Applications of Artificial Intelligence in the Control of Infectious Diseases: A Scoping Review in the Post-COVID Era

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Chanhee Kim, MPH, RN, CIC, PHIT[1], Robin R. Austin, PhD, DNP, DC, RN-BC, FAAN, FAMIA, FNAP[1], Rebecca Wurtz, MD, MPH[2], Connie White Delaney, PhD, RN, FAAN, FACMI, FNAP[1], Sripriya Rajamani, MBBS, PhD, MPH, FAMIA[1]

[1]School of Nursing, University of Minnesota, Minneapolis, Minnesota; [2]School of Public Health, University of Minnesota, Minneapolis, Minnesota

01. Background

- The COVID-19 pandemic exposed systemic vulnerabilities in public health infrastructure, underscoring the urgency for innovation in disease surveillance and emergency response[1].
- Artificial Intelligence (AI) has emerged as a promising tool to enhance the accuracy, efficiency, and scalability of public health interventions[2].
- Yet, there remains limited understanding of how AI has been applied in real-world infectious disease control, and who is contributing to its development and implementation.

02. Objectives

- Identify the types of AI tools currently used for infectious disease control
- Examine the specific infectious disease control strategies where these tools are applied

03. Methods

- The keywords included in the search terms were identified by reviewing the MeSH taxonomy comprehensively, focusing on terms related to the key concepts of this study—AI, infectious diseases, and public health interventions.
- The search was limited to original publications, English-language, human-subject studies published from 2020 onward to reflect the post-COVID-19 landscape.

04. Results

- Out of 602 records identified from Ovid MEDLINE® on June 13, 2025, ten studies met inclusion criteria (Figure 1).

