



A Comprehensive Review of Osteoporosis: Nursing Assessment, Interventions, And Management Strategies

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Abstract:

Background: Osteoporosis is a chronic, progressive condition characterized by a decrease in bone density and the deterioration of bone tissue, which increases the risk of fractures. It primarily affects older adults, particularly postmenopausal women and those with certain medical conditions or taking medications that influence bone health. Complications, particularly fractures, can significantly impair quality of life. Nursing interventions are crucial for the long-term management of osteoporosis, focusing on fracture prevention, patient education, and the promotion of healthy lifestyle behaviors.

Aim: This article aims to explore the role of nursing in managing osteoporosis, including assessment, interventions, and comprehensive care strategies for improving patient outcomes.

Methods: A comprehensive review of the literature was conducted to identify best practices in the nursing care of osteoporosis. The review included studies on nursing diagnoses, patient assessment, lifestyle modifications, medication management, and patient education. It also examined the effectiveness of various interventions for promoting bone health and preventing fractures.

Results: Effective nursing care for osteoporosis involves regular assessment of bone mineral density, monitoring for signs of fractures, and ongoing patient education. Nurses play a key role in promoting the use of calcium and vitamin D supplements, encouraging weight-bearing exercises, and ensuring patient adherence to medication regimens. Interdisciplinary collaboration is essential for providing holistic care.

Conclusion: Long-term nursing care for osteoporosis is vital in managing the disease's chronic nature, preventing fractures, and enhancing patient quality of life. Nurses must focus on comprehensive assessments, patient education, and coordinated care to optimize treatment outcomes. Ongoing monitoring and lifestyle modifications, such as promoting exercise and a balanced diet, are essential for effective disease management.

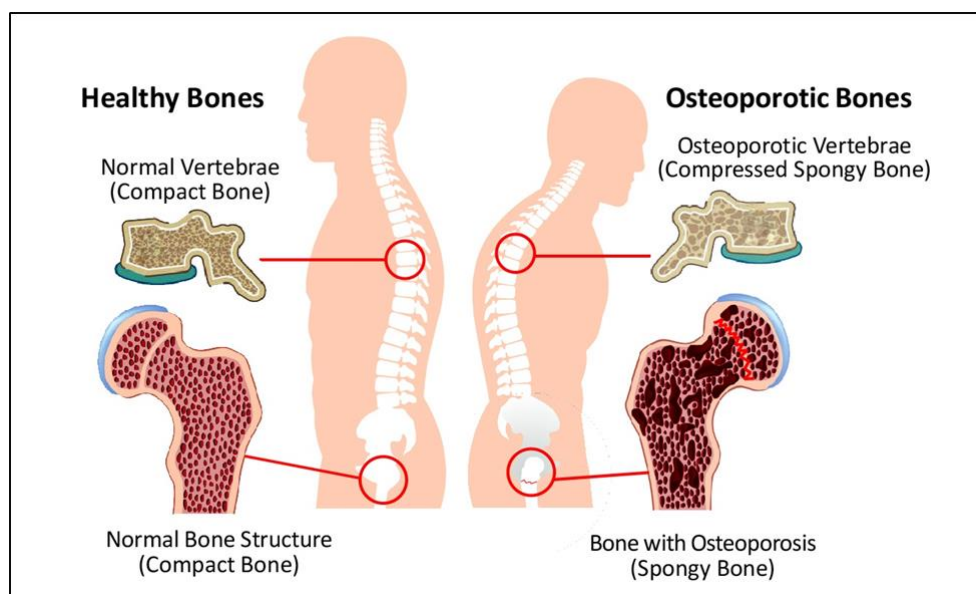
Keywords: Osteoporosis, nursing care, fracture prevention, bone health, patient education, medication management, lifestyle modifications.

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Introduction:

Osteoporosis is a progressive, chronic disorder marked by the excessive loss of bone mass and deterioration of bone tissue, leading to increased fragility and susceptibility to fractures [1][2]. This condition can arise from various etiological factors, including primary and secondary types. Primary osteoporosis is predominantly associated with the aging process, whereas secondary osteoporosis is induced by other underlying medical conditions or pharmacological treatments. The most notable complications of osteoporosis are fractures, particularly those of the hip and spine. This article aims to comprehensively explore various aspects relevant to nursing practice, including nursing diagnoses, etiology, risk factors, assessment procedures, evaluation methods, medical management, nursing interventions, and other essential considerations for healthcare providers in the management of osteoporosis.

