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Investigation into an artificial intelligence-based chest X-ray platform for the prediction of osteoporosis.

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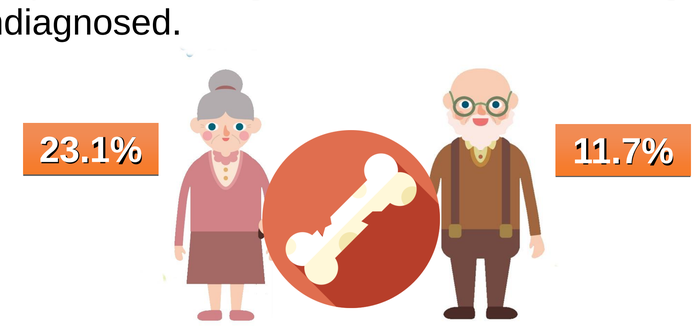
INTRODUCTION

Osteoporosis Prevalence

Osteoporosis affects 23.1% of women and 11.7% of men, often without noticeable symptoms, making it a "silent disease" that goes undiagnosed.



DXA (Dual-energy X-ray absorptiometry) scans, the gold standard for diagnosis, are underutilized due to high costs and radiation exposure.

METHOD

1 Data Collection
The study analyzed data from a total of 65,716 chest X-ray images at the institution from 2011 to 2021, with approximately 70% of the data used for deep learning model development.

2 Model Selection
After exploring various methods, the researchers selected the ResNext-SE 50 architecture as the final deep learning model to be trained on the chest X-ray data.

3 Model Performance
The trained model achieved an Area Under the Curve (AUC) of 0.94 in the internal validation set, demonstrating strong predictive capabilities.

4 External Validation
CXR-AI platform demonstrated 0.90 AUC on external data, indicating strong discriminatory capability

RESULTS

CXR-AI Platform

Opportunistic Screening
Leverages existing chest X-rays to predict osteoporosis risk without additional tests or radiation.

FRAX Integration
Generates FRAX (Fracture Risk Assessment Tool) data for healthcare professionals to assess fracture risk.

Early Intervention
Enables earlier identification of high-risk patients for preventative treatment.

Resource Optimization
Improves healthcare efficiency by reducing unnecessary DXA scans.

Benefits of the CXR-AI Platform

Increased Accessibility
Provides osteoporosis screening without additional costs or radiation exposure.

Personalized Risk Assessment
Generates individualized FRAX data to guide targeted prevention strategies.

Enhanced Care Quality
Empowers healthcare professionals to identify and manage osteoporosis earlier.

Improved Resource Allocation
Optimizes the use of DXA scans by prioritizing high-risk patients.

CONCLUSIONS

Unmet Need
Osteoporosis is a prevalent and underdiagnosed condition with significant medical, economic, and social impact.

Prevention is better than cure

Innovative Approach
The CXR-AI platform provides a novel, non-invasive solution to improve osteoporosis screening and management.

Potential Impact
Accurate risk prediction and early intervention can enhance healthcare quality and resource allocation.

REFERENCES

1. Compston, J. E., McClung, M. R., & Leslie, W. D. (2019). Osteoporosis. Lancet (London, England), 393(10169), 364–376. https://doi.org/10.1016/S0140-6736(18)32112-3
2. Mohammed, D. Z., Almeshal, M., Abbas, S., Aldawsari, Alanazi, M. A., Alanazi, A., Ali, F., Alqahtani, Alanazi, O.H., Abdulrahman, M., Alhassan, & Almuhesseny, A. A. (2019). PREVALENCE OF FRACTURE AND OSTEOPOROSIS AND AWARENESS OF OSTEOPOROSIS AMONG GENERAL POPULATION OF MAJMAAH CITY IN 2018.
3. Salari, N., Ghasemi, H., Mohammadi, L., Behzadi, M. H., Rabieenia, E., Shohaimi, S., & Mohammadi, M. (2021). The global prevalence of osteoporosis in the world: a comprehensive systematic review and meta-analysis. Journal of orthopaedic surgery and research, 16(1), 609. https://doi.org/10.1186/s13018-021-02772-0

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