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# One-year Anti-Osteoporosis Medication Use in Patients Identified by an AI-enabled Vertebral Fracture Pathway in the Fracture Liaison Service Setting

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## PURPOSE / OBJECTIVES

Fracture Liaison Services (FLSs) improve the delivery of secondary fracture prevention for adults with a recently diagnosed fragility fracture. Traditionally, FLSs have identified adults presenting to orthopedic teams with a fragility fracture.

While vertebral fractures (VFs) are a strong predictor of future fracture risk, most remain undiagnosed as the symptoms of back pain are often not recognised by patients or healthcare workers as due to a VF. Improving detection of patients with VF for osteoporosis assessment and management is a major healthcare priority.

One potential method is using existing CT scans that include the thoracic and lumbar spine to identify Vfs. Often, radiology reports do not mention VFs, use different terms or are not acted upon. Re-reading CT scans for 10,000 patients to identify those with VFs often not feasible.

Instead, an Artificial Intelligence (AI) programmes have been developed that analyse existing CT scans and flag ones that could have VFs. These patients can then be contacted by the local FLS for osteoporosis management.

We have previous demonstrated that the NanoxAI HealthVCF platform flagged 30.4% of scans with a potential vertebral fracture and 24.3% were confirmed clinically. 82% of those with a clinical confirmed VF were recommended anti-osteoporosis therapy.

Adherence to anti-osteoporosis therapy is essential to reducing fracture risk and is known to be higher for patients seen by an FLS. Whether patients identified by AI-enabled pathway would adhere to anti-osteoporosis therapy in the longer term is not known. We evaluated the impact of an automatic AI technology on anti-osteoporosis therapy adherence for patients with Vfs in the FLS setting.

## MATERIAL & METHODS

We evaluated the implementation of the NanoxAI HealthVCF platform embedded in a tertiary hospital FLS pathway. CT scans including the thoracic/lumbar spine were send to the on premise interface for AI analysis . Scans that were flagged with Genant grade 2/3/ VFs or with an endplate fracture were confirmed by clinicians with expertise in VF identification (RE/SC) with senior adjudication as required (RM, MKJ). Patients with non-fracture deformities or where the visualisation was not clear enough to decide were excluded.

Patients with definite VFs were assessed by the FLS for anti-osteoporosis treatment based on FRAX score and National Osteoporosis Guidelines Group UK recommendations, DXA, and co-morbidities. Patients aged 75 years or over with a vertebral fracture were treated without DXA unless treatment was contra-indicated or in palliative care.

Specific anti-osteoporosis treatment recommendations were based on previous anti-osteoporosis treatment use and comorbidities. Recommendations were sent to the patient's primary care physician for prescribing. Patients were contacted by telephone for a monitoring call 16 weeks after the initial clinical confirmation of a vertebral fracture. At the monitoring call patients were asked to report adherence and tolerability. After each monitoring assessment, relevant changes to treatment recommendations were made and communicated to the primary care teams. Persistence at 52 weeks was confirmed by checking primary care prescribing records.

A consecutive series of patients who were recommended anti-osteoporosis therapy were checked for persistance to anti-osteoporosis therapy 12 months after the initial confirmation of a VF by telemed interview. A logistic regression model was used to identify predictors of treatment adherence.

Fracture Liaison Services are clinically and cost-effective teams of clinicians who identify patients with a recent fragility fracture for osteoporosis and falls management.

**Vertebral fractures are often undiagnosed and missed by FLSs.**
**We have demonstrated the impact of an AI-enabled vertebral fracture FLS pathway using existing CT images on anti-osteoporosis treatment adherence.**

Further work is measuring the impact of AI-enabled VF FLS pathway on healthcare use and re-fracture rates

## RESULTS

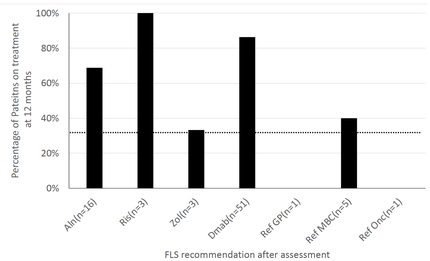
Ninety-six patients were identified by the AI platform and their treatment recommendations were checked for adherence.

The mean age of patients was 77.4 years and 54.2% were women.

The commonest anti-osteoporosis treatment recommendation was for denosumab (65.6%), followed by alendronate (18.9%), zoledronate (3.1%), and risedronate (3.1%). Additional recommendations included referral to the metabolic bone clinic for teriparatide (7.3%), primary care physician (1%), and oncology (1%).

By 12 months, 14 (14.6%) patients had died and treatment was no longer clinically appropriate in 2 patients, leaving 80 (83.3%) who should be on anti-osteoporosis therapy. Of these, treatment at 12 months was confirmed in 76.3%. The outcome for one patient was unknown. The rates of adherence by treatment recommendation are shown in the figure and were significantly higher if the FLS recommended a specific medication to patients vs. referral to another specialist (p=0.004).

**One year anti-osteoporosis prescription rates for adults identified through the AI-enabled FLS pathway**




Aln- Alendronate; Ris-Risedronate; Zol-zoledronate; Dmab-denosumab; Ref GP-referred to GP; Ref MBC-referred to local hospital metabolic bone clinic; Ref Onc-referred to patient oncologist. Reference line shows overall 12 month adherence rate for FLS (33.8%)

## SUMMARY / CONCLUSION

We have implemented an AI-enabled vertebral fracture identification pathway within an high volume FLS in a public NHS hospital the UK

The AI-enabled pathway resulted in high anti-osteoporosis medication adherence at 12 months, especially if the FLS recommended a specific medication.

The NIHR / NHSx funded ADOPT study is now examining the impact of the AI-enabled pathway with higher specificity on re-fracture rates, healthcare use and costs using historical controls.