Figure 1: Healthy Bone and Osteoporosis.



Nursing Diagnosis

For patients diagnosed with osteoporosis, several nursing diagnoses may be applicable. These include impaired mobility, particularly when there is a limitation in the range of motion; deficient knowledge, especially regarding the nature of osteoporosis and its management; imbalanced nutrition, particularly when the patient's diet may lack essential nutrients like calcium and vitamin D; risk for falls, as the fragility of the bones increases susceptibility to accidents; risk for injury, especially if significant bone loss is present, heightening the likelihood of fractures; and acute pain, often experienced in the event of fractures related to bone demineralization [3].

Causes

Osteoporosis is fundamentally associated with the dysfunction of osteoblasts and osteoclasts, two critical cell types involved in bone metabolism. In primary osteoporosis, osteoblast activity diminishes, while osteoclast activity remains unchanged or increases, disrupting the normal bone remodeling process [1]. This imbalance is typically a result of aging and hormonal alterations, particularly a reduction in estrogen in postmenopausal women. Secondary osteoporosis occurs when external factors, such as pharmacological interventions like glucocorticoids, or comorbidities exacerbate bone loss, further compromising bone density and structural integrity.

Risk Factors

Several factors contribute to the increased likelihood of developing osteoporosis. These risk factors are multifaceted, incorporating genetic, environmental, and behavioral elements. Ethnicity plays a significant role, with individuals of Caucasian or Asian descent being at higher risk. Increasing age is another major factor, as bone density naturally decreases over time. Individuals with a smaller body frame are also more susceptible due to the reduced mass of bone tissue. A family history of osteoporosis further elevates the risk, indicating a genetic predisposition. Gender is another determinant, with females, especially postmenopausal women, being at significantly greater risk than males due to hormonal changes. Lifestyle choices, including smoking and excessive alcohol consumption, are also recognized as risk factors, as they negatively affect bone health and reduce the body's ability to absorb calcium.

Assessment

The assessment process for osteoporosis begins with a thorough patient history, which should include an inquiry into known risk factors, such as a family history of osteoporosis, ethnicity, advanced age, smoking history, and alcohol use. A detailed physical assessment is also necessary, focusing on the patient's body size and the presence of any physical changes that may indicate advanced osteoporosis, such as height loss or the development of kyphosis (an abnormal curvature of the spine). These assessments help establish the baseline for diagnosis and guide the development of a comprehensive care plan for individuals at risk or already affected by osteoporosis.

Evaluation

Osteoporosis screening is advised for women starting at 65 years of age and for men beginning at 70 years of age. For individuals exhibiting risk factors for osteoporosis, earlier screening is recommended. Bone mineral density testing remains the standard diagnostic tool for osteoporosis, offering a reliable means of assessing the condition. In addition to measuring bone density, evaluating the patient's risk for fractures is an essential component of the diagnostic process, as it helps to identify those at higher risk for adverse outcomes related to bone fragility and guides appropriate interventions to mitigate fracture risks [3].

Medical Management

The management of osteoporosis necessitates a multifaceted approach, incorporating lifestyle modifications alongside pharmacological interventions. A balanced diet rich in nutrients essential for bone health, particularly calcium and vitamin D, and regular weight-bearing exercises are critical elements of both preventive and therapeutic strategies. Pharmacological treatments play a vital role in the medical management of osteoporosis. Bisphosphonates, such as alendronate and risedronate, are widely prescribed to prevent and treat osteoporosis by inhibiting bone resorption. Additionally, monoclonal antibody therapies are employed to enhance bone mineral density by targeting specific pathways involved in bone metabolism [4][5]. Hormone-related therapies, including calcitonin, are also used, particularly for postmenopausal women. Emerging research is investigating the efficacy and outcomes of newer medications designed to optimize bone preservation, offering hope for more effective treatments in the future [6]. Given the significant risk of fractures associated with osteoporosis, surgical interventions may be required in cases of severe bone damage, with surgical management offering a means to address fractures and stabilize bone structure [7-8].

