

EMBEDDING FRACTURE-DETECTION AI INTO DIABETIC FOOT PATHWAYS: PODIATRIST-SUPPORTED WORKFLOW OPTIMISATION AND REAL-WORLD MODEL EVOLUTION IN NHS

Dr Sarojini David, Victoria Whitehead, Dr Aarthi Surendran, Helen Hughes, Gian Marco Strapelli, Steve Thorndyke, Dr Prashanth Vas

BACKGROUND

- Timely decision-making in **Diabetic foot osteomyelitis (DFO)** and Charcot Foot is critical. While podiatry teams are experienced in diagnosing these conditions, associated fractures may be missed early in presentation.
- Plain radiography remains first line imaging, but delays in formal reporting can contribute to diagnostic uncertainty and delayed escalation.
- AI fracture detection tools provide near real-time outputs and may support earlier point of care decision making within diabetic foot pathways.

EARLY CLINICAL IMPACT:

- AI fracture outputs were available within minutes, preceding formal radiology reporting.
 - In the initial 20 patients:19 AI outputs recorded).
- AI report influenced workflow in 12/19 episodes (63%):
- 6 prompted further imaging
 - 5 supported conservative management
 - 1 prompted escalation
- Reduced reliance on delayed radiology reports before initial management decisions.
 - AI-negative outputs provided reassurance during early assessment; no unnecessary increase in downstream testing.
 - Improved confidence amongst podiatrists and junior clinicians at the point of care.
 - AI-supported fracture recognition prevented delayed diagnosis and reduced patient recall whilst awaiting reports that may be delayed by up to 7 days.

LIMITATIONS

- Insufficient sensitivity to differentiate DFO from fracture-positive X-rays in the current version, leading to potential model development.
- Reduced performance in selected anatomical regions in the current version.
- AI output must be used as a supportive tool and should be interpreted within the full clinical, radiographic and multidisciplinary context.

CONCLUSION

- Fracture-detection AI provides rapid second-reader support that enhances podiatrist-led care and supports junior clinicians.
- While not suitable for excluding diabetic foot osteomyelitis (DFO), its value lies in reducing diagnostic uncertainty and supporting earlier management planning, in the context of multidisciplinary team working.
- A prospective workflow-modification study is underway.

AIM

- Evaluate whether a clinically deployed fracture detection AI tool can support clinicians as a second reader within the diabetic foot pathway.
- Support podiatrist led care and confidence in alternative diagnosis.
- Improve workflow efficiency.
- Support junior clinicians in early decision making.
- Reduce reliance on delayed radiology reporting.

METHODS

- Single-centre NHS service evaluation.
 - Integrated diabetic foot pathway aligned with local referral and imaging processes.
 - 100 diabetic foot radiographs reviewed: initial phase
 - Diabetic Foot Clinic workflow modification
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- AI outputs assessed alongside clinical and radiographic interpretation.
 - Focus on feasibility, turnaround time, workflow support and point of care decision making.
 - MRI informed escalation decisions but was not used as a comparator.
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- Governance, deployment and user training remained aligned with established fracture-detection AI pathways. Targeted training was delivered to the podiatry team, clinician-led decision-making was maintained throughout, and no extension beyond the intended scope of use occurred.

