Royal Osteoporosis Society

Better bone health for everybody

State of the Nation report: Vertebral fracture identification in 2021

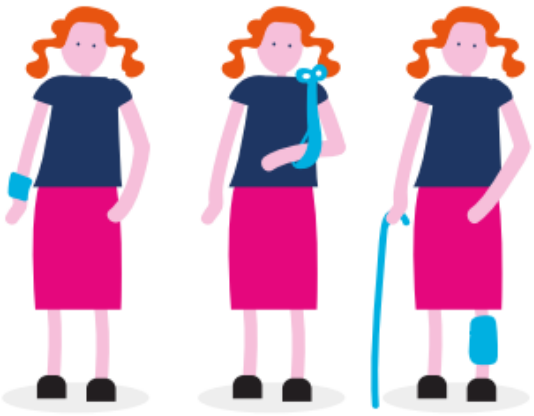
Better bone health for everybody

The Royal Osteoporosis Society (ROS) is the UK's only national charity dedicated to bone health and osteoporosis. We work to improve the bone health of the nation and support everyone with osteoporosis to live well through our support services and advice.

We influence and shape policy and practice at every level through our work with healthcare professionals and policy-makers. We are driving research and the development of new treatments and therapies, working towards a future without osteoporosis with our Osteoporosis and Bone Research Academy.

More than 3 million people in the UK are estimated to have osteoporosis.

What is osteoporosis and secondary fracture prevention?



According to our survey, a fifth of women (who have broken a bone) break 3 or more before their osteoporosis is diagnosed.

Osteoporosis is a condition where your bones lose strength, making you more likely to break a bone than the average adult. As bones lose strength, they can break during normal daily activities, or after a minor bump or fall. These breaks (fractures) are most common in the wrists, hips, and spine, and are clinically known as 'fragility fractures'. There are several drug treatments for osteoporosis that are both clinically and cost-effective. The first indicator of osteoporosis for many people is a broken bone. If this is picked up and the person is assessed and treated appropriately, then further breaks can be prevented – this is known as 'secondary fracture prevention'.

Sadly however, we know that a fifth of women who have broken a bone, break three or more before being diagnosed with osteoporosis.

Vertebral fractures

70%

of vertebral fractures do not come to medical attention

Vertebral (spinal) fractures are the most common type of broken bone caused by osteoporosis. More than one in 10 women over the age of 50 have one or more vertebral fractures, rising to one in five in the over 70s.[1-3] They most commonly occur in the thoraco-lumbar area of the spine. They can be asymptomatic or present with the generic symptom of back pain and loss of height. As a result, they are often dismissed as an inevitable part of ageing. The good news is that **vertebral fractures are treatable and preventable**. A range of medications are available that are highly effective in reducing the risk of further fracture by between 50% and 80%.[4-12]

This report outlines the challenges involved in identifying vertebral fractures and reviews the state of the nation in vertebral identification in the UK in 2021.

A vertebral fracture is a red flag

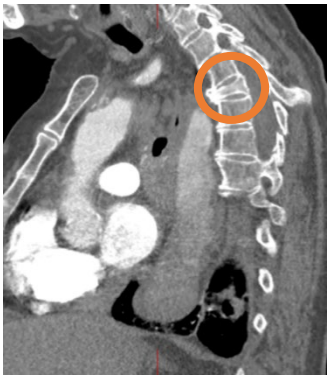
A vertebral fracture is a powerful predictor of another vertebral fracture and of a future hip fracture.[13-16] More than half of patients with a hip fracture have evidence of a prior vertebral fracture.[17] Without treatment, a person is nearly three times more likely to have a hip fracture after a vertebral fracture, and more than five times for likely to have another vertebral fracture.

Hip fractures alone cost the NHS £1.1 billion per year

Some vertebral fractures incur hospital costs, and we know that people with a diagnosed vertebral fracture visit their GP an additional 14 times in the first year, compared with the year before.[18] Given the expenses associated with these fractures and of the hip fractures that they predict, there is a clear cost benefit to the NHS for identifying vertebral fractures and treating the underlying osteoporosis.

