

Clinical Guidance for the Effective Identification of Vertebral Fractures

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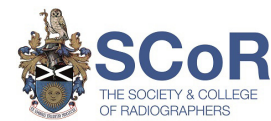
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This guidance is dedicated to Professor Judy Adams 1945 - 2017

Foreword

Early identification and management of osteoporosis following a low-trauma fracture presents a real opportunity to reduce the risk of a second fracture. Vertebral fractures are the most common osteoporotic fracture and are the most predictive of subsequent hip fractures. The cost to both the patient and the NHS of further fractures can be avoided if we design systems that are alert to a patient's first vertebral fracture.

However, identifying vertebral fractures systematically has proven challenging for all clinicians, and currently more than two-thirds are undiagnosed. This guidance seeks to address this and highlights the significant role of reporting clinicians in diagnostic imaging. Reporting clinicians often have the first opportunity to diagnose a patient's vertebral fracture, which, until then, may have been asymptomatic and clinically unsuspected. Clinicians in diagnostic imaging need to routinely examine all images showing the spine for vertebral fractures. Vertebral fractures must be reported unambiguously – using the word “fracture” – because clear communication will alert referring clinicians to their clinical significance and ensure that these patients are assessed and treated where appropriate. Effective identification of patients with vertebral fractures via a vertebral fracture pathway is achievable in every locality if we seize this opportunity.



Richard Evans OBE
Chief Executive Officer
Society of Radiographers

“It’s a sad thing, but I really do believe that if the fracture I suffered in my spine had been spotted earlier than it was, I would have been spared a great deal of pain and suffering.

I found out I had osteoporosis a few years ago, after I slipped on some ice, but the first fracture was not picked up, probably because of a lack of awareness on the part of the health professionals I saw at the time. Instead of starting a treatment for osteoporosis, I was sent away from my local hospital with painkillers.

As a result of this, I suffered more fractures in my spine – which were both devastating and life changing.

My life has not been the same since. I went from being someone who ran my own hair salon and walked over 30 miles a week to someone who had to stop work and all physical activities due to the horrendous pain. It was a struggle to just get through each day and I couldn’t plan anything in advance.

As if this wasn’t bad enough, I also had to cope with a change in body shape. I have lost four inches in height and gone down two dress sizes. Losing height means that your digestion and breathing are affected due to your organs being squashed into less space. You look in the mirror and hardly recognise yourself and feel ashamed of how you look. Your self-esteem takes a dive and you try to cover up your embarrassment by wearing loose-fitting clothes to hide your body. The impact is not only physical but also psychological.



Believe me when I say, living with these fractures is a nightmare that never goes away.”

Christine Sharp

Background

Vertebral fractures are the most common osteoporotic fracture. Prevalence studies suggest that 12% of women aged 50–79 have vertebral fractures, the majority of which will be osteoporotic in origin – increasing to 20% in women over 80 years of age.¹ However, currently **up to 70% of vertebral fractures remain undiagnosed.**^{2,3} Indeed, a recent UK study showed an incidence rate for vertebral fracture in GP records of just 7.1 per 10,000 person years in adults aged over 50 (4.6 for men, 9.4 for women).⁴

Vertebral fractures are a powerful predictor of further fracture,^{5,7} with an increased relative risk of 2.8 for hip fracture and 5.4 for vertebral fracture.⁸ Over 55% of older women with hip fracture have evidence of a prior vertebral fracture.⁹ However, as the majority are undiagnosed, the opportunity to intervene and prevent the hip fracture is missed. A recent study of patients with hip fracture who also had evidence of vertebral fracture on prior imaging found that only 46% of the vertebral fractures had been reported by a radiologist at the time the image was taken, and even fewer had been acted on by the referring clinician.¹⁰

In an ageing population, the identification of vertebral fractures presents a valuable opportunity to reduce the significant economic burden that hip fractures present to the NHS and social care.

