

Gebrye T¹, Mbada C¹, Niyi-Odumosu F.A³, Fatoye C¹, Odetunde M⁵, Hakimi Z⁴, Useh U², Fatoye F^{1,2}

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¹Department of Health Professions, Manchester Metropolitan University, Manchester, United Kingdom; ²Lifestyle Diseases, Faculty of Health Sciences, North-West University, South Africa; ³School of Applied Sciences, University of the West of England, Bristol, United Kingdom; ⁴Sobi AB, Stockholm, Sweden; ⁵Department of Medical Rehabilitation, College of Health Sciences, Obafemi Awolowo University, Ile-Ife, Nigeria

Introduction

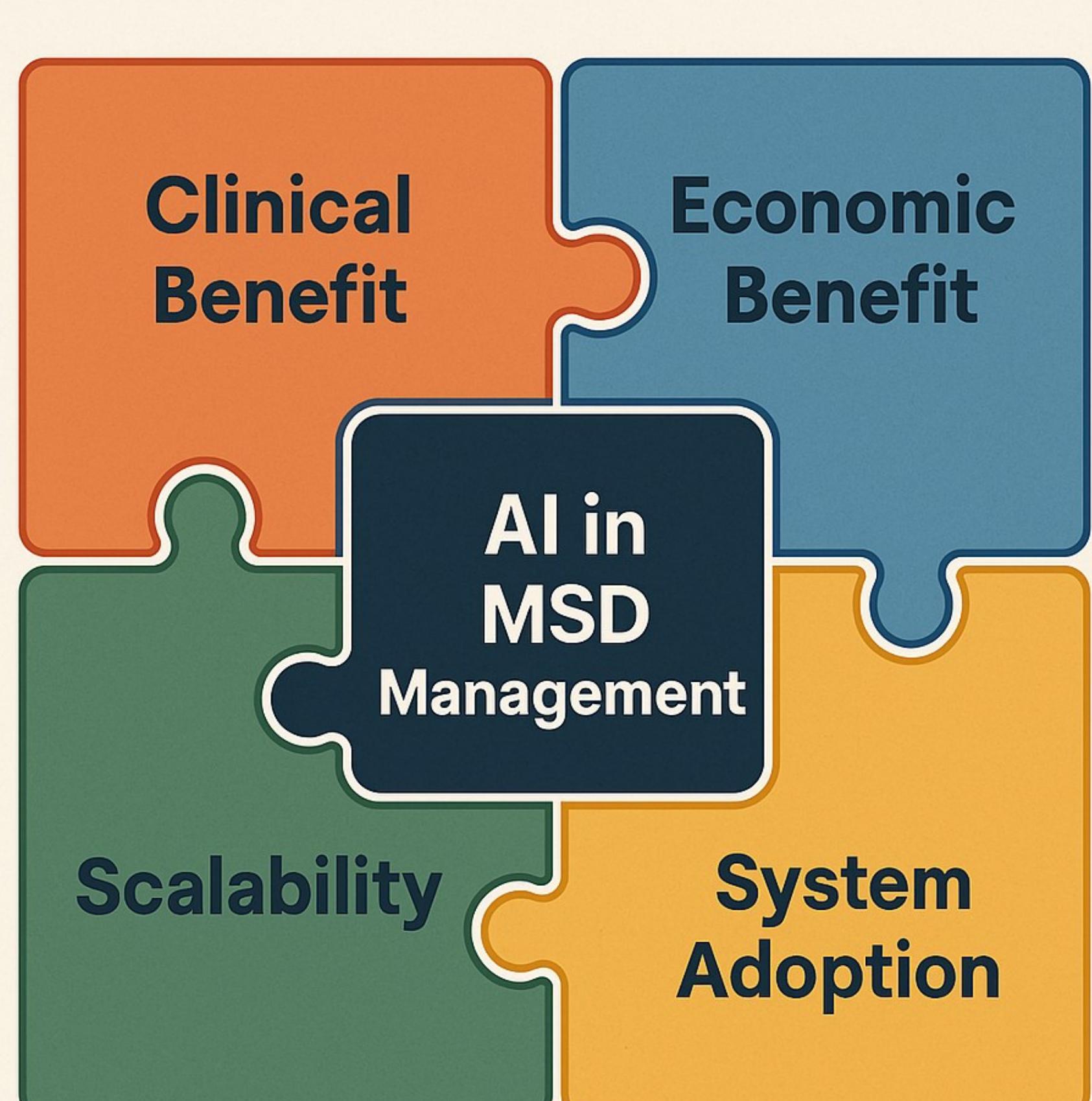
- Musculoskeletal disorders (MSDs) are a leading cause of disability and health expenditure globally.
- Artificial intelligence (AI) technologies such as machine learning, computer vision, and wearable sensors are increasingly used in MSD diagnosis, monitoring, and management.
- While AI shows promise in improving outcomes and efficiency, evidence on cost-effectiveness remains scarce.

Purpose

- To systematically review and synthesize evidence on the cost-effectiveness of AI-based interventions in the prevention, diagnosis, treatment, and management of MSDs.

Methods

- Design: Systematic review following PRISMA guidelines.
- Data sources: PubMed, Medline, CINAHL, Cochrane CENTRAL, and Web of Science.
- Search period: Inception to 6th April 2025.
- Inclusion criteria:
 - Studies evaluating AI-powered interventions for MSDs.
 - Studies reporting cost, resource use, or cost-effectiveness outcomes.
- Data extraction: Resource use, costs, cost-effectiveness ratios, sample characteristics, and study design.
- Quality assessment: Quality of Health Economic Studies (QHES) instrument.



Results

- Studies included: 5 (from USA, Germany, Denmark, Australia, South Korea).
- Perspectives used: Healthcare (n=3), Societal (n=1), Combined (n=1)
- AI interventions identified:
 - Deep learning-based diagnostic & exercise platform
 - Self-BACK mobile app
 - Standardized MRI protocols
 - Back Pain Choices online decision tool
 - Kaia back pain app
- Time horizons: 4 weeks to 3 years.
- Economic outcomes: AI interventions consistently demonstrated cost savings and improved clinical outcomes.
- QHES scores: High methodological quality (mean = 90.2%).

Conclusion

- AI interventions for MSDs demonstrated both clinical and economic benefits.
- Findings support the integration of AI technologies in MSD management pathways.
- Further research should focus on long-term cost outcomes, scalability, and healthcare system adoption.

References

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Contact:

Professor Francis Fatoye BSc, MSc (SportMed), MSc, PhD, MBA
Department of Health Professions
Manchester Metropolitan University, M15 6GX, UK
Email: f.fatoye@mmu.ac.uk