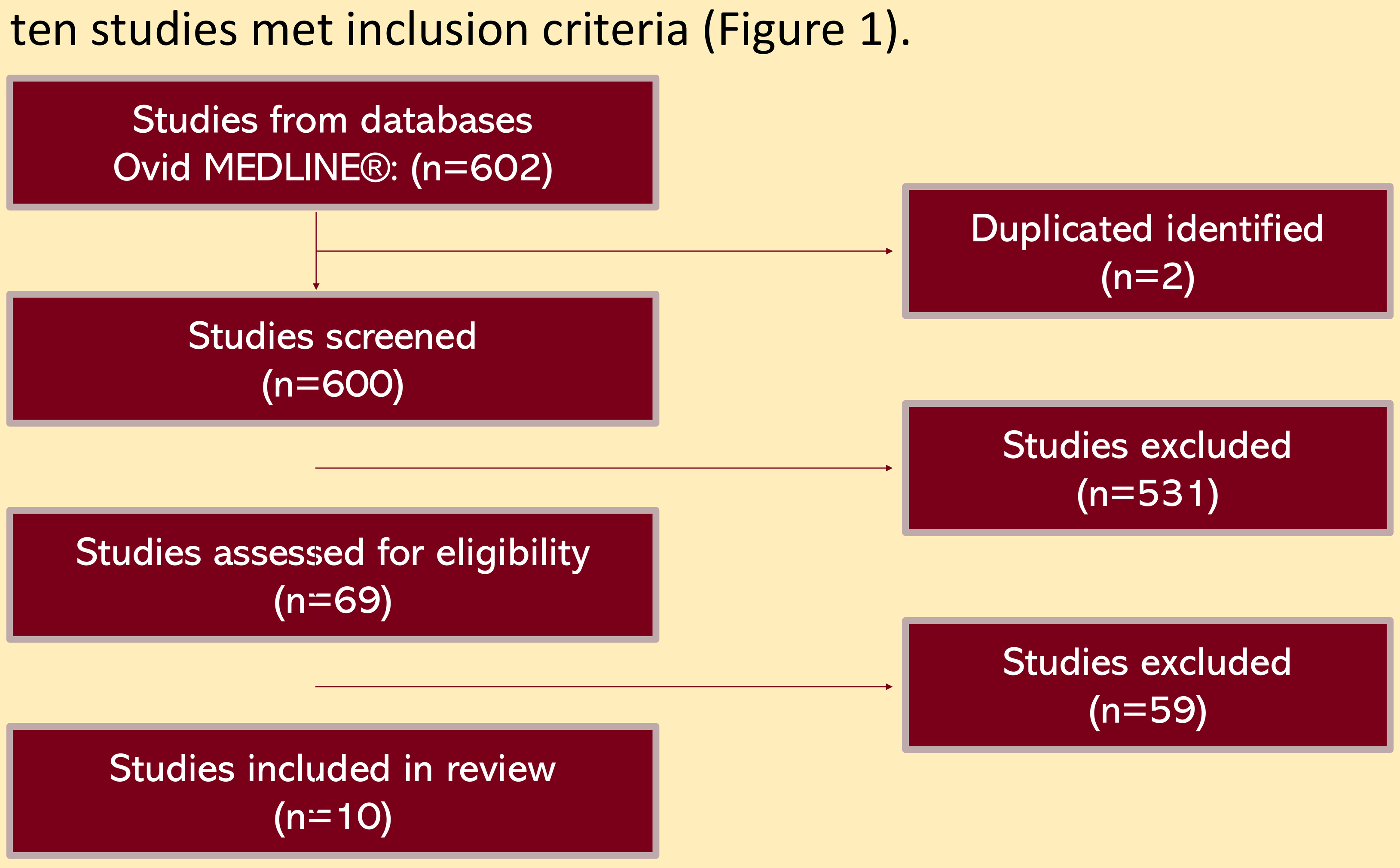

Figure 1. PRISMA Flowchart for Study Selection Process

- Table 2 summarizes the key characteristics of the 10 studies included in this review. The studies represent diverse regions, spanning the United States, Brazil, Pakistan, Italy, China, Kenya, Tanzania, and multiple African countries. Five studies applied AI tools at the local level, four at the national level, and one at a global scale. Target diseases varied: three focused on COVID-19, four on vaccine-preventable diseases (VPDs), two on HIV, and one on foodborne disease.

Study	Country	Level of Implementation	Target Disease	Purpose of AI
1	Tanzania	National	VPDs	Surveillance; Vaccination
2	Italy	Local	VPDs	Health Communication;
3	Kenya	National	HIV	Screening
4	Italy	Local	COVID-19	Outbreak Identification
5	Brazil	Local	HIV	Health Education
6	Pakistan	Local	VPDs	Vaccination; Health Education;
7	Brazil	National	COVID-19	Screening
8	Africa	Global	VPDs	Surveillance; Vaccination
9	USA	Local	COVID-19	Resource Allocation
10	China	National	Foodborne Diseases	Outbreak Identification

Table 1. Summary of Key Characteristics of Included Studies.

- Two major AI types were identified: machine learning (ML) algorithms and language-based tools such as chatbots and large language models (LLMs), as shown in Figure 2.
- ML-based studies were mainly applied to large-scale data tasks such as surveillance, outbreak prediction, risk profiling, and optimized resource allocation, improving efficiency in disease control and early warning systems.
- Language-based AI tools—such as chatbots and LLMs—were primarily designed to enhance health communication and education. They provided tailored messages to promote vaccination and HIV prevention, reducing misinformation and improving engagement.

