**Frailty and Falls** **Osteoporosis**

**Supporting booklet, references and further reading**

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**Nadine Fidler, Advanced Clinical Practitioner**

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# Falls

## What is a fall?

Inadvertently coming to rest on the ground, floor or other lower level, excluding intentional change in position to rest in furniture, wall or other objects.

A fall is defined as an event which causes a person to, unintentionally, rest on the ground or other lower level.

#### Reading:

[Quality statement 1: Identifying people at risk of falling - NICE](https://www.nice.org.uk/guidance/QS86/chapter/Quality-statement-1-Identifying-people-at-risk-of-falling)  [Falls - World Health Organization (WHO)](https://www.who.int/news-room/fact-sheets/detail/falls/) 

## Falls the facts

Falls are the most frequently reported incident affecting hospital inpatients. There were 247,000 falls occurring in inpatient settings each year in England alone.

Falls and fractures are a common and serious health issue faced by older people in England. People aged 65 and older have the highest risk of falling, with around a third of people aged 65 and over falling each year. 1 in 2 over 80 will have at least one fall a year.

Anyone can have a fall, but older people are more vulnerable and likely to fall, especially if they have a long-term health condition

Falls in older adults, particularly those living with frailty, should be considered a warning sign of potentially unidentified underlying conditions. A fall may be the presenting feature of acute medical conditions.

#### Reading:

[National Audit of Inpatient Falls 2023 annual report - data.gov.uk](https://www.data.gov.uk/dataset/bb9a630c-8378-4a14-87b9-943e091bf3b2/national-audit-of-inpatient-falls-2023-annual-report)[National Audit of Inpatient Falls 2020 - data.gov.uk](https://www.data.gov.uk/dataset/74aa0d1c-6a76-4c57-bf3b-b4155822d307/national-audit-of-inpatient-falls-2020)

[Falls: applying All Our Health - GOV.UK](https://www.gov.uk/government/publications/falls-applying-all-our-health/falls-applying-all-our-health)[British Journal of Nursing - Patient falls while under supervision ...](https://www.britishjournalofnursing.com/content/professional/patient-falls-while-under-supervision-trends-from-incident-reporting) 

## Local data regarding population and health impact

Previously the Oxfordshire Joint Strategic Needs Assessment (JNSA) identified current and future health and wellbeing needs of our local population. Last updated in 2024.

JSNA [Oxfordshire Health and Wellbeing](https://data.oxfordshire.gov.uk/wp-content/uploads/2024/12/JSNA2023_Introduction_summary.pdf)

The Oxfordshire data hub now replaces the JNSA and is our go-to source for comprehensive information about our county. You will find a wealth of information for you to use related to population, economy, health, education, environment, housing, crime, and more, hosted by the County Council.

[Health - UTLA | Oxfordshire | Report Builder for ArcGIS](https://data.oxfordshire.gov.uk/health-and-social-care/#/view-report/1835e7ef70a748c79aa478f386581700/___iaFirstFeature/G3)[Oxfordshire Data Hub – Population – Current Population](https://data.oxfordshire.gov.uk/population/current-population/)

## Consequences of falls

Personally: Health (injury, pain), Quality of life (distress/fear of falling, loss of confidence, mobility and independence), Social isolation and depression, Effects on family members and carers, hospitalisation, Care Home admissions.

Head injury whilst on anticoagulants can increase the risk of intracranial bleeds and internal bleeding following trauma.

Health Care System: Over 70,000 people in England, Wales and Northern Ireland will break their hip every year, occupation of one in thirty hospital beds and a cost of £2 billion in hip fractures, total cost estimated at £4.4 billion, £1.1 billion for social care.

Applying evidence-based guidance is essential in preventing and managing falls and fragility fractures.

#### Reading:

#### [The Frailty Syndrome - PMC](https://pmc.ncbi.nlm.nih.gov/articles/PMC5873811/)A qr code with dots  AI-generated content may be incorrect.[NICE impact falls and fragility fractures](https://www.bgs.org.uk/sites/default/files/content/resources/files/2018-08-29/NICE-Impact-falls-and-fragility-fractures.pdf) A qr code with black dots  AI-generated content may be incorrect.[NHFD-2024\_Annual\_Report\_v102.pdf](https://www.nhfd.co.uk/FFFAP/Reports.nsf/0/A54428B2730FFCC980258BA4003ABB86/%24file/NHFD-2024_Annual_Report_v102.pdf)A qr code with black dots  AI-generated content may be incorrect.

## Drivers and guidelines for reference

[NHS Long Term Plan v1.2 August 2019](https://www.longtermplan.nhs.uk/wp-content/uploads/2019/08/nhs-long-term-plan-version-1.2.pdf) [Fit for frailty | British Geriatrics Society](https://www.bgs.org.uk/resources/resource-series/fit-for-frailty) 

[CGA in Primary Care Settings: Introduction | British Geriatrics Society](https://www.bgs.org.uk/cgatoolkit) 

[NHS England » Priorities and operational planning guidance 2024/25](https://www.england.nhs.uk/publication/priorities-and-operational-planning-guidance-2024-25/)

## NICE Guidelines

Published in April 2025 replacing clinical guidelines CG161, covers assessment of falls risk and interventions to prevent falls in people aged 65 and over who present because of a fall or recurrent falls in the last year, falls prevention in older people in the community, older people at risk of falling or have fallen during hospital stay and now include people 50 to 64 who are at higher risk of falls.