Fracture Liaison Services

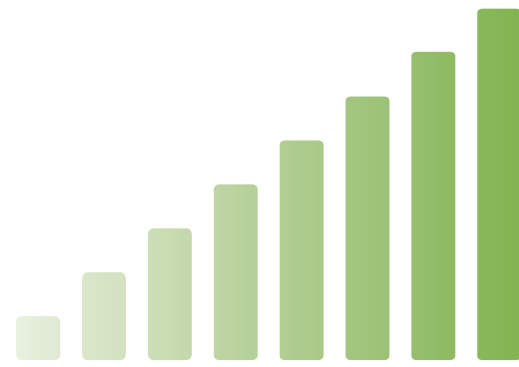
A Fracture Liaison Service (FLS) prevents secondary fractures by identifying patients with a fragility fracture using dedicated case-finding. It provides assessment for osteoporosis and where appropriate, treatment and follow-up. FLS designed to the national Clinical Standards offer the best model for effective secondary fracture prevention. The standards specifically require FLS to identify systematically all patients over 50 with a newly reported vertebral fracture.¹¹ However, in the first two annual reports from the national FLS-Database, the Royal College of Physicians reported low rates of vertebral fractures identified by FLS, with the lack of a patient pathway being the most frequently cited barrier to their identification.^{12,13}

Impact of vertebral fractures

Research shows that osteoporotic older people with vertebral fracture have worse physical-health-related quality of life than osteoporotic older people without vertebral fracture, even after accounting for age differences.¹⁴ Left untreated, vertebral fractures often progress to involve multiple levels in the thoracic and lumbar spine, leading to disabling pain, increased kyphosis (curved spine), and loss of independence and confidence. Increases in thoracic kyphosis and height loss contribute to problems such as swallowing and breathing difficulties, and incontinence.¹⁵



Every vertebral fracture accounts for
14 additional GP visits
in the year after fracture¹⁶



Vertebral fractures are associated with an **8-fold increase** in age-adjusted mortality¹⁷

Clinically treatable and preventable

A multidisciplinary approach should be used to manage patients' symptoms caused by a vertebral fracture. There is a range of pharmacological agents that are highly effective in reducing the risk of further fracture. Treatment reduces the risk of fracture within 6 to 12 months by 50–80%.^{2,18-24} Timely treatment is essential given that 19% of osteoporotic women with a recent vertebral fracture will sustain a new vertebral fracture within the next 12 months.²⁵ It is particularly important to identify those individuals with vertebral fractures who are osteopenic rather than osteoporotic, and who may otherwise not be considered for pharmacological treatment.²⁶

Why do vertebral fractures remain undiagnosed?

Under-diagnosis of vertebral fracture occurs for a number of reasons:

- Unlike other fragility fractures, only a minority of vertebral fractures result from a fall.
- Symptoms from a vertebral fracture are often attributed to another cause by both patient and healthcare professionals.
- The need for spine imaging in a patient with risk factors for osteoporosis presenting with new back pain is often not recognised.
- When imaging is undertaken for indications other than back pain, the spine may not be systematically scrutinised during the reporting process.
- Vertebral fractures may be reported using ambiguous and confusing terminology.
- The referring clinician may regard the finding of a vertebral fracture as incidental to the reason for the original referral, and fail to recognise its clinical importance.

Purpose and objectives of this guidance

The purpose of this guidance is to ensure that all vertebral fractures are systematically identified, reported using clear terminology to the referring clinician, and lead to appropriate management to avoid further fragility fractures.

This guidance aims to assist clinicians to establish processes to maximise identification of patients with vertebral fracture, and enable timely assessment and treatment. The principles described support the first objective of FLS (as outlined in the Clinical Standards for Fracture Liaison Services¹¹) (see figure opposite) but may also be applied within services that do not yet have a formal FLS.

The guidance does not address the onward clinical management of vertebral fractures, which is a priority for the National Osteoporosis Society's future work programme.

The key objectives of this guidance:

- To raise awareness among all healthcare professionals of the clinical significance of vertebral fractures and the importance of implementing timely investigation and management to reduce the risk of further fragility fractures.
- To enable services to identify all patients with vertebral fractures and offer management in the fracture prevention pathway.
- To raise awareness among reporting clinicians to ensure that vertebral fractures are reported clearly and unambiguously, and that the route to appropriate management is signposted within the report.
- To highlight to commissioners or those with responsibility for the allocation of resources, the clinical, financial and ethical case for a fully funded vertebral fracture identification pathway.
- To facilitate audit to inform service development and monitor progress.



