

**A Pocket Guide to:**

# **Osteoporosis and Bone Health**

**In Australia**



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## Chapter 1: Introduction

### What is Osteoporosis?

Osteoporosis is a systemic bone condition characterised by reduced bone mineral density consequently resulting in the increased risk of fractures. The condition is known as the 'silent disease' as it often progresses silently without any symptoms until a fracture occurs. It is often defined by assessing bone mineral density via Dual Energy X-ray Absorptiometry (DEXA) which provides a T score. Osteoporosis can affect any bone in the body, but the most common fractures occur in the hip, wrist, and spine.

### Importance of Understanding Osteoporosis

Understanding osteoporosis is vital to understand because it is a widespread condition affecting millions of people worldwide. Knowledge about its prevention, diagnosis, and treatment can help individuals reduce their risk of fractures and maintain a good quality of life. Early screening and detection enable individuals to become proactive about their bone health while working with an appropriately trained practitioner.

### Who is at Risk?

Osteoporosis can affect people of all ages, although it is more common in older adults, especially postmenopausal women. Other risk factors include family history, certain medical conditions, and lifestyle choices such as smoking, alcohol and lack of physical activity. Osteoporosis can be due to secondary reasons such as thyroid, diabetes, cancer or other medical conditions.

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## Chapter 2: Bone Health Basics

### Bone Structure and Function

Bones and the skeletal system are living tissues that provide structure, protect organs, anchor muscles, and store calcium. They are composed of a matrix of collagen fibres and mineral deposits that provide strength and flexibility. There are many types of bony shapes, sizes, densities and structure. The two main types of both are cortical (hard, thick) bone and trabeculae bone (lattice, honeycomb).

**Bone Remodelling Process**

Bone remodelling is a continuous process where old bone tissue is removed (resorption) and new bone tissue is formed (formation). The removal process is carried out by cells called osteoclasts, whereas the building cells are known as osteoblasts. This cyclical process is essential for maintaining bone strength and integrity throughout life. The skeleton is always remodelling, however when the removal/resorption process is greater than the formation, osteoporosis can be the result.

**Peak Bone Mass**

Peak bone mass is the maximum bone density and strength that an individual achieves, typically in their late twenties. Achieving a high peak bone mass through proper nutrition and physical activity during childhood and adolescence can reduce the risk of osteoporosis later in life. Peak bone mass is important and easier to maintain if it is achieved in the 20-30 year old age.

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**Chapter 3: Causes and Risk Factors****Genetic Factors**

Genetics play a significant role in determining bone density and the risk of osteoporosis. A family history of the condition can increase an individual's likelihood of developing it.

**Lifestyle and Environmental Factors**

Modifiable factors such as diet, physical activity, smoking, and alcohol consumption can significantly impact bone health. A diet low in calcium and vitamin D, sedentary lifestyle, smoking, and excessive alcohol intake are known risk factors for osteoporosis. This impairs the remodeling and uptake of minerals for bone turnover.

**Medical Conditions and Medications**

Certain medical conditions, such as rheumatoid arthritis, diabetes, and hyperthyroidism, can increase the risk of osteoporosis. Additionally, long-term use of medications like corticosteroids can negatively affect bone density. There is a long physiological reasoning behind these medications.

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## Chapter 4: Symptoms and Diagnosis

### Early Signs and Symptoms

Osteoporosis is often called the "silent disease" because it typically has no symptoms until a fracture occurs. However, some early signs may include

- 1) a reduction in height
- 2) low-mid back pain
- 3) stooped/hunched posture.

### Diagnostic Tests and Procedures

Bone density tests, such as dual-energy x-ray absorptiometry (DEXA), are the primary method for diagnosing osteoporosis. Other tests may include blood tests and imaging studies to assess bone health and rule out other conditions. Calcium, vitamin D and thyroid tests are frequently assessed. New imaging assessments such as REMS technology/ultrasound are now emerging on the market. Other assessments such as CT scans for peripheral bones currently exists.

### Understanding Bone Density Scores

Bone density scores are expressed as T-scores and Z-scores. A T-score compares an individual's bone density to the average peak bone density of a healthy young adult, while a Z-score compares it to someone of the same age, gender, and body size. The scores relate to how many standard deviations away from the normal value.