<https://www.nice.org.uk/guidance/ng249> 

[Recommendations | Head injury: assessment and early management | Guidance | NICE](https://www.nice.org.uk/guidance/ng232/chapter/Recommendations#pre-hospital-assessment-advice-and-referral-to-hospital)

## Why we fall

Older adults are at increased risk of falling due to a combination of both extrinsic and intrinsic factors

**Extrinsic factors** include environmental hazards such as poorly lit or cluttered environments, use of assistive devices like walkers or canes, and health conditions that cause muscle weakness, vertigo, balance or walking issues.

**Intrinsic factors** include age-related changes in physical fitness, as we age, we may become less active, leading to reduced muscle mass and strength, poor balance and coordination, reduced flexibility and decreased bone mass.

**Chronic diseases** such as Multiple sclerosis, Stroke, Parkinson's disease, Alzheimer's disease, diabetes, cardiac causes (bradycardia/heart block and atrial fibrillation or other arrhythmias) and arthritis that affect balance, physical strength and joint integrity.

**Acute illness** such as infection, dehydration or acute kidney injury.

Our **vision** can become impaired due to age-related eye diseases such as cataracts, glaucoma, and macular degeneration make it difficult to detect fall hazards. A change in visual acuity (which measures the clarity of your vision at a distance) depth perception and contrast sensitivity (the ability to distinguish between an object and the background behind it) also occurs with age and can impact us when walking between rooms, on different surfaces or down steps.

#### References/Reading:

[Aging and Your Eyes | National Institute on Aging](https://www.nia.nih.gov/health/vision-and-vision-loss/aging-and-your-eyes)  (Further information and age-related eye conditions

Why is contrast sensitivity so important <https://www.optometrytimes.com/view/why-is-contrast-sensitivity-important->

Contrast Sensitivity and how it Differs with Visual Acuity <https://www.youtube.com/watch?v=x57VSBAgXCM>

[The Royal College of Ophthalmologists |](https://www.rcophth.ac.uk/) 

[Vision and falls - College of Optometrists](https://www.college-optometrists.org/category-landing-pages/falls/focus-on-falls) 

[World Guidelines for Falls Prevention and Management for Older Adults: A Global Initiative | British Geriatrics Society](https://www.bgs.org.uk/world-guidelines-for-falls-prevention-and-management-for-older-adults-a-global-initiative)

[VALD: physio strength and balance technology assisting in fall prevention - Physiotherapist Brisbane City, Physio Therapy](https://northwestphysio.com.au/vald-physio-strength-and-balance-technology-assisting-in-fall-prevention/)

**Medications** like sedatives, antidepressants, antipsychotics, opioids all impact our central nervous system and our response/awareness to our surrounding. Some cardiovascular drugs can cause drowsiness, dizziness (can cause our blood pressure to drop on standing), slow the pulse rate, and low blood pressure (reducing blood volume), increasing the risk of falls. Changes in absorption, distribution, metabolism, and excretion also occur with ageing requiring that doses of some drugs be decreased to avoid toxicity.

Reviewing medications is best practice and it is important to consider risks and benefits and apply STOPP/START principles.

[Prescribing in the elderly | Medicines guidance | BNF | NICE](https://bnf.nice.org.uk/medicines-guidance/prescribing-in-the-elderly/) 

There is evidence to suggest that medicines with anticholinergic properties can adversely affect cognition in older people and showing a greater rate of cognitive decline over time, falls and increased mortality. Some patients are found to be taking anti dementia medication called acetylcholinesterase inhibitors and if this is the case their medication to review any with an ACB burden should be reviewed. You can calculate the score using this link: [ACB Calculator](https://www.acbcalc.com/)

There are alternatives that we should consider and guidance has been formulated by the Oxford University Trust [Falls MIL Feb24.docx](https://ohft365.sharepoint.com/%3Aw%3A/r/sites/MCOHS/_layouts/15/Doc.aspx?sourcedoc=%7BB7230B5C-899F-4E35-AB9F-AF7DBF1B5789%7D&file=Falls%20MIL%20Feb24.docx&action=default&mobileredirect=true)

#### Reading:

[Acetylcholinesterase inhibitors | Prescribing information | Dementia | CKS | NICE](https://cks.nice.org.uk/topics/dementia/prescribing-information/acetylcholinesterase-inhibitors/) 

[Drugs Contributing to Anticholinergic Burden and Risk of Fall or Fall-Related Injury among Older Adults with Mild Cognitive Impairment, Dementia and Multiple Chronic Conditions - PMC](https://pmc.ncbi.nlm.nih.gov/articles/PMC6386184/#:~:text=Anticholinergic%20drugs%20could%20increase%20fall,a%20loss%20of%20visual%20accommodation) 

[Home - electronic medicines compendium (emc)](https://www.medicines.org.uk/emc) 

### [Medicines Optimisation | RPS](https://www.rpharms.com/resources/pharmacy-guides/medicines-optimisation) - Medicines Optimisation

### Comprehensive Geriatric Assessment

The Comprehensive Geriatric Assessment (CGA) is a multidimensional holistic assessment of an older person that considers their health and wellbeing with the formulation of a plan and interventions. Progress is reviewed and reassessed at appropriate intervals with the interventions reconsidered accordingly.

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| **Ask specific questions to establish the detail of what happened.****Ask how many falls in the last year and begin with the most recent fall and work backwards.** |
| How many falls in the last year? |  |
| When did they first start to fall? |  |
| Are they worried about falling? |  |
| **Falls:** | **Most recent** | **Next fall** | **Next fall** | **Next fall** |
| Date |  |  |  |  |
| Time of day |  |  |  |  |
| Where were they |  |  |  |  |
| What were they doing |  |  |  |  |
| Was it a long lie |  |  |  |  |
| **Did they experience any:** |  |  |  |  |
| Dizzy/giddiness |  |  |  |  |
| Syncope/LOC |  |  |  |  |
| Chest pain |  |  |  |  |
| Palpitations |  |  |  |  |
| Sweaty |  |  |  |  |
| Weakness |  |  |  |  |
| Seizure |  |  |  |  |
| Injury sustained |  |  |  |  |
| Were they able to get themselves up unassisted |  |  |  |  |

The British Geriatric Society CGA toolkit has been developed for medical and healthcare professionals and explains what comprehensive geriatric assessment is, in what circumstances to use it. The CGA guides cover a range of conditions and situations, from bone health to end of life care.

