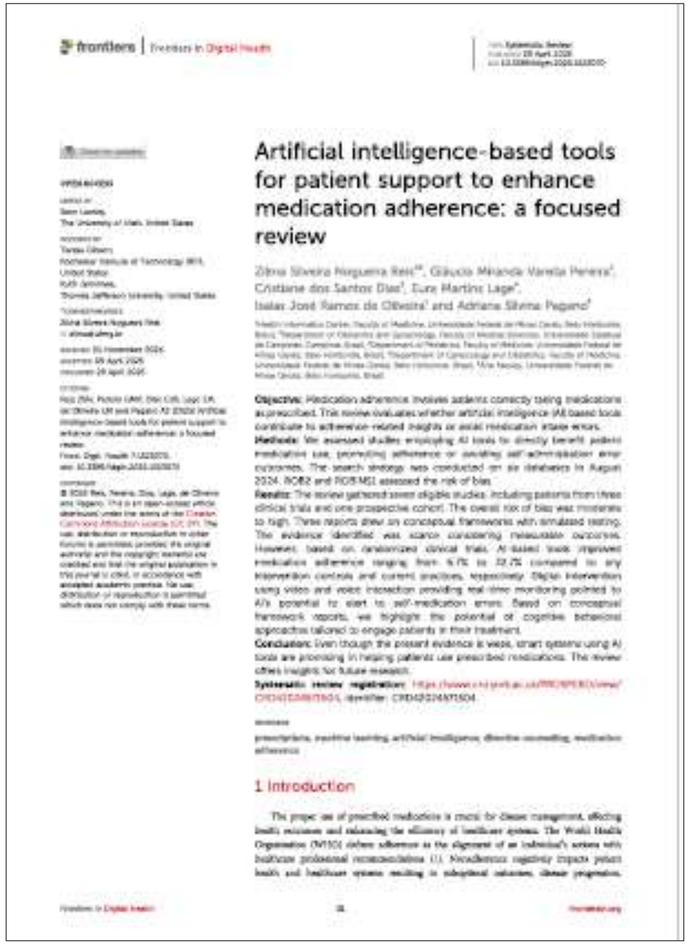
Zavaleta-Monestel E, et al. Artificial Intelligence Tools That Improve Medication Adherence in Patients With Chronic Noncommunicable Diseases: An Updated Review. Cureus. 2025 Apr 28;17(4):e83132.

Effectiveness of AI tools for adherence support

- AI-based tools improved adherence by approximately **6–33%** compared with standard care
- Real-time AI monitoring (video, voice, mobile apps) enabled early detection of non-adherence and medication misuse
- AI effectiveness depended not only on algorithms, but also on integration with broader patient-support systems



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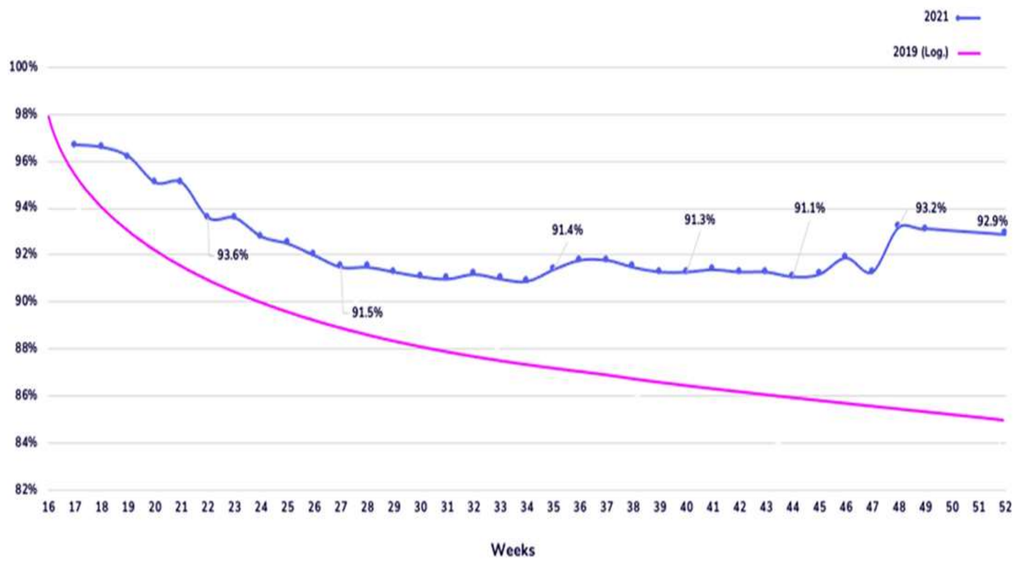
Artificial intelligence-based tools for patient support to enhance medication adherence: a focused review

1 Introduction

Reis ZSN et al..Artificial intelligence-based tools for patient support to enhance medication adherence: a focused review. Front Digit Health. 2025 Apr 29;7:1523070.