The 5 IQ approach to quality in fracture prevention

The role of diagnostic imaging departments in the vertebral fracture pathwayⁱ

Effective case-finding and management of patients with osteoporotic vertebral fractures requires an integrated approach across the whole fracture prevention pathway, with diagnostic imaging departments being uniquely placed to bring about the most substantial improvements by:

- actively seeking vertebral fractures apparent on any imaging that includes the thoracic and/or lumbar spine
- reporting vertebral fractures clearly and unambiguously
- alerting the referring clinician to the need for further assessment of fracture risk, via the FLS where available.

Vertebral fracture identification

Vertebral fractures are most likely to be under-reported on imaging obtained for non-musculoskeletal indications. This includes images acquired using all modalities that involve any part of the thoracolumbar spine, with the greatest opportunity presented by the increasing number of computed tomography (CT) scans undertaken in older adults.

It is recommended that diagnostic imaging services establish local processes to ensure that the spine is routinely evaluated for the presence of vertebral fracture in all available imaging and that reports are actionable. Depending on local policies, this may involve:

- routine sagittal reformatting of CT images using bone algorithms, either by the operator or by the reporting clinician
- scrutiny of lateral views of the spine on any relevant images (e.g. CT, magnetic resonance imaging (MRI), radiographs)
- raising awareness among reporting clinicians of the importance of vertebral fracture identification

- training and CPD to increase confidence in the recognition of vertebral fracturesⁱ
- inclusion on departmental audit programmes
- agreement between diagnostic imaging departments, referring clinical teams and Trust management of a fail-safe alert mechanism in respect of vertebral fractures as “significant, important, unexpected and actionable findings” in accordance with the Royal College of Radiology (RCR) standards guidance.²⁷

Reporting of vertebral fractures

Whenever imaging that includes the spine is reported, the report should indicate that the spine has been assessed.

It is imperative that the appearance of the vertebral bodies is described clearly and unambiguously.

A vertebra may be described in one of three ways:

1. Vertebral fracture

- Additional information should be given describing the vertebral level(s) involved and the severity of the fractures.
- If previous imaging including the spine is available, this should be reviewed to identify the timing of the fracture.

2. Non-fracture vertebral deformity

- If the cause of the deformity is clear, this should be described in the report. Common causes include degenerative change, Scheuermann’s disease and Schmorl’s nodes.

3. Normal

Use of ambiguous and obscure terminology leads to confusion and the risk that vertebral fractures will be overlooked. Terms to be avoided to describe vertebral fracture include:

- wedging
- vertebral height loss
- deformity
- end-plate infraction or depression.

Where appearances are equivocal because the quality of images is sub-optimal, this should be reported.

Recommending further assessment

The RCR endorses actionable reporting, written “in a way appropriate to the referrer’s expected level of familiarity with the issues raised.”²⁷ If a vertebral fracture is identified, the report should use the principles of fail-safe alerts (in line with RCR guidance and agreed locally) and flag to the referring clinician the need for further assessment and management to reduce the patient’s risk of further fracture.²⁷ The presence of severe, multiple or recent vertebral fractures indicates that the patient is at very high fragility fracture risk, warranting urgent evaluation.

The wording used will depend on the local service model and agreed pathways. A standard phrase may be saved as a short code that can be automatically inserted into the report. Examples include:

- Appearances suggest osteoporosis – the patient should be offered assessment in the Fracture Liaison Service.
- Appearances suggest osteoporosis. Further investigation and management to reduce the risk of further fracture is advised.
- Appearances suggest a high risk of fragility fracture – referral for DXA scan / referral to the metabolic bone clinic is advised.

Integration with the fracture liaison service

Localities with an established FLS should collaborate with their diagnostic imaging department to optimise case-finding into the service. Any additional activity will need to be scoped and appropriately resourced.

In most cases, the FLS will need to liaise with the referring clinician prior to offering assessment in the FLS or osteoporosis service. This allows the referrer to share information relevant to the patient’s referral and ensure that it is clinically appropriate for the patient to be offered assessment. Assessment in the FLS may not be necessary or may not be in the patient’s best interests: the patient may already have been evaluated for osteoporosis, the vertebral fracture may be traumatic or due to pathology other than osteoporosis (such as malignancy), or the patient may have other conditions contra-indicating treatment (such as end-stage renal disease).

It may be possible to route patients directly from diagnostic imaging into the FLS, depending on local agreement and governance. Where this approach is adopted, mechanisms must be in place to ensure FLS assessment is appropriate and to avoid duplication by the referring clinician.