#### Comprehensive Geriatric Assessment Toolkit for Primary Care Practitioners | British Geriatrics

 [Society](https://www.bgs.org.uk/resources/resource-series/comprehensive-geriatric-assessment-toolkit-for-primary-care-practitioners)

#### Crib Sheet to support falls history taking

## Falls history taking

Ask about how often the person has fallen, the circumstances in which the fall(s) occurred (such as place, time, activity being performed, and preceding symptoms [for example light headedness or loss of consciousness]), and the consequences of the fall(s) (such as injuries, fear of falling, difficulty performing daily activities, activity restriction, and/or pain). If possible, obtain an eye-witness account.

This will help to distinguish a simple fall (caused by a chronic impairment of cognition, vision, mobility, or balance) from a collapse (caused by an acute medical problem, for example, arrhythmias, transient ischaemic attack, or vertigo).

It is important to ask in regards fear of falling again as some studies have found a correlation between fear of falling and increased frailty.

#### Reading:

[Association Between Fear of Falling and Frailty in Community-Dwelling Older Adults: A Systematic Rev](https://www.tandfonline.com/doi/pdf/10.2147/CIA.S328423)

[Scenario: Falls - risk assessment | Management | Falls - risk assessment | CKS | NICE](https://cks.nice.org.uk/topics/falls-risk-assessment/management/falls-risk-assessment/)

[Falls - risk assessment | Health topics A to Z | CKS | NICE](https://cks.nice.org.uk/topics/falls-risk-assessment/)

### Orthostatic hypotension (postural hypotension)

Orthostatic hypotension (OH) is an abnormal decrease in systolic blood pressure (BP) on standing and has been defined as a systolic drop of >20mmHg, diastolic drop of 10mmHg within 3 minutes of standing.

There are many causes including neurogenic conditions such as Parkinsons, multi system atrophy, autonomic failure, dementia. Medication induced particularly polypharmacy in older people. B12 deficiency, diabetes, autoimmune diseases and dehydration, anaemia, alcoholism, vasovagal symptoms.

Symptoms can occur following a postural change form sitting or lying on rising from bed or chair. Symptoms can include lightheaded, syncope, dizziness and less frequently gait disturbance and limb weakness and fatigue.

Orthostatic Hypotension <https://www.ncbi.nlm.nih.gov/books/NBK448192/> 

### How to undertake a lying and standing blood pressure

Oxford Health guidance

**How to take a lying and standing blood pressure**

* Do not use automated equipment
* Explain the procedure to the patient
* Ensure the patient is lying down for at least two minutes prior to taking the first blood pressure
* Leave the cuff in place and stand the patient, with assistance or support
* Immediately retake their blood pressure using the following principles:
	+ Hover around the systolic, by inflating and deflating the cuff repeatedly
	+ Listen to the systolic beat only
	+ Continue to hover until the lowest systolic beat is recorded
	+ When the systolic begins to rise again you can stop
	+ This can take between 0-3 minutes

**Remember cuff size matters**

The air bladder inside the cuff should fit around at least 80% of the arm but not more than 100%. If the cuff is too small it will be unable to fully close off the blood vessels, the bladder will inflate too much, and a higher reading will be recorded.

If too large a cuff and it overlaps itself the cuff will inflate on itself, cut off the blood supply too easily and the reading will be recorded as being lower than it should.

#### Reading:

<https://www.heart.org/en/news/2022/03/01/when-it-comes-to-accurate-blood-pressure-readings-cuff-size-matters#:~:text=Using%20the%20wrong%20size%20cuff,using%20the%20wrong%20cuff%20size>.

**Royal College of Physicians guidance**

Although OH has our own mechanism for recording a L&S blood pressure the literature suggests taking the BP after lying for at least 5 minutes. Second BP taken after standing in the first minute. A third BP should be taken after standing for three minutes. Repeated if the BP is still falling.

<https://www.rcp.ac.uk/improving-care/resources/procedure-for-measuring-lying-and-standing-blood-pressure-bp/> 

### Management of OH

* Rectify dehydration/ensure good fluid intake 6-8 cups a day
* Review medications that may be contributing
* Avoid hurrying to get up, answering the doorbell or telephone
* Safely sit on the edge of the bed with their legs hanging down for a few minutes before standing when getting up
* Calf pump exercises
* Avoid hot baths and showers
* Avoid triggers
* Sit when dressing
* March on the spot if you have to stand still

#### Reading/Resources:

[Blood pressure.m4v](https://ohft365.sharepoint.com/sites/FallsPreventionService/_layouts/15/stream.aspx?id=%2Fsites%2FFallsPreventionService%2FShared%20Documents%2FBlood%20pressure%2Em4v&ga=1&referrer=StreamWebApp%2EWeb&referrerScenario=AddressBarCopied%2Eview%2E0c14ef70%2Df531%2D40c6%2Dbf20%2D249886685fc2) Video how to take a lying and standing BP

[Managing Your Orthostatic Hypotension.docx](https://ohft365.sharepoint.com/%3Aw%3A/r/sites/O365Grp-ICCPathway-Falls/_layouts/15/Doc2.aspx?action=edit&sourcedoc=%7B979da061-90d3-4974-99b8-23957eaa994b%7D&wdOrigin=TEAMS-MAGLEV.teamsSdk_ns.rwc&wdExp=TEAMS-TREATMENT&wdhostclicktime=1747125042235&web=1) patient information from Falls Prevention Service

<https://www.nhs.uk/conditions/peripheral-neuropathy/> Peripheral neuropathy

### B12 Deficiency

Vitamin B12 deficiency can lead to demyelination (failure to produce adequate myelin) and autonomic neuropathy, a condition where the autonomic nervous system (which controls involuntary functions like heart rate, blood pressure regulation, digestion and bladder control) is damaged.