Vertebral fractures are associated with an eight-fold increase in mortality

The risk increases with the number of vertebral fractures sustained.[19-21] This rise in mortality is not seen with most other fractures (other than hip and wrist fractures) and is not yet understood. It is also not explained by factors such as increased age, smoking or chronic disease. However, studies have found deaths due to pulmonary diseases and cancer to be significantly elevated after a vertebral fracture.[19-20] More research is needed to establish the common underlying pathology of osteoporosis and cancer spread, and whether there is an underlying inflammatory disease.



Case study:

In February 2013, an 84-year-old woman was referred by a chest physician for a CT-scan with chest pain following recent treatment for TB. The CT report comment on bones said, 'No aggressive bony lesion.' There was no comment or recommendation for follow up or further assessment for osteoporosis or fragility fracture risk.

In May 2015, a follow-up CT was performed. There was no comment on the bones in the report. In April 2016, the woman fell and broke her hip, and had a total hip replacement. Unfortunately, she did not leave care and died in June 2016.

In a local audit of vertebral fracture identification in August 2017, the original 2013 CT-scans were scrutinised, and showed a vertebral fracture at T3. This opportunity to assess for osteoporosis and provide treatment that could avert a future hip fracture was missed.

Vertebral fractures significantly diminish people's quality of life

Vertebral fractures lead to a devastating loss of independence and confidence. These fractures interfere with people's ability to conduct almost all daily tasks involving bending and standing, such as washing up, cooking, and getting dressed.[22] The dominant symptom reported is acute immobilizing pain that is emotionally draining, physically exhausting and intensely disruptive.[23]

58% of people who have experienced at least one fracture in their spine have long-term pain which they don't think will ever go away.

The loss of height caused by vertebral fractures and curving of the spine (kyphosis) causes problems with balance, eating, swallowing, and breathing. People describe a sense of feeling that they are being pulled forwards, and fear that they will lose their balance and fall. They also describe feeling 'squashed', causing restricted breathing and loss of appetite. Often, this is suffering that could have been averted had their first vertebral fracture been identified.

> " I went from running my own hair salon and walking over 30 miles a week, to having to stop work and all physical activities due to the horrendous pain. I've also lost four inches in height. You look in the mirror and hardly recognise yourself. Living with these fractures is a nightmare that never goes away. "

Vertebral fracture identification in 2021

The case for the identification of vertebral fractures is clear – however, currently **only 30% of vertebral fractures come to medical attention**.[24-25] This is a worldwide problem and it due to a complex number of reasons.[26]

In the first instance, unlike other fractures, most vertebral fractures do not result from any kind of trauma or fall, so often a person themselves will not report their symptoms to their GP. When someone does visit their GP with back pain, it is commonly written off as degenerative or age-related changes, and only painkillers are recommended. There is a perception among GPs that NHS guidance discourages routine imaging for 'back pain', though it is warranted where osteoporosis is suspected. This has created a barrier at primary care level to referral, identification, and treatment for osteoporosis.

This report looks at the extent to which people with vertebral fractures are receiving the best practice care that they need in 2021. It focuses on opportunities to identify vertebral fractures in secondary care. It will examine the evidence of effective vertebral fracture identification and address what more needs to be done.

Vertebral fractures identified incidentally by radiology

An opportunity to identify vertebral fractures arises when a patient is referred to radiology for imaging (for example, a CT-scan) for *any clinical reason.* Though the vertebrae may not be the focus of the investigation, if the thoracic spine can be viewed on the image this is an opportunity to spot undiagnosed fractures. In practice however, this opportunity is often missed because:

- The spine may not be routinely scrutinised during reporting by the radiologist or radiographer.

- Radiologists who identify vertebral fractures do not report them for several reasons, all of which demonstrate a lack of understanding of their clinical importance. When surveyed by the ROS, radiologists said that they did not report vertebral fractures because:
    - They believed that they would not be treated (there is no patient pathway to osteoporosis treatment for a vertebral fracture discovered incidentally)
    - They only reported on the primary question being asked in the referral
    - They believed that osteoporosis (including fracture) is a normal aging process.

- When radiologists identify fractures in a CT, they will often use ambiguous terminology rather than the word 'fracture'. Terms such as 'loss of height' or 'wedging' are common. This fails to alert other clinicians to their significance.

- Similarly, even when a vertebral fracture is reported, the clinician who referred the patient (for another medical issue) will often fail to recognise the clinical importance and therefore fail to act.

