Needs for AI modelling in CKD using Big Data and how to estimate their cost-effectiveness

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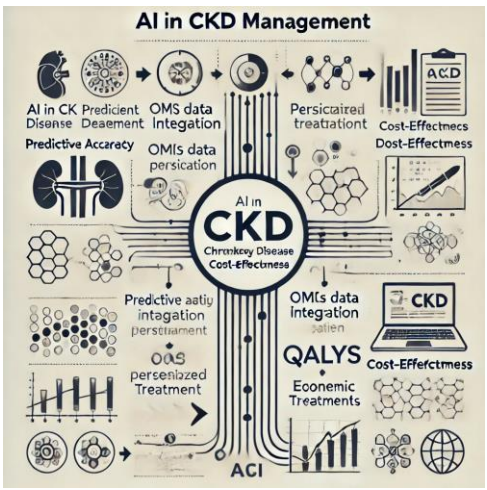
Background

Chronic Kidney Disease (CKD) poses a global health and economic challenge. AI and Big Data innovations offer potential for early detection, precision treatment, and cost reduction. Integrating omics data could enhance CKD care through accurate predictions and personalized interventions.

Aim of the Project

To assess the cost-effectiveness of AI in CKD management, emphasizing health economics and omics data integration. The project explores how AI can optimize resources, enhance patient outcomes, and reduce costs in CKD care



Methods

Literature Review: Searched databases (e.g., PubMed, IEEE Xplore) for studies on AI in CKD, omics data integration, and health economics models.
Data Categorization: Organized findings into three themes: (1) AI in CKD diagnosis/management; (2) Omics data enhancing AI predictions; (3) Evaluating AI's cost-effectiveness in healthcare.
Framework Development: Created a framework to assess AI's economic value in CKD, focusing on metrics like early detection rates, reduced costs, and QALYs.

Results

- **Enhanced CKD Management**: AI models, especially those incorporating omics data, showed improved accuracy in predicting CKD progression and treatment responses. This precision is vital for early interventions and personalized treatment planning.
- **Cost-Saving Potential**: Economic models suggest significant savings by: (a) Reducing late-stage interventions (dialysis, transplants); (b) Lowering hospitalization rates through predictive, preventive care
- **Data-Driven Framework**: A comprehensive framework for assessing AI's value in CKD was established, enabling researchers to quantify economic benefits through QALYs and cost-benefit analysis.

Outlook

The findings lay a foundation for future clinical research and practical applications of AI in CKD management. Key areas for further exploration include:

- **Clinical Validation**: Testing the conceptual framework in clinical settings to evaluate AI's impact on cost savings and patient outcomes in real-world CKD management.
- **Integration with Emerging Technologies**: Leveraging multi-omics data and advanced AI models to enhance predictive precision, potentially reducing the progression to costly late-stage CKD.
- **Policy and Economic Models**: Developing policies to support AI integration in healthcare and refining economic models for assessing AI's cost-effectiveness, promoting sustainable adoption in CKD care.