**Osteoporosis detection and treatment – an update about ongoing activities to ascertain the value of early detection and treatment by the ADOPT team.**

Osteoporosis is a chronic debilitating skeletal condition leading to an increased risk of fractures at various sites. Vertebral compression fractures, the most common of the major osteoporotic fractures, increase patient morbidity and mortality as well as increasing fracture risk for major osteoporotic fractures such as hip fracture.

While vertebral fractures are the most common osteoporotic fracture, up to 70% are undiagnosed (Royal Osteoporosis Society, 2017) and despite effective interventions, most patients remain untreated and develop worsening bone health.

One recommendation for improving identification is re-reading existing CT scans that include the spine. However, these patients often have significant co-morbidities, and it is not clear how many patients survive long enough to potentially benefit from fracture prevention interventions.

In recent work by the, ADOPT team presented in the ECTS, 611 consecutive CT scans that included the thoracic and lumbar spine were re-read by clinical experts.  210 (34.4%) patients had died since their scan with 13.9% deceased by 12 months and 20.1% deceased by 24 months. The survival of patients with vertebral fractures versus those without is shown below.



In this audit population, a large proportion of patients identified with vertebral fractures using their 2017 CT scans survived for more than 3 years, long enough to benefit from FLS interventions.

Another study from the ADOPT team, presented at the BRS, showed that fewer than 30% of vertebral fragility fractures (VFs) present on routine clinical CT scans are reported. As VFs can increase the risk of mortality, morbidity and fracture risk, it is essential VFs are detected as early as possible.

The multi-centre audit compared the routine radiology reporting of VF against the Royal Osteoporosis Society (ROS) guidelines using 500 consecutive CT scans retrieved by each of 4 NHS sites from 2017 that included imaging of the spine. All patients were assessed for vertebral fractures from sagittal imaging by a clinician with local radiologist adjudication. For each scan, the clinician recorded if a VF was present, was a VF(s) were mentioned in the clinical report and did the clinical report use the term ‘vertebral fracture.’

The results show that out of 2000 CT patient scans (49.7% women) that were audited, a total of 242 (12.1%) vertebral fracture patients were identified in the audit, M=113, F=129. Radiologists mentioned a VF in 55% of reports and correctly used the term “Vertebral fracture” in 29.3% of the reports. However, only 9 (3.7%) vertebral fractures were recommended for further assessment. The prevalence of VF varied between types of scan (p=0.017).

Dr. Kassim Javaid discussed that a clinically significant care gap remains in the reporting and actioning of VF in routine NHS healthcare settings. Opportunistic VF reporting in CT using AI technologies, linked to Fracture Liaison Services has the potential for substantial patient benefit.

An Artificial Intelligence (AI) programme is being used as part of routine NHS care that will look at old CT scans and flag ones that could have broken a spine bone. The AI programme has been developed by a company called Nanox.AI and is certified and approved for use in the NHS. As part of routine NHS care, all the scans the AI programme identifies with a potential vertebral fracture will be confirmed by the local hospital team, who will then contact them to arrange further routine NHS care to improve the patient’s bone health. To measure the benefit to patients we will study the outcomes of patients who had a scan in 2017 and those who had a scan more recently in 2023 focusing on hospital admissions in the 2 years after the CT scan was performed. The results of the comparisons between patients will be used to develop a calculator for the NHS to understand the benefits and budget impact from using an AI-enhanced vertebral fracture prevention pathway for patient benefit.

Adopt study (AI-enabled Detection of Osteoporosis for Treatment) funded by NIHR and NHSE uses an AI enabled FLS clinical pathway implemented in several NHS sites, aims to describe the following:
- the performance of the AI-enabled vertebral fracture identification platform compared with NHS radiology reports and local readers.
- the implementation of an AI software in NHS hospitals to develop a supporting toolkit.
- how the AI-FLS pathway improves key performance indicators for patient’s identification, assessment, treatment recommendation and adherence
- evaluate the clinical and cost effectiveness of the AI-FLS pathway