Where direct referral to the FLS is agreed locally, systematic mechanisms for case-finding can be used, for example:

- A copy report is sent either automatically or manually to the FLS.
- Search criteria are applied to diagnostic imaging reports to identify the presence of vertebral fractures.

Examinations reported remotely

In many areas, reporting of imaging, including CT and MRI, is provided under a contract by a third-party provider (tele-radiology). This should be part of an integrated diagnostic imaging service, subject to the same governance framework as the rest of the services.²⁸ New contracts should specify that new pathways or protocols for vertebral fracture identification should be followed, including how vertebral fractures are reported. Existing tele-radiology contracts or other agreements may require modification to address any change to pathways or protocols for vertebral fracture identification and reporting.

Clinical imaging software and services

Commercially available computerised algorithms are now available that can evaluate vertebral shape and identify vertebrae that are likely to be fractured. These systems may be applied prospectively as images are acquired, or retrospectively to archived images.

The services can evaluate previously reported images and generate a list of those in which vertebral fractures may be present, to facilitate identification of those patients in whom a diagnosis of vertebral fracture has been missed.²⁹⁻³² This service may be useful as a baseline audit to determine the need for a vertebral fracture identification initiative. Services that have limited availability of reporting clinicians and can secure ongoing funding may use the software or services for prospective case-finding.

Identification of vertebral fractures during fracture risk assessment using DXA

Dual energy X-ray (DXA) measurement of bone mineral density (BMD) is undertaken as part of fracture risk assessment in patients with risk factors for osteoporosis. In addition to BMD measurement, DXA may also be used to acquire images of the thoracolumbar spine (usually from T4 to L4) using vertebral fracture assessment (VFA) scans. These involve very low doses of ionising radiation (1% of the dose used to acquire spine radiographs) and may be obtained at the same appointment. Although VFA images are of lower resolution than conventional spine imaging, moderate and severe vertebral fractures can be reliably identified, providing additional independent prediction of fracture risk.

It is recommended that VFA scans are targeted to patients at increased risk of vertebral fracture where identification of vertebral fracture will alter clinical management (i.e. lead to additional investigation, initiation or change in treatment). Approaches to target VFA that may be applicable to a variety of clinical service models have been described, focusing on the elderly and those with specific risk factors, such as glucocorticoid use.³³⁻³⁵ It may be particularly relevant in patients shown to be osteopenic on DXA who would not otherwise be recommended treatment.

VFA images can be evaluated visually in the same way as other imaging modalities. Morphometric algorithms are incorporated within the DXA manufacturers' software; these can highlight images likely to include vertebral fractures but cannot be relied upon to diagnose fractures or replace the visual assessment of the vertebral shape and appearance of the end plates (see Appendix A).

DXA scans are often reported by clinicians who are not radiologists or reporting radiographers. With training and experience, these clinicians may be confident to identify vertebral fractures from VFA images; however, this raises governance responsibilities that need to be addressed. Solutions may involve adjudication by a reporting practitioner or by confirmation of vertebral fracture using spine radiographs, which also enable more detailed evaluation of the differential diagnosis.

Systematic VFA imaging by DXA services should be regarded as an essential part of an integrated vertebral fracture identification pathway.

Audit of vertebral fractures ⁱⁱ

Baseline audit of vertebral fracture reporting is necessary to quantify the diagnostic “gap” and can provide a powerful driver for change and stimulate collaboration across departments. It will also inform the case for funding of a specific vertebral fracture identification pathway. Periodic re-audit is used to monitor progress and services should also submit data on vertebral fractures to the national FLS-Database (FLS-DB).

Audit criteria:

- Consecutively acquired images including lateral view of thoracic and/or lumbar spine:
 - For simplicity, the baseline audit may focus on CT scans, but other modalities (e.g. MR, radiographs) may be included.
 - Include images obtained in patients aged 50 and above.
- Sagittal views of the spine are assessed by a clinician with experience of interpreting spine images for the presence of moderate and severe vertebral fractures as defined using semi-quantitative morphometry or the algorithm-based qualitative (ABQ) method (see Appendix A).^{36,37}
 - Findings are compared to the clinical report.
- A sample size of 150 to 200 scans is required to ensure that an adequate number of images is audited including moderate or severe vertebral fractures.