How clinicians respond to significant unexpected findings

Here's a helpful comparison to understand the significance of the failure to report or act on reports of vertebral fractures:

Patients can rely on the fact that if a heart attack were incidentally identified on an ECG, it would be treated, and their management would be changed. This is not the case for vertebral fractures identified incidentally, even though the situations have a lot in common when it comes to the benefits to the patient of reporting accurately.

"Starting daily pravastatin after a myocardial infarction (MI) leads to a **24%** reduction in the risk of new MI, an outcome that comes with an in-hospital mortality of 3–5% at age 70–79. Starting osteoporosis treatment with a mere annual dose of zoledronic acid after an osteoporotic vertebral fracture reduces the risk of hip fracture, a condition that also has an in-hospital mortality of 3–5%, by **42%**."

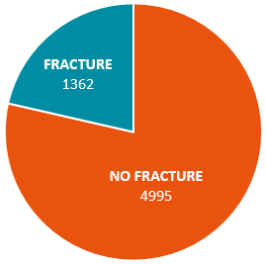
2019 National Audit of Radiology Services

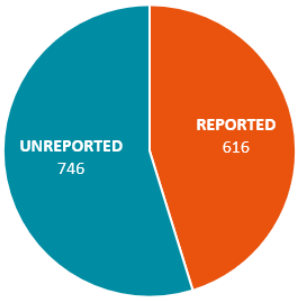
Following publication of the ROS clinical guidance on the reporting of vertebral fractures in 2017, we collaborated with the Royal College of Radiologists and the Royal College of Physicians to develop a national audit of vertebral fracture identification in the UK.[27] The audit examined the organisational reporting structure and involved retrospective scrutiny of several CT-scan reports (chest, abdomen and pelvis) that included images of the spine. These scans had been requested by a referring clinician for *any* clinical reason (other than trauma, myeloma or known bone metastatic disease). The 63% UK response rate was good (127/202 radiology departments), though notably lower in Wales (20%). Data was included on 6,357 patients.

Key findings

Identification and reporting

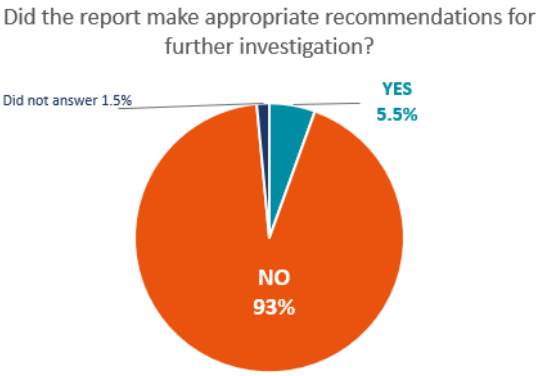
21.4% of patients had a vertebral fracture. Encouragingly, where vertebral fractures were reported – they were described as 'fractures' in 60% of cases.





Of those identified, only 45.2% of vertebral fractures were reported in the original clinical report – this represents 746 missed opportunities to intervene in the progression of patients' underlying bone disease.

Acting on reports of vertebral fracture

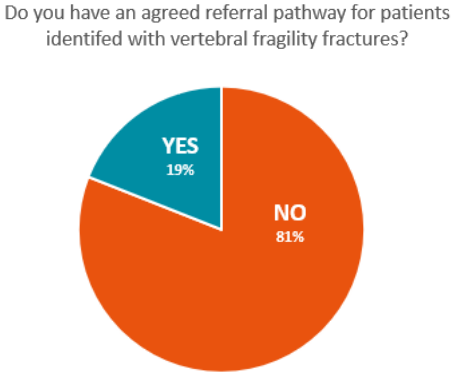


A worrying finding of the audit was that where a vertebral fracture *had* been identified, **only 5.5% of reports made recommendations for further investigation** – such as a bone density (DXA) scan or a fragility fracture assessment.

Therefore, in most cases, prompt and appropriate action would not have been taken.

Radiology departments use alert systems to notify referrers of significant, unexpected, or urgent findings. However, lack of compliance with UK guidelines around the communication of these findings is commonplace.[28] This audit found that only 26% of radiology departments included vertebral fragility fractures in their policy for alerts.

Available patient pathways for onward referral



The audit found that even though in 95% of cases patients could access an appropriate bone service, only 19% of radiology departments had a defined pathway for patients with a vertebral fracture to FLS or osteoporosis service due to a lack of multidisciplinary collaboration between departments.