#### Symptoms include

Pernicious anaemia (most common in UK)Is a type of megaloblastic anaemia (immature large red cells (macrocytosis) high MCV, mean cell volume on blood results) caused by a deficiency of vitamin B12, which is primarily due to the body's inability to absorb it due to an autoimmune attack on the stomach cells that produce intrinsic factor, a protein essential for B12 absorption.

Orthostatic HypotensionDeficiency can disrupt the autonomic nervous system, leading to impaired blood pressure regulation.

##### Nerve Problems – loss of myelin (demyelination) Myelin, made up of protein and fatty substances, is a protective layer around nerve fibres in the brain and spinal cord enabling electrical signals to travel quickly and efficiently along the nerve cells. Demyelination causes damage to the nerves completely or slowing the transmission of signals, symptoms include pins and needles in our hands or feet, muscle weakness, reduced sensation (peripheral neuropathy) and overtime can affect your balance and in turn mobility, reflexes are slower, bladder and bowel problems, vision loss and trouble with sexual arousal. Some can get better with treatment some permanent.

Mental Health Mood and memory troubles are common signs of a B12 deficiency, and the memory clinic ask for B12 levels prior to a referral, symptoms can include cognitive decline, depression, Irritability, anxiety, restlessness, insomnia, trouble thinking clearly, psychiatric illness

Brain ChangesOver time our brain shrinks with age, however studies have shown that low vitamin B12 levels may be associated **with brain shrinkage** and reduced brain volume.

Optic Nerve DamageVitamin B12 deficiency can lead to damage to the optic nerve which transmit signals from the eye to the brain.

Bladder FunctionNerve damage can impair the bladder's ability to signal when it's full, potentially leading to involuntary urination (urinary incontinence) or retention.

#### When to treat

Laboratory normal range for B12 is between 180-900ng/L. Dr Adam Darowski (Consultant Geriatrician, falls consultant), for many years has recognised the cut off, but advocate treating levels lower than 250ng/L as can have a beneficial effect on orthostatic hypotension, neurological functioning and cognition.

NICE guideline NG239 published on 06 March 2024 guidance is as follows;

Less than 180ng/L B12 deficiency

Between 180-350 ng/L possible B12 deficiency

More than 350ng/L B12 deficiency unlikely

#### Treatment

Red blood cells, nerves, and brain all need vitamin B12 and left untreated can have adverse effects.

##### Prescribed

Hydroxocobalamin injections, loading dose of 6 over 2 weeks then at least 3 monthly for life

Cyanocobalamin tablets come in 50 micrograms (mcg) and 1,000 micrograms

##### Over the counter

Cyanocobalamin vitamin B12 supplements that you can buy come as tablets, capsules, mouth sprays and drops. These come in different strengths from 10 micrograms to 1,000 micrograms

Red blood cells, nerves, and brain all need vitamin B12 and left untreated can have adverse effects.

#### Risk factors for vitamin B12 deficiency include:

Age can increase risk

Abdominal surgery gastric sleeves, gastric bypass

Family history of pernicious anaemia (inability to absorb through the gut)

Diet low in vitamin B12 for example, in people who:

* follow a diet that excludes, or is low in, animal-source foods (such as a vegan diet, or diets excluding meat for religious beliefs)
* do not consume food or drinks fortified with vitamin B12
* have an allergy to some foods such as eggs, milk or fish
* find it difficult to buy or prepare food (for example, people who have dementia or frailty, or those with mental health conditions)
* find it difficult to obtain or afford foods rich in vitamin B12 (for example, people on low income)
* have a restricted diet (for example, because of an eating disorder)

Sources of Vitamin B12 include; eggs, milk, cheese, milk products, meat, fish, marmite, some cereals, shellfish and poultry. Some soy and rice beverages as well as soy-based meat substitutes are fortified with vitamin B12.

Celiac disease causes damage to the small intestines particularly where B12 is absorbed

Crohn’s disease due to the inflammation of the lining of the digestive system a person is at risk of not absorbing enough B12

Atrophic gastritis which is a chronic inflammation and thinning of the stomach lining, causes include helicobacter pylori (H. pylori) infection and autoimmune reactions and affect the way our body absorbs B12.

Folic acid (helps with red blood cell production) can mask an underlying Vitamin B12 deficiency by disrupting normal metabolism of vitamin B12. Before starting treatment always check B12 levels.