The audit standards

- Audit Standard 1: Proportion of scans in which the reporting clinician has commented on the thoracic and/or lumbar spine appearance (target: 100%).
- Audit Standard 2: Proportion of scans in which moderate/severe vertebral fractures are correctly identified on the report (target: >90%).
- Audit Standard 3: Proportion of vertebral fractures reported using correct terminology (i.e. “vertebral fracture”) (target: 100%).
- Audit Standard 4: Proportion of patients with

vertebral fractures in which the report contains appropriate recommendations for further assessment (target: 100%).

Any vertebral fractures identified at audit that were not highlighted on the clinical report should be reported using the local discrepancy procedure.

National clinical audit and ongoing performance monitoring

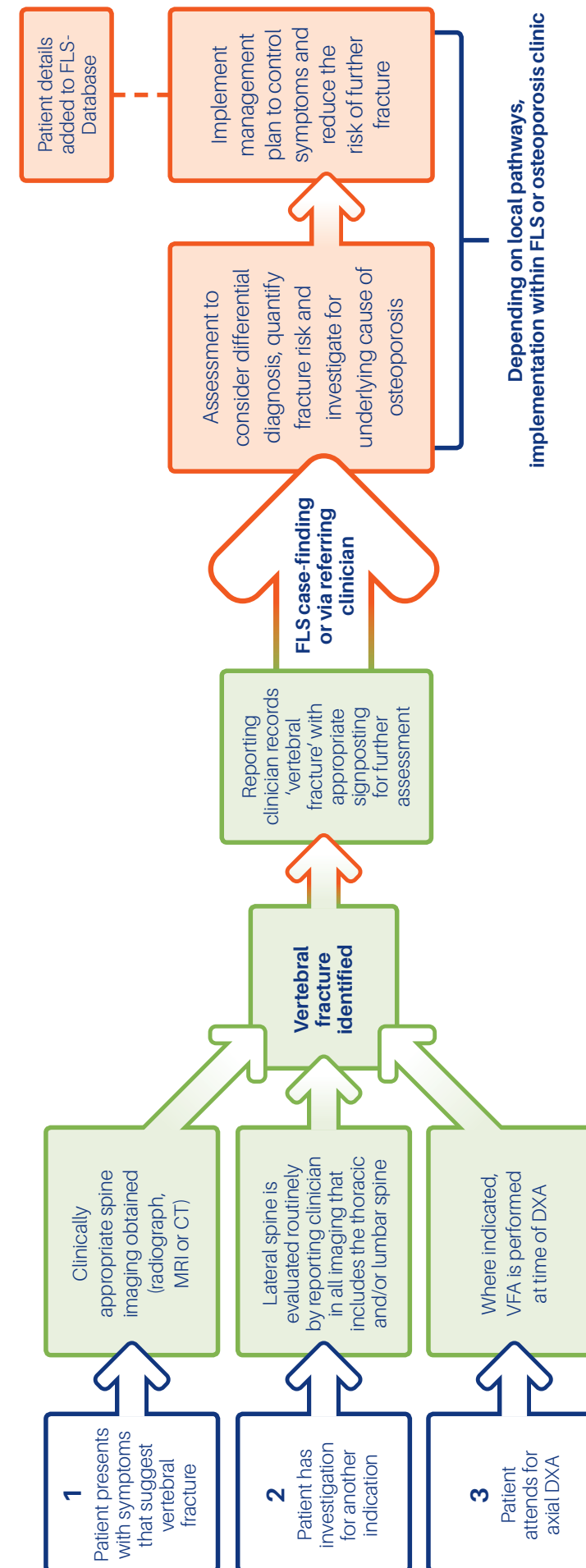
After a fragility fracture, most patients are not tested and treated for osteoporosis or falls risk, which leads to avoidable fractures. Currently, despite endorsement of the FLS model by the Department of Health, NHS England and the Scottish Intercollegiate Guidelines Network, fewer patients are receiving treatment after a fracture than in previous years.³⁸⁻⁴¹

Demonstrating ongoing effectiveness of services is key to their sustainability, particularly in light of the competing demands for NHS funding. FLS need the data to show commissioners that they meet agreed clinical standards and shape discussion on further service improvement.

The FLS-DB is commissioned by the Healthcare Quality Improvement Partnership and managed by the Royal College of Physicians as part of the Falls and Fragility Fracture Audit Programme (FFFAP) alongside the National Audit of Inpatient Falls and the National Hip Fracture Database. The FFFAP is included in the NHS England listing for national audits that must be reported in the Trust’s Quality Account and also forms part of the National Clinical Audit Patient Outcomes Programme. As a result, Trusts and commissioners are required to supply the resources needed to participate in the FLS-DB.