Outsourcing radiology reporting

Use of offsite 'teleradiology' reporting services[1] is increasingly commonplace in the NHS. At least 65% of services audited reported outsourcing a proportion of their reporting of CT imaging. Even where there was a vertebral fracture referral pathway for patients in place, this was unavailable to 60% of these teleradiology companies.

Radiological practices

Vertebral fractures were much more likely to have been identified and reported where an image of the spine in its length (sagittal reformat) was presented to the radiologist and saved on the reporting platform (PACS system). This only occurred as standard practice in 50% of cases. This presents a straightforward opportunity to improve reporting by routinely saving this image.

[1] Outsourced teleradiologist is a radiologist usually at Consultant level or equivalent but not hospital based i.e. working for a teleradiology company remotely often over several hospital sites.

Identification of vertebral fractures in Fracture Liaison Services

What is a Fracture Liaison Service (FLS)?

An FLS is a **secondary fracture prevention service**. It is designed to identify, investigate, and treat patients with fragility fractures with a view to preventing further fractures. FLS use a variety of methods to identify patients with fragility fractures, such as lists of people by fracture clinics, radiology or A&E, patients identified by artificial intelligence algorithms and patients on trauma lists. They also take direct referrals. These patients are then assessed, treated for osteoporosis if necessary and supported in onward management.

In 2021, access to an FLS is a postcode lottery. Only 60% of the UK population have access to an FLS. Furthermore, in 2020 nearly 50% of FLS ceased operations due to the COVID-19 pandemic. It is not clear what proportion of these services are currently offering a service, remote or otherwise.

However, if a person with a vertebral fracture is fortunate enough to live in an area served by a Fracture Liaison Service (FLS), then their fracture may be picked up by this service.