Metformin can interfere with vitamin B12 absorption in the small intestine

#### Reading:

<https://www.nice.org.uk/guidance/ng239> Vitamin B12 deficiency in over 16s: diagnosis and management, NICE guideline, NG239, 06 March 2024

<https://cks.nice.org.uk/topics/anaemia-b12-folate-deficiency/> Anaemia - B12 and folate deficiency, last revised March 2024

<https://www.nhs.uk/conditions/vitamin-b12-or-folate-deficiency-anaemia/> Vitamin B12 or folate deficiency anaemia

[Metformin and reduced vitamin B12 levels: new advice for monitoring patients at risk - GOV.UK](https://www.gov.uk/drug-safety-update/metformin-and-reduced-vitamin-b12-levels-new-advice-for-monitoring-patients-at-risk) Metformin and reduced vitamin B12 levels: new advice for monitoring patients at risk

[What Happens if Your B12 Deficiency Is Left Untreated?](https://www.webmd.com/diet/b12-deficiency-left-untreated)

### Further resources:

Falls Prevention Leaflet which gives information about the service, how to prevent falls and signpost people to other services who may help them. [ Falls Prevention Leaflet.docx](https://ohft365.sharepoint.com/%3Aw%3A/r/sites/FallsPreventionService/_layouts/15/Doc.aspx?sourcedoc=%7bE3D0FBE3-F659-4669-B120-D217ACA0A40D%7d&file=Falls%20Prevention%20Leaflet.docx&action=default&mobileredirect=true)

Referral form [ Falls Referral Form 2024.docx](https://ohft365.sharepoint.com/%3Aw%3A/s/FallsPreventionService/ESSYxaykD35Oi-CkiCgUHTwBlILNRjmHBi6tWLf09nXGrA?e=70dD4D)

Link to Falls Prevention page [Falls Prevention Service - Home](https://ohft365.sharepoint.com/sites/FallsPreventionService)

Link to Frailty page [Frailty - Home](https://ohft365.sharepoint.com/sites/MCOHS)

Link to Care Home Support Service <https://www.oxfordhealth.nhs.uk/chss/>

# Osteoporosis

### Definition

As we age our bones become weaker and are more likely to fracture. Falls are more common in later life, which can lead to increased fracture risk. Osteoporosis is a disease characterized by low bone mass and structural deterioration of bone tissue, with a consequent increase in bone fragility and susceptibility to fracture. Osteoporosis itself is asymptomatic and often remains undiagnosed until a fragility fracture occurs.

An osteoporotic fracture occurs as a consequence of increased bone fragility. Characteristically fractures occur in the wrist, spine, and hip. Vertebral fractures may occur spontaneously, or as a result of routine activities. A fragility fracture is defined as a fracture following a fall from standing height or less.

#### Reading

Osteoporosis - prevention of fragility fractures: Summary <https://cks.nice.org.uk/topics/osteoporosis-prevention-of-fragility-fractures/>

### Prevalence

In England and Wales, it is estimated that annually around 180,000 fractures occur as a result of osteoporosis.

Osteoporosis and fractures, including spinal (vertebral) fractures, are more common in women than men. Women usually have smaller bones than men and lose bone more quickly for a few years around the time of the menopause, caused by a drop in the level of the hormone oestrogen. Men are still at risk of osteoporosis and fractures. Risk of osteoporosis and fractures is unlikely to be affected if a person is transgender if they take prescribed hormone replacement therapy.

Those from certain ethnic backgrounds have a higher risk of osteoporosis, White and Asian people have a higher risk of osteoporosis and broken bones than people of other ethnicities.

But anyone can develop osteoporosis, whatever their ethnicity.

### Risk factors

Female sex.

Increasing age.

Smoking.

Alcohol.

People with a low body weight (BMI under 19) are more likely to develop osteoporosis and broken bones than people with a healthy weight.

When woman reach the menopause, their ovaries stop producing as much of the hormone oestrogen. Oestrogen helps to keep bones strong, so women lose bone more quickly for a few years around the time of the menopause. Those who have an ‘early’ menopause, before the age of 45 are at an increased risk.

Previous fractures particularly after the age of 50, increase fracture risk- individuals are two to three times more likely to break another bone than someone who has never fractured.

A parent having osteoporosis will not, on its own, greatly increase an individual’s risk of breaking bones. But if one parent has broken a hip, this increases a person’s risk of fracturing. This is likely to be due to certain genes that are passed down from their parents that affect bone strength.

Common medical conditions increase your risk of osteoporosis and include.

* Rheumatoid arthritis
* Conditions that cause low oestrogen or testosterone levels (such as anorexia, Klinefelter syndrome, Kallmann syndrome)
* Overactive thyroid (hyperthyroidism)
* Parathyroid disease (hyperparathyroidism)
* Conditions that affect how your body absorbs food (such as Crohn’s disease or coeliac disease)
* Neurological conditions that make you inactive or increase your risk of falling (such as multiple sclerosis)

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Medications can increase the risk of osteoporosisB including ottom of Form

* Steroid (‘glucocorticoid’) tablets (daily treatment or regular short courses)
* Anti-epileptic drugs
* Breast cancer treatments that lower oestrogen levels, such as aromatase inhibitors
* Prostate cancer treatments that lower testosterone levels, such as hormone therapy (even whilst on a treatment break)

How much an individual’s bone health is affected will depend on the type of treatment, the dose and duration.

#### Reading

[Royal Osteoporosis Society - Better Bone Health for Everybody](https://theros.org.uk/)

Check your own risk <https://theros.org.uk/risk-checker/?campaign=77a866ee-c708-ed11-82e5-0022481b5a28>

### Assessment of risk

Assessing individual risk for osteoporosis is important to prevent fractures. NICE guidance recommends that we consider the assessment of fracture risk:

* in all women aged 65 years and over and all men aged 75 years and over
* in women aged under 65 years and men aged under 75 years in the presence of risk factors, for example:
	+ previous fragility fracture
	+ current use or frequent recent use of oral or systemic glucocorticoids
	+ history of falls
	+ family history of hip fracture
	+ other causes of secondary osteoporosis
	+ low body mass index (BMI; less than 18.5 kg/m2)
	+ smoking
	+ alcohol intake of more than 14 units per week for men and women.