The FLS-DB includes a key performance indicator of the proportion of patients with vertebral fractures that are identified by the FLS, and this will be included in both annual reports and live run charts that will be publicly available in spring 2018.¹³

Vertebral fracture pathway



Implementation of the vertebral fracture pathway

Redesign of existing FLS pathways to improve vertebral fracture identification in accordance with this guidance may require additional resource, to include:

- Systematic reporting of spine imaging and introduction of a fail-safe alert process for vertebral fractures.
- Case-finding of vertebral fracture patients.
- Evaluation as to whether a vertebral fracture is a new finding in a patient already on treatment, and whether it is due to other pathology or trauma.
- Assessment, management and follow-up by the FLS or osteoporosis service.
- Audit of vertebral fracture identification.

Extra resource may include additional clinical and DXA assessments, as well as additional time for FLS nurses to establish whether an identified vertebral fracture is a new or old finding. Similarly, establishing whether a patient with a newly identified vertebral fracture needs to be seen in the FLS will in some cases take careful consideration and additional time.

National Osteoporosis Society support for service development

The NOS can support sites aiming to establish a new vertebral fracture pathway or augment their existing pathway to better meet the national clinical standards for FLS in respect of vertebral fractures.

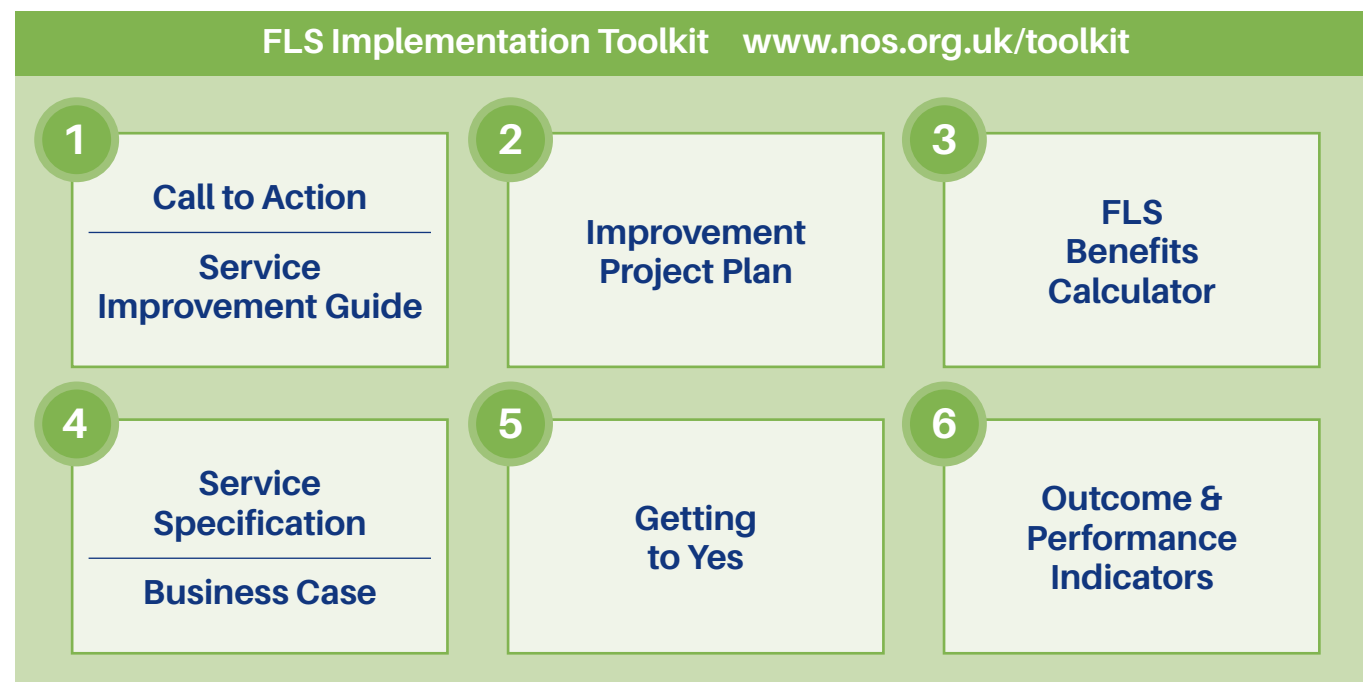
Since 2015 the NOS has been supporting the development of FLS across the UK. A team of specialist service development managers with clinical and commissioning experience works with sites to support new service development or quality improvement of existing services, to increase the coverage of secondary fracture prevention to all fracture types.