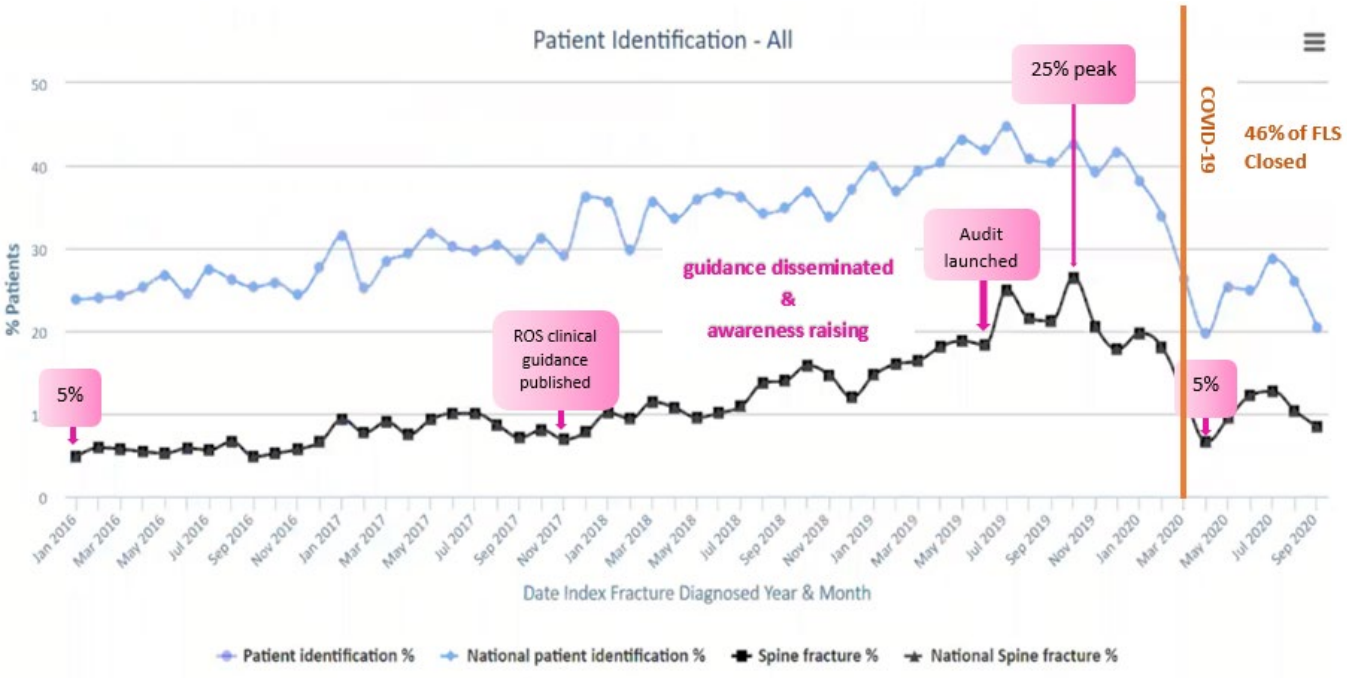
The FLS national audit database

The Royal College of Physicians holds a national audit database of FLS in England, Northern Ireland, and Wales. Currently, 61 FLS routinely submit nearly 60,000 patient records to the database every year. These records demonstrate that identification of people with vertebral fractures has proven consistently challenging. Individual FLS fail to find cases of vertebral fragility fracture for a variety of reasons:

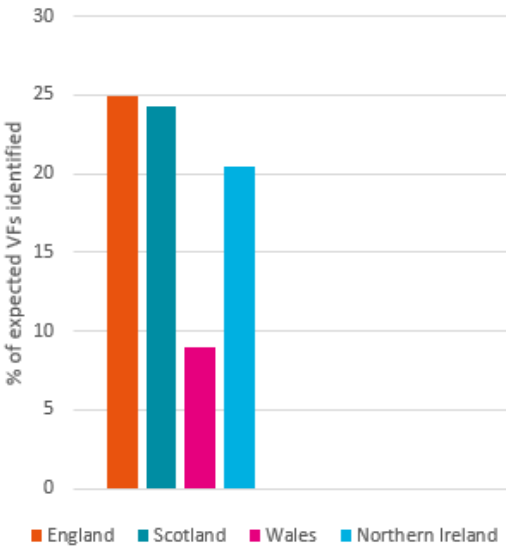
- These patients often do not present to A&E and are therefore not found on trauma lists.
- Vertebral fractures are sometimes outside the scope of the FLS as it was commissioned.
- Clinicians lack awareness of the significance of a vertebral fracture, and therefore do not refer patients to FLS when alerted to one.
- There are poor links between FLS and radiology services, and even where links are good, radiologists may not comment on incidentally discovered vertebral fractures.
- Outsourced teleradiology services do not flag up these fractures to FLS.

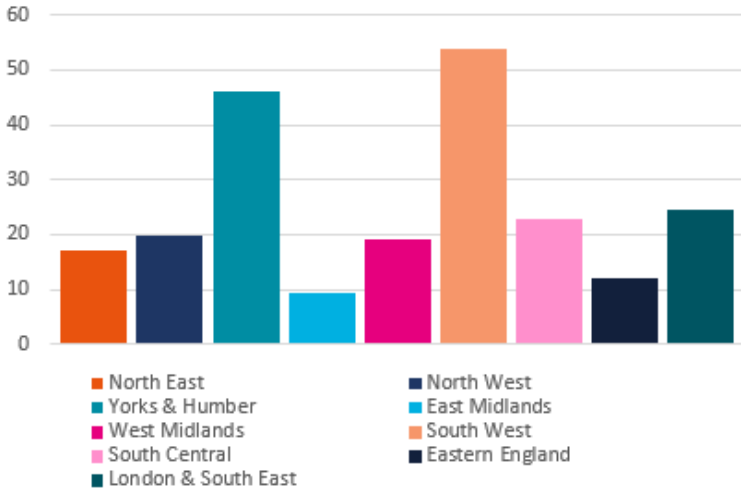
Success in identifying vertebral fractures varies widely across FLS, however it has improved since 2016, when identification rates at 5% of expected cases. Marked improvement began after the publication of our clinical guidance in late 2017, to a peak at 25% in 2019 after work to disseminate the guidance and raise awareness. This progress was all but wiped out after the closure of 46% of services during coronavirus, but we expect much of the progress to be restored after the pandemic.

National and regional variation in FLS identification of vertebral fracture



In 2019, identification by FLS of vertebral fracture varied widely between the four nations of the UK and between the regions of England. Regional profiles suggest that FLS services in the south west of England are the most effective in identifying vertebral fractures but still fall short of optimal levels and are missing opportunities. Hospital Trusts in the East of England and Wales report the lowest proportion of vertebral fractures identified (see regional profiles in Appendix 1).