There are two risk assessment tools recommend by NICE the [FRAX](https://frax.shef.ac.uk/FRAX/) (without a bone mineral density [BMD] value if a dual‑energy X‑ray absorptiometry [DXA] scan has not previously been undertaken) or [QFracture](http://www.qfracture.org/%22%20%5Ct%20%22_top), within their allowed age ranges, to estimate a 10‑year predicted fracture risk.

* + People at high risk should be offered a DXA scan to confirm osteoporosis.
	+ People at intermediate risk whose fracture risk is close to the recommended threshold and who have risk factors that may be underestimated by FRAX®, such as people taking high doses of oral corticosteroids, should be offered a DXA scan.
	+ People at low risk should not be offered treatment or a DXA scan, but given lifestyle advice.

### Dual‑energy X‑ray absorptiometry [DXA]

Dual-energy X-ray absorptiometry (DEXA or DXA) is a medical imaging technique used to measure bone mineral density (BMD). It involves using two X-ray beams with different energy levels to scan the bones, typically the spine, hip, or forearm. The difference in absorption of the X-rays by the bones and soft tissues allows for precise measurement of bone density.

A 10-year fragility fracture risk score should be calculated prior to arranging a dual-energy X-ray absorptiometry (DXA) scan to measure bone mineral density (BMD), or starting a bisphosphonate, except in people:

* + Over 50 years of age with a history of fragility fractures — a DXA scan should be offered.
	+ Under 40 years of age who have a major risk factor for fragility fracture — a DXA scan should be offered, then referral to a specialist experienced in the treatment of osteoporosis depending on the BMD T-score. The T-score is the number of standard deviations below the mean BMD of young adults at their peak bone mass.

A bisphosphonate should be offered to people with a BMD T-score of -2.5 or lower, if appropriate and there are no contraindications.

#### Cautions

Do not routinely assess fracture risk in people aged under 50 years unless they have major risk factors (for example, current or frequent recent use of oral or systemic glucocorticoids, untreated premature menopause or previous fragility fracture), because they are unlikely to be at high risk.

Care home residents and older more frail people are at high risk of fragility fracture. However, recommended risk assessment tools such as FRAX and QFracture, only estimate fracture risk up to the 9th decade and use 10‑year fracture risk, may not be helpful.

General advice re DEXA scanning is under 75 years due to degenerative changes related to old age so general rule of thumb is treat based on risk factors. However there maybe scenarios whereby a patient id recommended for a DEXA when over 75 years.

Local guidance [osteoporosis-guidance-for-fracture-risk-assessment-and-prevention-in-primary-care.pdf](https://www.bucksoxonberksw.icb.nhs.uk/media/5103/osteoporosis-guidance-for-fracture-risk-assessment-and-prevention-in-primary-care.pdf)

## Treatment

A combination of lifestyle changes and drug treatment aims to prevent fragility fractures in patients with osteoporosis.

### Lifestyle changes

Increase physical activity, stop smoking [Smoking cessation](https://bnf.nice.org.uk/treatment-summaries/smoking-cessation/), maintain a normal BMI level, reduce alcohol intake.

Adequate intake of calcium and vitamin D. Calcium should preferably be obtained through increasing dietary intake; supplements may be used if necessary. A daily dietary supplement of vitamin D may be considered for those at increased risk of deficiency.

Elderly patients, especially those who are housebound or live in residential or nursing homes, are at high risk of vitamin D deficiency and may benefit from calcium and vitamin D treatment. Elderly patients also have an increased risk of falls (see [Prescribing in the elderly](https://bnf.nice.org.uk/medicines-guidance/prescribing-in-the-elderly/)).

### Drug treatment

Choice of treatment is generally determined by the spectrum of anti-fracture effects across skeletal sites, patient preference and suitability.

**Osteoporosis drug treatments help strengthen your bones and reduce your risk of breaking a bone. You may be offered medication if your risk of breaking a bone is significantly higher than normal.**

Osteoporosis treatments can work by:

* slowing down the cells that break down bone (osteoclasts) – known as ‘antiresorptive’ drugs
* stimulating the cells that build new bone (osteoblasts) – known as ‘anabolic’ drugs
* a combination of both.

#### Postmenopausal osteoporosis

The oral bisphosphonates [alendronic acid](https://bnf.nice.org.uk/drugs/alendronic-acid/%22%20%5Co%20%22alendronic%20acid) and [risedronate sodium](https://bnf.nice.org.uk/drugs/risedronate-sodium/) are considered as first-line and have been shown to reduce occurrence of vertebral, non-vertebral and hip fractures. [ibandronic acid](https://bnf.nice.org.uk/drugs/ibandronic-acid/) may be considered as an alternative oral bisphosphonate. Parenteral bisphosphonates or [denosumab](https://bnf.nice.org.uk/drugs/denosumab/) are alternative options for women who are intolerant of oral bisphosphonates or in whom they are unsuitable, with [raloxifene hydrochloride](https://bnf.nice.org.uk/drugs/raloxifene-hydrochloride/) or [strontium ranelate](https://bnf.nice.org.uk/drugs/strontium-ranelate/) as additional alternative options.

Hormone replacement therapy (HRT) may also be considered as an additional alternative option, but its use is generally restricted to younger postmenopausal women with menopausal symptoms who are at high risk of fractures. This is due to the risk of adverse effects such as cardiovascular disease and cancer in older postmenopausal women and women on long-term HRT therapy. [tibolone](https://bnf.nice.org.uk/drugs/tibolone/) as an option in younger postmenopausal women, particularly those with menopausal symptoms.