Nursing Management

Nursing care for patients with osteoporosis encompasses a comprehensive approach, with an emphasis on maintaining physical function and promoting self-care. Nurses are tasked with assessing the patient's functional status, particularly their ability to perform activities of daily living, and offering assistance as needed. Encouraging weight-bearing exercises is an integral part of nursing management, as these activities help maintain bone density and overall mobility. For patients experiencing gait instability, nurses should provide ambulatory support to prevent falls and enhance patient safety [9][10].

Furthermore, patient education is a crucial aspect of nursing care, focusing on the importance of a calcium- and vitamin D-rich diet, smoking cessation, and limiting alcohol consumption. Education regarding prescribed medications is also essential, as nonadherence to medication regimens is a common challenge in osteoporosis management, and ensuring patients understand the role of medications in preventing further bone loss is key to improving outcomes [11].

When To Seek Help

Individuals diagnosed with osteoporosis face an elevated risk of fractures, which necessitates prompt medical attention upon occurrence. Patients should seek healthcare assistance if they experience a sudden reduction in movement or an increase in pain with motion, particularly following a fall or injury. These signs may indicate a fracture or worsening of the condition, and a healthcare provider should be consulted promptly to assess the situation and provide appropriate intervention.

Outcome Identification

For patients diagnosed with osteoporosis, a primary expected outcome is the preservation of joint range of motion, as well as the maintenance of functional mobility. The T-scores and Z-scores, derived from bone mineral density tests, can be instrumental in evaluating the effectiveness of treatment interventions and monitoring the progression or stabilization of the disease. These scores serve as valuable indicators in the assessment of the patient's bone health and help guide adjustments to the care plan if necessary [12].

Monitoring

Ongoing monitoring of patients with osteoporosis is critical for ensuring adherence to the prescribed care plan and for detecting potential complications, such as fractures. Regular assessment of bone health through appropriate diagnostic measures, along with tracking patient compliance with treatment regimens, plays an essential role in optimizing outcomes. This proactive approach helps in identifying early signs of complications, allowing for timely interventions to mitigate further bone loss or injury.

Coordination of Care

Effective management of osteoporosis requires a collaborative, interdisciplinary approach, involving various healthcare professionals to address the multifaceted needs of patients. In addition to primary care providers and nursing staff, pharmacists, endocrinologists, registered dietitians, and physical or occupational therapists are integral members of the healthcare team. Should fractures occur, orthopedic surgeons will become essential to the care team. Social workers and case managers also play a vital role in addressing any psychosocial or financial concerns, as well as coordinating the provision of any necessary specialized equipment to enhance patient care and quality of life [13].

Health Teaching and Health Promotion

It is crucial to equip patients with comprehensive knowledge on how to reduce their risk of developing osteoporosis or suffering from its complications. Nurses should assess the patient's current understanding of osteoporosis and provide targeted education on dietary modifications, such as increasing calcium and vitamin D intake, identifying calcium-rich foods, and avoiding phosphorus-rich beverages like sodas and colas. Furthermore, nurses should be mindful of potential barriers to the patient's adherence to health-promoting behaviors, such as limited access to nutritious food, financial constraints, or language barriers. Additionally, promoting the importance of regular screenings, including bone density testing, and encouraging healthy lifestyle practices like smoking cessation and alcohol moderation are key aspects of the educational process.

Risk Management

Ensuring the safety of patients with osteoporosis is paramount, particularly due to the heightened risk of fractures associated with the condition. Effective risk management involves educating patients on strategies to reduce the likelihood of fractures, such as increasing calcium and vitamin D intake, engaging

in weight-bearing exercises (when appropriate), quitting smoking, and adhering to prescribed medications. Failure to educate patients adequately regarding these essential aspects of osteoporosis management can lead to negative health outcomes and may have significant legal and ethical implications for healthcare providers [14].

Discharge Planning

A thorough review of the care plan and prescribed medication regimen is essential upon the discharge of patients with osteoporosis. Nurses should ensure that patients fully understand their treatment plan and the steps they need to take to continue managing their condition effectively after leaving the healthcare facility. In addition to providing health promotion education, nurses should also provide guidance on when to schedule follow-up appointments with healthcare providers, ensuring continuity of care and monitoring of the patient's condition post-discharge.

Evidence-Based Issues

Both lifestyle modifications and pharmacological interventions have demonstrated beneficial effects for patients with osteoporosis. Incorporating evidence-based practices into nursing care involves not only educating patients about their care plans but also promoting optimal patient functioning while minimizing the risk of injury. By integrating the latest research and clinical guidelines into daily nursing practices, healthcare providers can enhance patient outcomes and reduce the impact of osteoporosis on patients' lives.