Vertebral fractures: the call to action

It is not acceptable that in 2021, opportunities to identify and treat vertebral fractures are being missed. The current failings present a challenge to radiologists and clinicians, government agencies, professional bodies, and the ROS. However, this is also a significant opportunity to enact positive change to the health and wellbeing of a large number of people.

1. **End the postcode lottery for quality secondary care and develop a national FLS network.** We need strict, top-down standards to ensure everyone who fractures has access to a quality-assured Fracture Liaison Service (FLS) in every area of the UK. We also need to ensure the re-establishment of all FLS post-pandemic.

2. **Invest in the hospital-based solutions reliant on IT infrastructure and communications networks.** Some of the answers lie with radiology, radiographers, clinicians and their administrative teams – to agree and standardise reporting and agree referral pathways so that patients can receive the treatment they need. In the future, it is possible that artificial intelligence systems may have a significant role to play in vertebral fracture identification, as these have been demonstrated to be highly efficient.

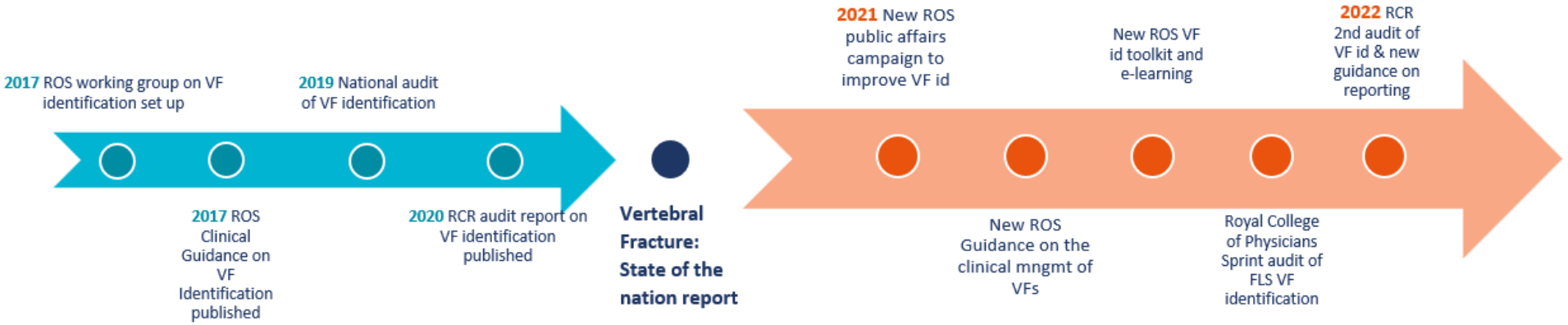
3. **A fair share of research investment.** Muscular-skeletal conditions account for 9% of the health burden but a mere 3% of research spend. Further research is required to understand the underlying pathology of osteoporosis and vertebral fractures, to reduce mortality of patients. The Osteoporosis and Bone Research Academy is leading the search for a cure, through its Research Roadmap. We invite the Government to commit to match-funding research investment.

The role of the ROS

We will continue to drive improvements in vertebral fracture identification. In 2021, we are ramping up our policy and public affairs focus to drive improvement in secondary fracture prevention.

In 2021, we are publishing new clinical guidance on the clinical management of vertebral fractures for all healthcare professionals delivering care for people with vertebral fractures, including nurses, physiotherapists, neurosurgeons, and geriatricians. We are also developing an identification toolkit and e-learning. We continue to support the Royal College of Physicians, which via the FLS Database will conduct a sprint audit of vertebral fracture identification in 2021 to improve our understanding of the barriers in place. Similarly, the charity is working with the Royal College of Radiologists, which has committed to conduct a second audit of radiology services in 2022.