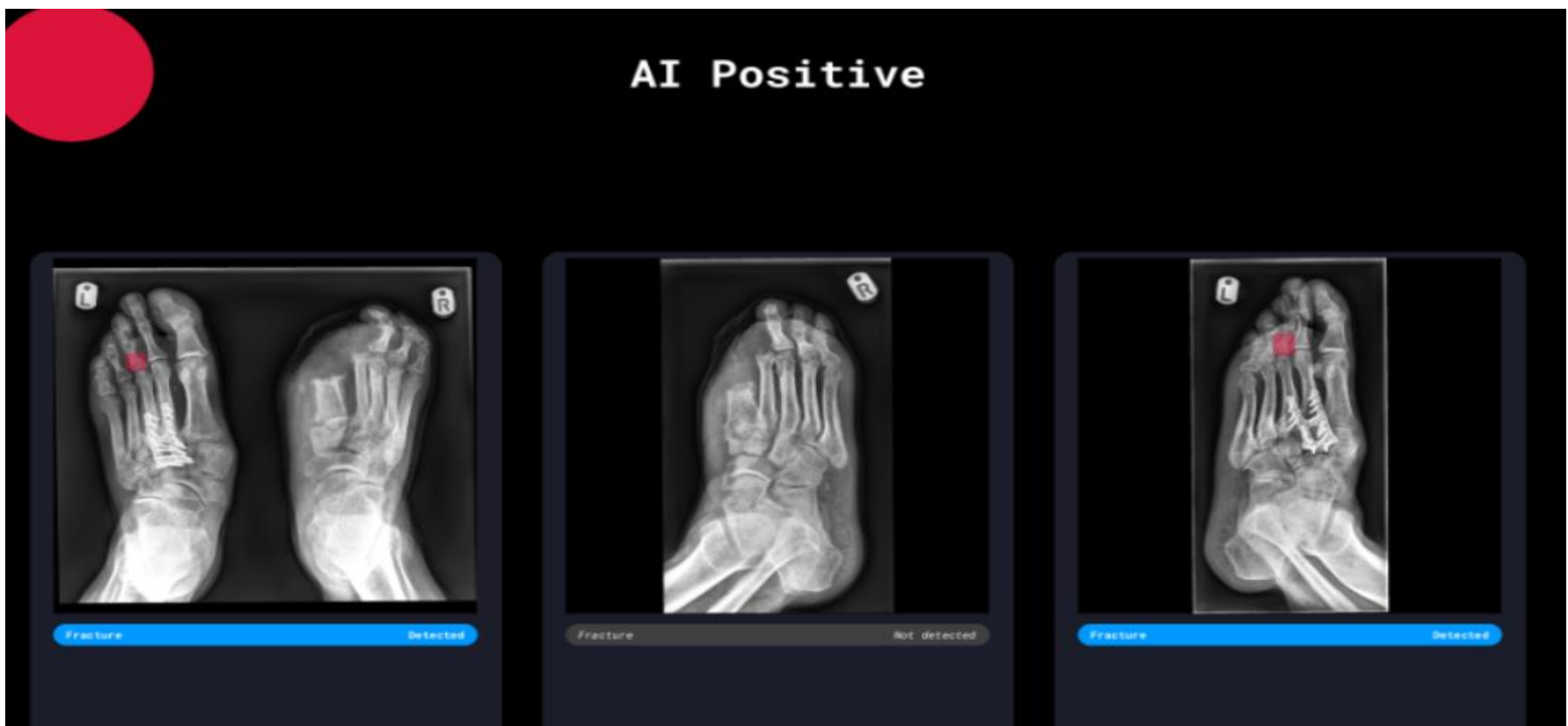
KEY LEARNING POINTS

- AI as a second reader: supports podiatrist-led pathways, enhances early confidence and reduces diagnostic uncertainty.
- Real world deployment matters: post-deployment surveillance identified opportunities not evident during initial implementation.
- Governance remains essential: AI should aid, not replace, specialist radiological and multidisciplinary interpretation.
- Model evolution is possible: structured clinician feedback enabled iterative vendor refinement.
- No AI-related safety concerns identified.

POTENTIAL OPERATIONAL IMPACT

- Earlier radiographic abnormality recognition may reduce repeat assessment, delayed treatment and avoidable deterioration.
- Preventing delayed clinical workflow in 7/20 (35%) patients demonstrates potential for pathway optimisation and admission cost avoidance.
- The pathway utilised existing AI infrastructure without additional staffing or workflow redesign.
- Demonstrates potential NHS efficiency gains through earlier point of care decision making and streamlined escalation pathways.

FIGURE 1: Changing Management



Fracture detected in the base of 3rd meta tarsal by AI tool.
OM identified by Podiatrist Additional fracture detection at point of care prior to formal radiology report.

A Need for Model Refinement & Maintaining Clinical Oversight

FIGURE 2



An example of DFO abnormalities not detected by the current AI tool: However confirmation of fracture negative AI output improved diagnostic confidence and expedited patient treatment.

FIGURE 3



Example of the AI fracture detection tool highlighted DFO changes, but not consistently – need for model refinement. Corresponding MRI demonstrating DFO changes.

FUTURE MODEL & PATHWAY EVOLUTION

- Real-world NHS deployment within diabetic foot pathways
- Clinician-led feedback and iterative AI refinement, specifically modelled for diabetic foot.
- Earlier escalation and point of care decision making
- Prospective evaluation of workflow and patient outcomes
- Optimised integration into future diabetic foot pathways