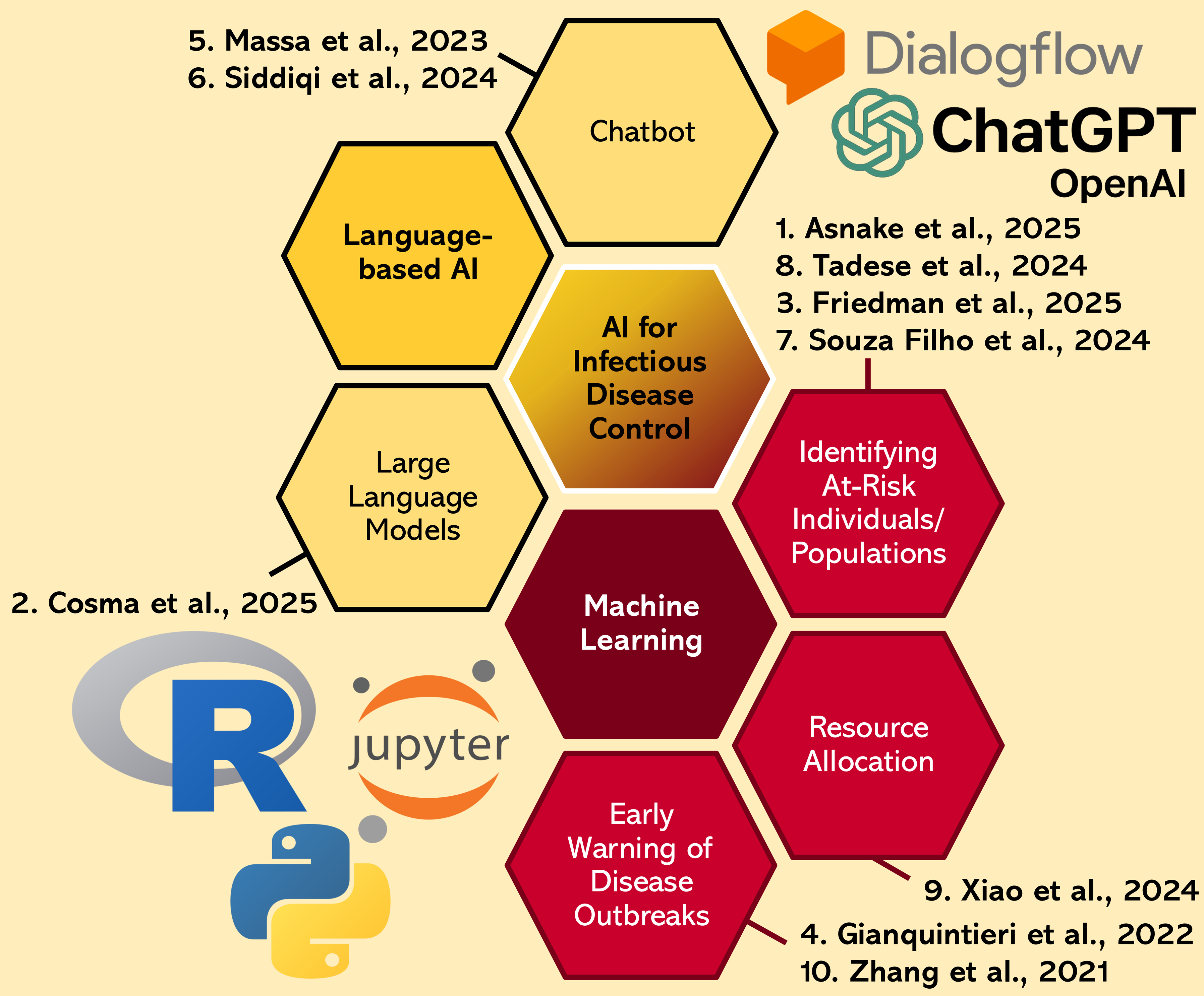

Figure 2. Types of AI technologies and their applications in infectious disease–related public health interventions.

05. Conclusion

- AI was applied to infectious disease control in two key domains: data-driven analysis and public-facing communication. ML supports backend decision-making for public health practitioners, while language-based tools enhance community engagement.

06. Future Plans

- Though this review outlines the type of AI technologies and how these tools are used in infectious disease control, more implementation studies and exploration of diverse AI approaches are needed.

07. Acknowledgement

- This study received funding from a Rapid Response Grant, Data Science Institute (DSI), Research and Innovation Office, University of Minnesota. The study PI (SR) and first author (CK) who received research support as a student from the grant are grateful to DSI for this funding.

08. References

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Contact Information
Chanhee Kim (kim01968@umn.edu)