[Teriparatide](https://bnf.nice.org.uk/drugs/teriparatide/) is reserved for postmenopausal women with severe osteoporosis at very high risk of fractures, particularly vertebral fractures. [romosozumab](https://bnf.nice.org.uk/drugs/romosozumab/) as an option for postmenopausal women with severe osteoporosis who have previously experienced a fragility fracture and are at imminent risk of another (within 24 months).

In postmenopausal women with at least one severe or two moderate low-trauma vertebral fractures, [teriparatide](https://bnf.nice.org.uk/drugs/teriparatide/) or [romosozumab](https://bnf.nice.org.uk/drugs/romosozumab/%22%20%5Co%20%22romosozumab) are recommended over oral bisphosphonates.

#### Glucocorticoid-induced osteoporosis

The greatest rate of bone loss occurs early after initiation of glucocorticoids and increases with the dose and duration of therapy. Bone-protection treatment should be started at the onset of glucocorticoid treatment in patients who are at high risk of a fracture.

Women aged ≥70 years, OR with a previous fragility fracture, OR who are taking large doses of glucocorticoids (prednisolone ≥7.5 mg daily or equivalent) should be considered for bone-protection treatment. Men aged ≥70 years with a previous fragility fracture, OR who are taking large doses of glucocorticoids, should also be considered for treatment. For some premenopausal women and younger men (particularly those with a previous history of fracture or who are receiving large doses of glucocorticoids), bone-protection treatment may be appropriate. SIGN (2021) recommends that bone-protection treatment should be considered in all men and women taking large doses of glucocorticoids (prednisolone ≥7.5 mg daily or equivalent) for 3 months or longer.

The oral bisphosphonates [alendronic acid](https://bnf.nice.org.uk/drugs/alendronic-acid/%22%20%5Co%20%22alendronic%20acid) or [risedronate sodium](https://bnf.nice.org.uk/drugs/risedronate-sodium/) are first-line treatment options. [Zoledronic acid](https://bnf.nice.org.uk/drugs/zoledronic-acid/), [denosumab](https://bnf.nice.org.uk/drugs/denosumab/) or [teriparatide](https://bnf.nice.org.uk/drugs/teriparatide/) are alternative options in patients intolerant of oral bisphosphonates or in whom they are unsuitable.

If glucocorticoid treatment is stopped, the need to continue bone-protection treatment should be reviewed. However, bone-protection treatment should be continued with long-term glucocorticoid treatment. Complex cases of glucocorticoid-induced osteoporosis should be referred to a specialist.

#### Osteoporosis in men

The oral bisphosphonates [alendronic acid](https://bnf.nice.org.uk/drugs/alendronic-acid/%22%20%5Co%20%22alendronic%20acid) or [risedronate sodium](https://bnf.nice.org.uk/drugs/risedronate-sodium/) are recommended as first-line treatments for osteoporosis in men. [Zoledronic acid](https://bnf.nice.org.uk/drugs/zoledronic-acid/) or [denosumab](https://bnf.nice.org.uk/drugs/denosumab/) are alternatives in men who are intolerant of oral bisphosphonates or in whom they are unsuitable; [teriparatide](https://bnf.nice.org.uk/drugs/teriparatide/) or [strontium ranelate](https://bnf.nice.org.uk/drugs/strontium-ranelate/) are additional alternative options.

Men having androgen deprivation therapy for prostate cancer have an increased fracture risk. Fracture risk assessment should be considered when starting this therapy. A bisphosphonate can be offered to men with confirmed osteoporosis; [denosumab](https://bnf.nice.org.uk/drugs/denosumab/) may be considered as an alternative if bisphosphonates are unsuitable or not tolerated.

#### Bisphosphonates: treatment duration

Some patients may benefit from a bisphosphonate-free period as their therapeutic effects last for some time after cessation of treatment, although there is limited evidence to support this.

Bisphosphonate treatment should be reviewed after 5 years of treatment with [alendronic acid](https://bnf.nice.org.uk/drugs/alendronic-acid/%22%20%5Co%20%22alendronic%20acid), [risedronate sodium](https://bnf.nice.org.uk/drugs/risedronate-sodium/) or [ibandronic acid](https://bnf.nice.org.uk/drugs/ibandronic-acid/%22%20%5Co%20%22ibandronic%20acid), and after 3 years of treatment with [zoledronic acid](https://bnf.nice.org.uk/drugs/zoledronic-acid/). Based on fracture-risk assessment, continuation beyond this period can generally be recommended for patients who are over 75 years of age, have a history of previous hip or vertebral fracture, have had one or more fragility fractures during treatment, or who are taking long-term glucocorticoid treatment. Due to limited evidence, recommendations on duration are based on limited extension studies in postmenopausal women. There is no evidence for treatment beyond 10 years; management of these patients should be on a case-by-case basis with specialist input as appropriate.

#### Reading

 [Osteoporosis | Treatment summaries | BNF | NICE](https://bnf.nice.org.uk/treatment-summaries/osteoporosis/#:~:text=Patients%20should%20be%20encouraged%20to%20increase%20their%20level,health%20and%20reduce%20the%20risk%20of%20fragility%20fractures.)

 Clinical guideline for the prevention and treatment of osteoporosis. The National Osteoporosis Guideline Group (NOGG). 2017 (updated July 2019).
<https://www.sheffield.ac.uk/NOGG/downloads.html>

 Management of osteoporosis and the prevention of fragility fractures. Scottish Intercollegiate Guidelines Network. Clinical guideline 142. June 2020 (updated January 2021).
<https://www.sign.ac.uk/our-guidelines/management-of-osteoporosis-and-the-prevention-of-fragility-fractures>

[Finding more information and committee details | Osteoporosis: assessing the risk of fragility fracture | Guidance | NICE](https://www.nice.org.uk/guidance/cg146/chapter/Finding-more-information-and-committee-details)

<https://youtu.be/WsBbPRvemzg> - How do you treat osteoporosis?