Operating in an economic climate where health budgets are tightly constrained, investment in new services must demonstrate both a solid evidence base and a strong business case. The NOS has produced a suite of evidence-based online resources to support FLS development and improvement. A comprehensive FLS Implementation Toolkit supports providers and payers in the commissioning process.⁴² Users can create a compelling, evidence-based business case without the need for advanced skills in costing, modelling or other health economic techniques.

In addition to online resources, the NOS offers:

- bespoke and expert support from inception to launch of an FLS, including development of the business case, service specification, and resource and capacity planning
- facilitation of engagement with stakeholders, including commissioners, to generate commitment to FLS and ensure that services are sustained
- assistance with induction and training of the fracture liaison nurse⁴³
- support for quality improvement to enable the development of an FLS to meet the UK FLS Clinical Standards, including periodic gap analysis and peer review
- advice regarding relevant protocols and care pathways for the service
- advice regarding data collection and methods of analysis, reporting, evaluation and inputting to the FLS-DB.

These services and resources are provided free of charge.



Appendix A – Definition of a vertebral fracture

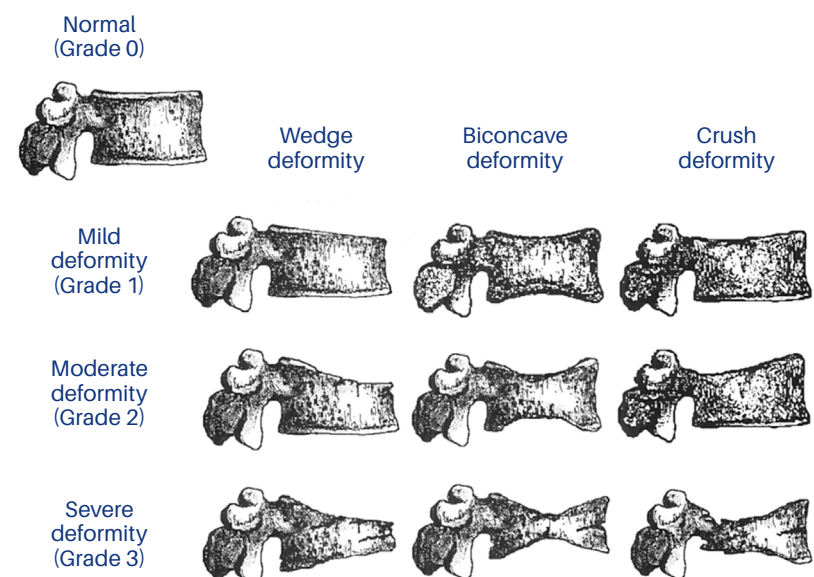
Various methods have been described to facilitate the systematic vertebral fracture definition. Primarily developed for use in clinical research trials, they may also be applied in clinical practice. However, experienced radiologists will generally undertake a less formal visual read of the images rather than systematically applying these techniques, which can be time-consuming.

Quantitative morphometric techniques involve detailed measurement of vertebral heights (anterior, mid and posterior) with comparison to adjacent vertebrae or to a normative reference database. Vertebral fractures can be defined if, for example, there is a greater than 3 standard deviations difference in vertebral heights from the reference range.⁴⁴ This is the methodology incorporated into DXA VFA scanners. However, an important limitation of this approach is that, by relying purely on change in vertebral height ratios, it does not differentiate between vertebral fractures and non-fracture deformities. It may therefore over-diagnose vertebral fracture where moderate to severe deformity is present resulting from other pathology (such as Scheuermann's disease or spondylosis), but under-diagnose mild vertebral fractures that do not meet height-loss criteria. A morphometrically defined fracture must always therefore be adjudicated by an experienced reader.

The most widely used technique is the semi-quantitative method described by Genant et al., which requires the visual recognition of a $\geq 20\%$ decrease in vertebral height (anterior, mid or posterior dimensions) together with careful scrutiny of vertebral end-plate changes to diagnose a vertebral fracture.³⁷ In equivocal cases, formal measurement of vertebral height may be undertaken.