Vertebral fractures: Moving forward



Acknowledgement of support

AMGEN

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Appendix 1

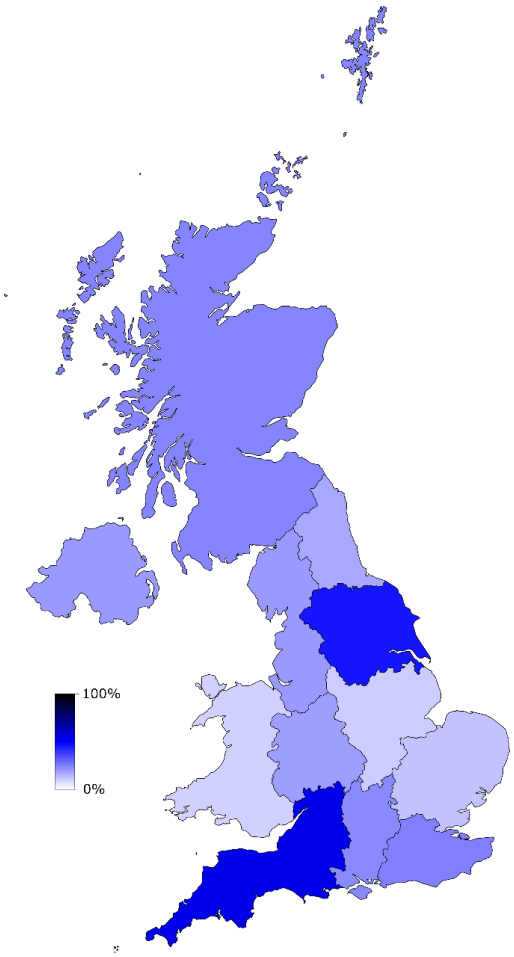
Vertebral fracture identification by FLS services: Regional profiles

UK Region	% VFI by FLS in region
North East England*	17.2
North West England*	19.8
Yorkshire and Humber*	45.9
East Midlands England*	9.4
West Midlands England*	19.2
South West England*	53.9
South Central England*	22.8
Eastern England*	12.1
London and South East England*	24.5
Wales *	9
Scotland **	24.2
Northern Ireland**	20.5

*Data reported by RCP FFFAP FLSDB 2019
** Direct reporting to ROS by FLS'

Heat map

Heat map demonstrating the percentage coverage of FLS across the UK.



Further analysis: Lows and highs

Data from RCP FFFAP FLSDB reporting in 2019:

There are 10 hospital Trusts that report less than 1% of vertebral fracture identification.

Region	n. Trusts reporting <1% VFI
London and South East England	3
North West England	2
West Midlands England	1
Eastern England	3
East Midlands	1

These 10 Trusts are commissioned by 20 Clinical Commissioning Groups

CCG	% VFI by Trust commissioned by CCG
Wigan Borough CCG	0
Birmingham and Solihull CCG	0
Stockport Clinical Commissioning group	0.3
Mansfield and Ashfield CCG	0.7
Newark and Sherwood CCG	0.7
Nottingham City CCG	0.7
Nottingham North and East CCG	0.7
Nottingham West CCG	0.7
Rushcliffe CCG	0.7
Mid Essex CCG	0.7
Cambridgeshire and Peterborough CCG	0.7
Shouthend CCG	0.8
CWHHE Collaborative *	0.9 (0- 0.9)
BHH federation **	0.9 (0- 0.9)

* NHS Central London CCG, NHS Ealing CCG, NHS Hammersmith & Fulham CCG, NHS Hounslow CCG, and NHS West London CCG: commissioning 2 Trusts in this table

** NHS Brent CCG, NHS Harrow CCG and NHS Hillingdon CCG: commissioning 2 trusts in this table

There are 10 hospital Trusts which report more than 50% of vertebral fracture identification.

Region	**n. Trusts reporting >50% VFI**
South West England	4
Yorkshire and Humber	2
West Midlands England	1
North West England	1
South Central England	1
London and South East England	1

These 10 Trusts are commissioned by 10 Clinical Commissioning Groups and integrated care system.

CCG	**% VFI by Trust commissioned by CCG**
Somerset CCG	275.8 (52.6-52.6-146.4)
Rotherham CCG	52.7
Staffordshire and Stoke-on-Trent CCGs and NHS Trusts	61.4
Oldham CCG	61.9
Dorset CCG	118.5 (52.6-65.9)
Buckinghamshire, Oxfordshire and Berkshire West ICS*	66.2
Bradford District and Craven CCG*	124.1
Bath and North East Somerset CCG	146.4
Wiltshire CCG	146.4
Southwark CCG	305.8

*utilised artificial intelligence/automated solutions for VFI

There are 49 additional trusts reporting VFI from 1%- 49%, however most trusts (27) report less than 10% VFI.

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