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## Chapter 5: Prevention Strategies

### Nutrition for Bone Health

A diet rich in calcium and vitamin D is essential for bone health. Foods such as dairy products, leafy greens, and fortified foods are good sources of calcium. Sun exposure and foods like fatty fish and fortified milk provide vitamin D. Protein is extremely important for the amino acid profile that makes up bony matrix. Including a protein rich diet such as 1g protein/1kg of body weight is a common recommendation. Whether vegetarian, vegan, carnivore or a general diet, the guidelines recommend the same values of 1200-1300mg calcium whether from natural diet or supplemented.

**Exercise and Physical Activity**

Weight-bearing and muscle-strengthening exercises are beneficial for maintaining bone density. Activities such as weights, progressive jogging, and resistance training help stimulate bone formation and improve balance and coordination.

The interplay between muscle and bone is that muscle pulls on the bone as a stimulus which creates bowing in the bone and sends a mechanical signal to create a chemical signal in our body. Another point is that impact causes bones to absorb the force and impact thus creating a similar signal. With repetitive stimulus the osteoblasts formation are stimulated and adequate nutrition ensures the mineral and repair process is achieved.

**Lifestyle Modifications**

Avoiding smoking and limiting alcohol consumption can reduce the risk of osteoporosis. This is because the absorption process of nutrition is not impaired through alcohol or smoking. It also doesn't interfere with uptake of hormones. Additionally, maintaining a healthy weight and preventing falls through safety measures are important for bone health.

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**Chapter 6: Treatment Options****Medications for Osteoporosis**

Several medications are available to treat osteoporosis, including bisphosphonates, selective estrogen receptor modulators (SERMs), and parathyroid hormone analogs. These medications help slow bone loss and increase bone formation. A GP, rheumatologist, endocrinologist will specialise more in the prescription of these medications.

**Hormone Replacement Therapy**

Hormone replacement therapy (HRT) can be effective in preventing and treating osteoporosis in postmenopausal women by replacing the estrogen that is lost during menopause. However, HRT should be discussed with your healthcare provider.

**Alternative and Complementary Therapies**

Alternative treatments such as acupuncture, yoga, and herbal supplements may help manage symptoms and improve overall well-being. However, these therapies will not help stimulate bone.

## Chapter 7: Living with Osteoporosis

### Managing Pain and Discomfort

Pain management strategies for osteoporosis include medications, physical therapy, and lifestyle modifications. Maintaining a healthy weight, using proper posture, and engaging in regular exercise can help alleviate pain and improve mobility.

### Fall Prevention and Safety Tips

Preventing falls is crucial for individuals with osteoporosis. Safety tips include using assistive devices, wearing supportive footwear, removing tripping hazards, and ensuring adequate lighting in the home.

### Mental and Emotional Well-being

Living with osteoporosis can be challenging but maintaining a positive outlook and seeking support from friends, family, and healthcare professionals can improve mental and emotional well-being.

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## Chapter 8: Future Directions in Osteoporosis Research

### Advances in Medical Treatments

Ongoing research is focused on developing new medications and therapies to improve bone density and reduce fracture risk. Emerging treatments, such as monoclonal antibodies and gene therapy are currently being investigated. A combined approach such as medications, supplements, exercise, adequate nutrition and education are emerging as the key combined approach to reverse and maintain osteoporosis.

### Innovative Therapies and Technologies

Innovations in medical technology, such as bone graft substitutes and regenerative medicine, are being explored to enhance bone healing and regeneration in individuals with osteoporosis. This is a difficult area to investigate although rat studies are building a basis.

**The Role of Genetics and Personalised Medicine**

Genetic research is helping to identify individuals at higher risk for osteoporosis and tailor treatments based on genetic profiles. Personalised medicine aims to provide more targeted and effective interventions.... Thus combined with exercise and nutrition aids in better support and outcomes.

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**Chapter 9: Resources and Support****Support Groups and Organisations**

Many organisations provide support and resources for individuals with osteoporosis, such as the National Osteoporosis Foundation and the International Osteoporosis Foundation. Joining support groups can offer emotional support and valuable information. Watch this space for more information and support at our clinic....

**Educational Materials and Online Resources**

There are numerous educational materials and online resources available to help individuals learn more about osteoporosis and its management. Reliable sources include medical websites, research institutions, and healthcare providers, see our resource link for more information on this. Ensure it is credible material as many websites and forums can lead to misinformation.

**Professional Help and Counselling**

Seeking professional help from healthcare providers, such as doctors, nutritionists, and physical therapists, can ensure comprehensive care and support for managing osteoporosis effectively.