Another technique involving visual evaluation of the vertebrae is the algorithm-based qualitative (ABQ) methodology.⁴⁵⁻⁴⁶ This is a systematic qualitative approach that relies on recognition of vertebral end plate deformity to identify vertebral fracture. This technique enables fractures with $<20\%$ decrease in vertebral height to be identified as well as guiding the differentiation of vertebral fractures from non-fracture deformities by scrutiny of the vertebral end plate.

Whichever method is used, it should be noted that a more severe fracture, or the presence of multiple fractures, indicates greater likelihood of future fracture. For this reason, single mild or borderline fractures are often discounted, particularly if there is no evidence from comparison to previous imaging of a change representing a definite new vertebral fracture.



Classification of vertebral fractures by the Genant semi-quantitative method.³⁷

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Appendix B – Case study of an audit performed in a large teaching hospital

A 15-day period was chosen. All CT chest, abdomen and pelvis scans (CT-CAP) performed during this period were identified from the digital radiological archives and were examined against the Audit Standards. An experienced clinician used the ABQ method to review all sagittal spinal views for the presence or absence of osteoporotic vertebral fractures.

Results

220 CT-CAP were performed during the 15 days, of which 193 were in men and women over 50 years old.

- *Audit Standard 1:* 161 (83.4%) of scan reports included comment on the thoracic and lumbar spine.
- *Audit Standard 2:* 26 (13.5%) of scans showed moderate/severe vertebral fractures, of which only 15 (57.7%) were identified in the report. Of the 11 scans with moderate/severe vertebral fractures that had not been reported, six had the fracture reported in subsequent imaging, and one had the fracture reported in previous imaging. Four had not had the fracture reported in previous or subsequent imaging.
- *Audit Standard 3:* Of the 15 scans reporting a vertebral fracture, 14 (93.3%) used the word "fracture". The single scan that did not use the phrase "Stable L1 superior endplate change".
- *Audit Standard 4:* No reports of scans with vertebral fractures included appropriate recommendations for further assessment of bone health or future fracture risk.

Conclusions

Midline sagittal reformatted images are generally performed and stored for future viewing as standard in our hospital. There is a need to raise awareness with colleagues in diagnostic imaging departments of the importance of reporting the spine and identifying any moderate/severe vertebral fractures using the word "fracture" in the report. There is also a need to develop a standard phrase for reporting clinicians to insert into the report when identifying a moderate/severe vertebral fracture. We will be recommending the following wording: "It is suggested that this patient should be investigated and managed for osteoporosis according to national guidelines". In this two-week audit, four patients were identified with moderate or severe vertebral fractures who may not yet be aware of this diagnosis. This suggests that, in our hospital, just in those patients having CT-CAP, approximately 100 additional patients per year could be identified as having a vertebral fracture and therefore could be investigated and managed to reduce their risk of further fractures. This has implications for both the patient's quality of life and healthcare cost savings.

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About us

The National Osteoporosis Society is the only UK-wide charity dedicated to ending the pain and suffering caused by osteoporosis. The Charity works tirelessly to help and support people with the condition as well as promoting good bone health to prevent osteoporosis. We do this by:

- Providing a range of information resources covering all aspects of osteoporosis for health professionals and the public.
- Providing a free helpline staffed by nurses with specialist knowledge of osteoporosis and bone health.
- Investing in research to ensure future generations are freed from the burden of osteoporosis.
- Influencing government and campaigning to improve and maintain essential services.
- Educating Health Professionals to ensure they are kept up to date about osteoporosis – through events, accredited training courses and our leading conference on osteoporosis and bone health.
- Working in partnership with the NHS to set up and improve Fracture Liaison Services which can reduce the number of fractures caused by osteoporosis.

To find out more about our information, support and services, visit our website: www.nos.org.uk

Professional Membership

Professional membership of the National Osteoporosis Society will ensure you become better informed and able to deliver the best care possible to people with osteoporosis or fractures.

As a professional member, you'll have all the information you need at your fingertips and will stay up to date on best practice, care, delivery, new treatments and the latest news on osteoporosis research findings.

You'll also feel proud to be part of an organisation working hard to help those affected by osteoporosis.

To join a growing network of professional members like you, call our membership team on 01761 473287 or visit www.nos.org.uk/professionals

 **01761 471771** (General Enquiries)

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