Other Issues

Osteoporosis is a condition defined by significant bone loss, leading to an increased risk of fractures and impaired bone strength. This disorder is particularly concerning because it may not present symptoms until a fracture occurs. Various factors contribute to the development of osteoporosis, including genetic, environmental, and lifestyle influences. The most notable risk factors include ethnicity, with individuals of White or Asian descent being at a higher risk. Additionally, advancing age, particularly post-menopausal women, contributes significantly to the onset of osteoporosis. Other risk factors include having a small body frame, smoking, excessive alcohol consumption, and a family history of osteoporosis. These factors combine to increase an individual's susceptibility to the disease, making early intervention and regular monitoring essential.

Diagnosis and Medical Management

Bone density testing is the principal diagnostic tool used to identify osteoporosis. This non-invasive procedure measures bone mineral density (BMD) and is essential for assessing the risk of fractures and determining the appropriate course of treatment. In terms of medical management, bisphosphonates are the primary class of medications prescribed for the prevention and treatment of osteoporosis. These drugs work by inhibiting the activity of osteoclasts, thereby reducing bone resorption and increasing bone mineral density. Bisphosphonates such as alendronate and risedronate are commonly used to help patients maintain bone strength and prevent fractures. Additionally, ongoing research continues to explore other therapeutic options, including hormone replacement therapy and monoclonal antibodies, which are emerging as viable alternatives for patients who may not respond to traditional treatments.

Lifestyle Modification and Consultation

Lifestyle modifications are critical in both the prevention and management of osteoporosis. Regular weight-bearing exercise, adequate intake of calcium and vitamin D, and smoking cessation are essential components of a comprehensive approach to managing the condition. Furthermore, reducing alcohol consumption can have a positive effect on bone health, as excessive alcohol use has been linked to increased bone loss. Patients are strongly encouraged to engage in these preventive measures to slow the progression of the disease and enhance overall bone health. It is also essential for patients to consult with their healthcare provider if they experience acute pain that intensifies with movement. This may be

indicative of a fracture or further bone deterioration, necessitating immediate medical evaluation and appropriate intervention [14-16].

Long Term Nursing Care of Osteoporosis:

Osteoporosis, a chronic and progressive condition characterized by reduced bone mass and structural deterioration of bone tissue, significantly increases the risk of fractures, particularly in older adults. While the primary focus of osteoporosis management involves the prevention of fractures and maintaining bone health, long-term nursing care plays a crucial role in managing the complexities of this condition. Nurses are integral to both the medical and psychosocial aspects of care for individuals with osteoporosis, providing essential monitoring, education, and support to optimize patient outcomes and improve quality of life. The scope of long-term nursing care encompasses comprehensive assessment, patient education, medication management, lifestyle modifications, coordination of care, and continuous evaluation.

Comprehensive Assessment

A key element of long-term nursing care for osteoporosis is the ongoing assessment of the patient's physical health, functional status, and psychosocial well-being. Nurses should conduct regular screenings for osteoporosis risk factors, including a thorough assessment of the patient's medical history, family history, lifestyle choices, and physical limitations. A critical aspect of this assessment is evaluating the patient's adherence to prescribed treatment regimens, as medication noncompliance is a significant barrier to effective osteoporosis management. Nurses should regularly assess bone mineral density through diagnostic tools like dual-energy X-ray absorptiometry (DXA) scans and track any changes in bone strength or fracture incidence over time. Additionally, monitoring the patient's overall mobility, posture, and gait is vital, as osteoporosis often leads to a loss of height, vertebral compression fractures, and a stooped posture, which can result in an increased risk of falls. Physical assessments should also identify other comorbidities or complications that may exacerbate osteoporosis, such as arthritis, diabetes, or cardiovascular disease, and adjust the care plan accordingly. Furthermore, assessing psychosocial factors, including the patient's understanding of their condition, anxiety related to fractures, and emotional support needs, is essential for promoting long-term well-being. Through this comprehensive assessment, nurses can tailor interventions that address not only the physical manifestations of osteoporosis but also the emotional and social impacts of the disease.