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## **Chapter 10: Conclusion**

### **Summary of Key Points**

Osteoporosis is a common condition that weakens bones and increases the risk of fractures. Understanding its causes, risk factors, prevention strategies, and treatment options is essential for maintaining bone health and improving quality of life. By the time it is identified in older adults, it can become increasingly challenging to reverse because of the biological ageing. Identifying and ruling out secondary causes is also extremely important.

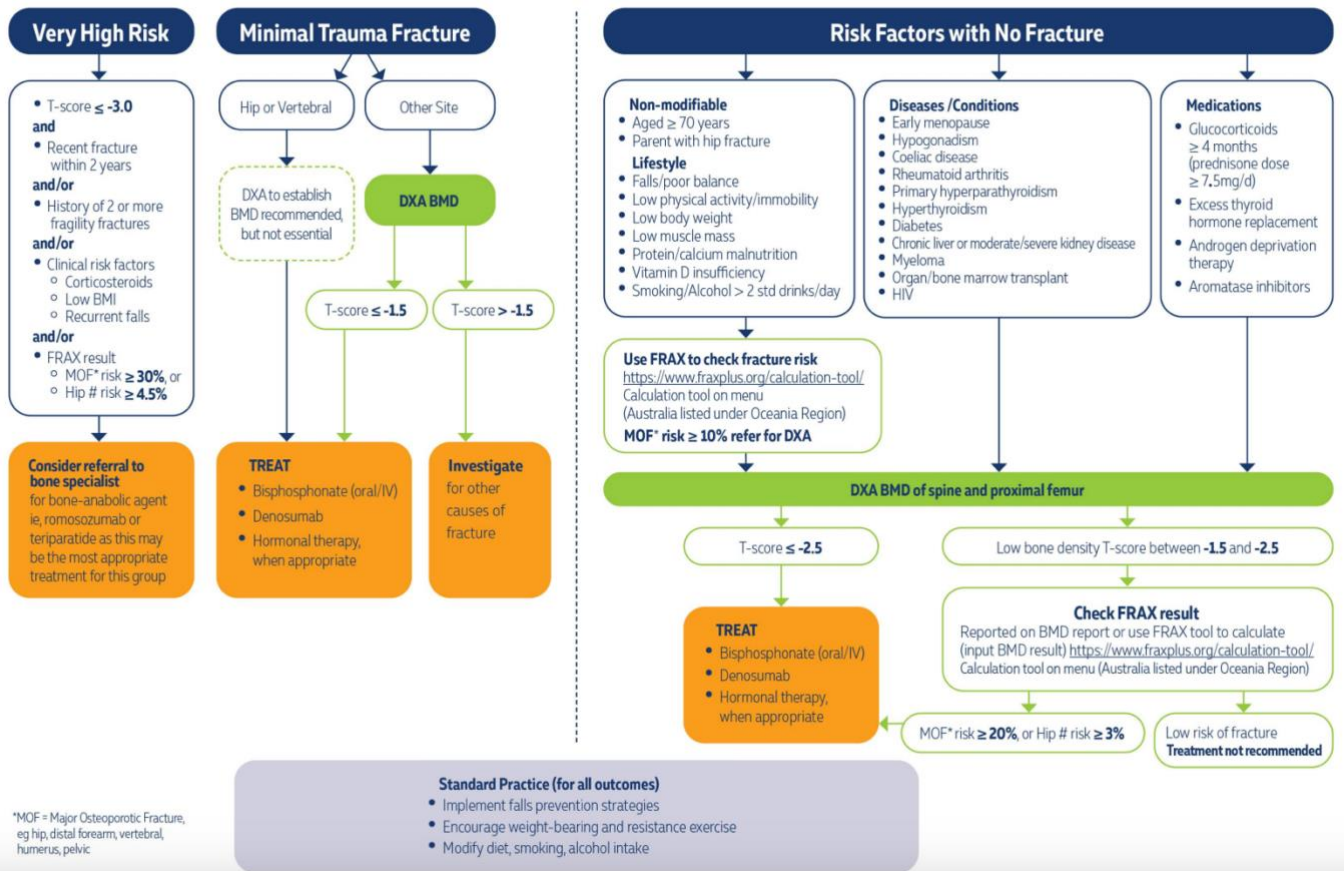
Medication, supplementation, diet, exercise and education are the key combined approach that has shown to reverse and maintain osteoporosis.

### **Encouragement and Hope for the Future**

While living with osteoporosis can be challenging, advances in research and treatment options provide hope for the future. With proper care and support, individuals with osteoporosis can lead healthy and active lives.

## Osteoporosis Risk Assessment, Diagnosis and Management

Recommendations for postmenopausal women and men aged >50 years



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