Various benefits of AI-supported adherence program

- AI-supported pharmacist intervention improved adherence in **hypertension** (+5.9%), **hyperlipidemia** (+7.9%), and **diabetes** (+6.4%)
- Diabetes control improved (HbA1c target attainment: 75.5% → 81.7%)
- Better adherence was associated with up to 32% lower healthcare costs
- The intervention led to **improved Medicare Star ratings**



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Pros & Cons of AI in medication adherence

PROS	CONS
• Low cost & cost reduction • Speed • Scalability • Pattern recognition • Early risk prediction • Multi-source data integration • Personalization • Continuous monitoring (24/7) • Decision support • Advancing scientific discovery	• Limited validation • Explainability problems ("black box") • Data privacy & security • Algorithmic bias • Data quality issues • Regulatory approval • Workflow integration • Digital exclusion • Trust and acceptance • Dehumanization of care

Good Acceptance of AI in Adherence

- **Jordan:** Strong support for AI reminders (80%) and educational features (76%), lower acceptance of predictive AI functions (49–58%)[1]
- **Saudi Arabia:** Positive attitudes toward AI strongly associated with better AI knowledge (58% vs. 11%)[2]
- **Africa:** AI-assisted video analysis found useful for monitoring adherence with TB[3]

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Limitations & Challenges of AI in Adherence

- Heterogeneous adherence measures
- Weak evidence base: most studies focus on predictive accuracy rather than clinical impact, and few have demonstrated improvements in real-world patient outcomes
- Limited external validation (lack of clinical trials)
- Short-term evaluation
- Cost
- Alert fatigue
- Environmental footprint

Bashir SG et al. Artificial intelligence approaches to predicting treatment non-adherence in chronic diseases: a narrative review. Front Digit Health. 2026 Apr 14;8:1769337.
Zavaleta-Monestel E, et al. Artificial Intelligence Tools That Improve Medication Adherence in Patients With Chronic Noncommunicable Diseases: An Updated Review. Cureus. 2025 Apr 28;17(4):e83132.
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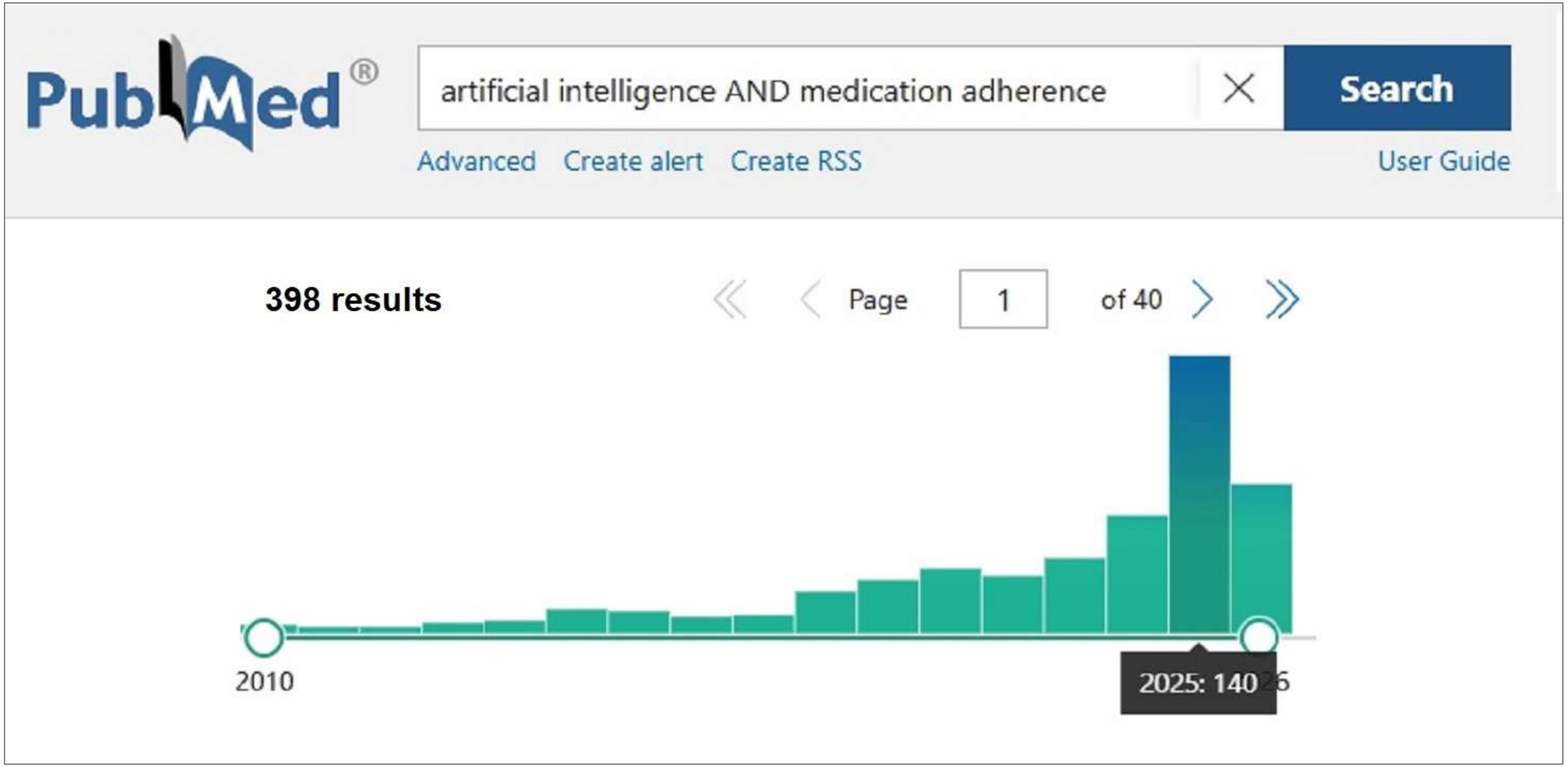
Current trends in AI for adherence



The future of AI in adherence

The future of AI in adherence

- AI will not replace clinicians, but **it can augment adherence care**
- AI has the potential to transform adherence management into **precision adherence medicine**
- **Technology alone is not enough** - system-level implementation and policy change are essential

Thank you

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