### Health Promotion

#### Vitamin D

Vitamin D is essential for healthy bones and muscles. Vitamin D helps your body absorb and use calcium, which gives your bones their strength and hardness. There are three ways you can get vitamin D:

* From sunlight
* From food
* From supplements

Low vitamin D levels could increase your risk of osteoporosis and broken bones. And a severe shortage of vitamin D causes rickets and osteomalacia, which is soft, weak bones.

[**Download our fact sheet**](https://strwebprdmedia.blob.core.windows.net/media/4jnlbttc/ros-vitamin-d-supplements-and-tests.pdf)

#### Sunlight

When the sun’s rays fall on your body, they react with your skin to make vitamin D. In the UK, your skin can only get vitamin D from sunlight from the beginning of April to the end of September. During this time, it's recommended you expose your skin to direct sunlight for around 10 minutes, once or twice per day.

Give your skin short periods in the sun, without sunscreen, while you're doing short outdoor tasks such as:

* hanging out the washing
* pulling up weeds
* walking to the shops.

Remember:

* If the weather is cloudy, it takes longer to produce the same amount of vitamin D as on a sunny day.
* Glass blocks the sun’s rays, so go outside or open your window.
* Darker skin produces vitamin D at a slower rate.
* Sunblock and high factor sunscreen stop the sun's rays reaching your skin. This reduces the amount of vitamin D your body makes.

[**Vitamin D supplements and tests fact sheet**](https://strwebprdmedia.blob.core.windows.net/media/grija5r1/ros-vitamin-d-supplements-and-tests-fact-sheet-december-2018.pdf)

It is recommended that everyone considers taking 10 micrograms (400 International Units (IU)) of vitamin D every day from the end of September to the beginning of April.

Vitamin D supplements should be taken all year round if you:

* have dark skin (for example if you have an African, African-Caribbean or south Asian background)
* rarely go outdoors (for example if you’re housebound or in a care home)
* cover up most of your skin when outdoors.

People on an osteoporosis drug treatment may be advised to take 20 micrograms (800 IU) of vitamin D a day, to make sure they are getting enough.

#### Calcium

Most adults need **700mg** of calcium a day. Some may benefit from **1,000mg a day**. People on an osteoporosis drug treatment should aim for 700-1,000mg of calcium a day, to make sure they are getting enough.

A person may get all the calcium they need from food, without taking a supplement. This may be harder if people don’t or can’t eat dairy products.

Too much calcium may increase risk of other health problems so be cautious. [**Calcium supplements and blood tests**](https://strwebprdmedia.blob.core.windows.net/media/pq5bh4d5/ros-calcium-supplements-and-tests.pdf).

Good sources of calcium include dairy products, green leafy vegetables, almonds, dried fruits and calcium-boosted soya products. [calcium-rich-food-chooser-2023.pdf](https://strwebprdmedia.blob.core.windows.net/media/ysyfrmwd/calcium-rich-food-chooser-2023.pdf)

Examples of a good daily calcium intake include:

* + one 40g portion of cheese and a 200ml glass of milk and a 125g pot of yoghurt, or
	+ two 200ml glasses of calcium-fortified plant-based dairy alternatives and a 120g portion of calcium-set tofu and two vegetarian sausages.

**Calcium calculator**

To see whether you're getting enough calcium from what you eat and drink, you can use [**this**](https://webapps.igmm.ed.ac.uk/world/research/rheumatological/calcium-calculator/)[**online calcium calculator**](https://webapps.igc.ed.ac.uk/world/research/rheumatological/calcium-calculator/), from the University of Edinburgh.

#### Alcohol

Regularly drinking more than 14 units of alcohol a week can increase the risk of osteoporosis and fractures. As well as affecting the cells that build and break down bone, alcohol can make a person unsteady - making falls and fractures more likely.

14 units is equivalent to:

* + six pints of average-strength beer, or
	+ 10 small (125ml) glasses of lower-strength wine, or
	+ 14 small (25ml) shots of spirits.

#### Smoking

Smoking increases the risk of breaking bones by slowing down the activity of cells that build bone. Smokers often have a lower body weight, and female smokers tend to reach the menopause sooner than non-smokers - both of which increase the risk of osteoporosis and fractures. Even if a person smoked in the past, their risk of fracture will reduce since giving up.

It’s too early to say whether e-cigarettes (‘vaping’) are better for our bones than tobacco products.

#### Exercise

Weight-bearing exercise is important for bone strength, particularly if the activity causes lots of impact on our bones. The movement causes our muscles to pull on our bones, and this causes our bones to renew themselves and get stronger.

Muscle-strengthening exercise helps with bone strength too. And strength and balance exercises also help to prevent falls and fracture risk, especially as we get older.

Recommendations:

* + 150 minutes (2 hours and 30 minutes) of moderate-intensity exercise a week (including weight-bearing exercise with impact, where the body has to support its own weight – such as jogging, jumping or dancing)
	+ muscle-strengthening exercise on at least 2-3 days a week (such as lifting weights or using elastic resistance bands).

[**https://www.nice.org.uk/guidance/cg146**](https://www.nice.org.uk/guidance/cg146)

**Osteoporosis: assessing the risk of fragility fracture -**

**Osteoporosis - prevention of fragility fractures: Summary** [**https://cks.nice.org.uk/topics/osteoporosis-prevention-of-fragility-fractures/**](https://cks.nice.org.uk/topics/osteoporosis-prevention-of-fragility-fractures/)