Patient Education and Health Promotion

Patient education is one of the most significant responsibilities of nurses in the long-term management of osteoporosis. Educating patients about the nature of osteoporosis, its risk factors, and preventive measures is crucial in promoting active participation in their care. Nurses should provide clear and accessible information about the pathophysiology of osteoporosis, explaining how bone resorption outpaces bone formation and leads to weakened bones. This knowledge can empower patients to make informed decisions regarding their health and adhere to treatment plans more effectively. One of the central tenets of osteoporosis management is the modification of lifestyle habits. Nurses should educate patients on the importance of a healthy diet rich in calcium and vitamin D, as these nutrients are essential for maintaining bone density. Nurses can help patients identify calcium-rich foods such as dairy products, leafy green vegetables, and fortified cereals, and discuss the appropriate use of calcium and vitamin D supplements. Additionally, nurses should advise patients on the importance of weight-bearing exercises, such as walking, jogging, or resistance training, which have been shown to strengthen bones and improve balance, thus reducing the risk of falls and fractures. Smoking cessation and limiting alcohol consumption are other critical lifestyle changes that nurses should emphasize. Smoking has been shown to accelerate bone loss by impairing calcium absorption, while excessive alcohol intake can negatively affect bone health and increase fracture risk. Nurses should provide resources and support to help patients quit smoking and reduce alcohol consumption, which could substantially improve their bone health and overall quality of life.

Medication Management

Osteoporosis treatment often involves pharmacological interventions, including the use of bisphosphonates, selective estrogen receptor modulators (SERMs), and denosumab, among others. Nurses play an essential role in ensuring patient adherence to prescribed medications and educating patients on the proper use and potential side effects of these drugs. Bisphosphonates, such as alendronate, risedronate, and ibandronate, are commonly prescribed to inhibit osteoclast activity and reduce bone resorption. Nurses should educate patients on the correct administration of these medications, as some, like alendronate, require the patient to remain upright for at least 30 minutes after ingestion to minimize gastrointestinal side effects. Additionally, hormone replacement therapy (HRT) or estrogen therapy may be used for postmenopausal women, but nurses should ensure that patients are aware of the risks associated with long-term hormone therapy, including an increased risk of breast cancer and cardiovascular events. Nurses must also ensure that patients receiving injectable therapies, such as denosumab or teriparatide, are comfortable with the administration process and are monitored for any adverse reactions. Nurses should also monitor patients for potential side effects or complications associated with osteoporosis medications, such as gastrointestinal issues, joint pain, and, in rare cases, osteonecrosis of the jaw. Regular follow-up visits should be scheduled to assess the effectiveness of the treatment, evaluate for side effects, and adjust the treatment regimen as necessary. Nurses must act as advocates for patients, ensuring that their concerns are addressed and that they are fully informed about their treatment options.

Fall Prevention and Safety Interventions

Given the high risk of fractures associated with osteoporosis, fall prevention is an integral component of long-term nursing care. Nurses should conduct a thorough assessment of the patient's home environment to identify and mitigate potential hazards. This includes ensuring that the patient's living space is free from obstacles, installing grab bars in bathrooms, and recommending the use of assistive devices such as walkers or canes when necessary. Nurses should also provide education on maintaining safe movement patterns and techniques, emphasizing the importance of maintaining balance and avoiding sudden movements that could increase the risk of falls. Patients with osteoporosis may also benefit from physical therapy interventions to improve balance, strength, and coordination. Nurses should coordinate with physical therapists to develop an individualized exercise plan that focuses on these aspects while being mindful of the patient's physical limitations. The goal is to enhance the patient's ability to perform daily activities independently while minimizing the risk of injury.

Psychosocial Support and Coordination of Care

Osteoporosis is not only a physical condition but also a source of psychological and social challenges. Patients with osteoporosis may experience fear of fractures, depression, or anxiety about their ability to perform everyday tasks. Nurses should provide emotional support and encourage patients to discuss their concerns openly. Providing resources for counseling or support groups may also be beneficial in helping patients cope with the emotional burden of living with a chronic condition. Collaboration among healthcare professionals is essential for the comprehensive management of osteoporosis. Nurses should facilitate communication between the various members of the healthcare team, including physicians, physical therapists, dietitians, and pharmacists. This interdisciplinary approach ensures that patients receive holistic care that addresses all aspects of their health. Nurses should also be proactive in coordinating referrals for additional services, such as orthopedic specialists or social workers, when necessary.

Ongoing Evaluation

Continuous evaluation is crucial in ensuring the effectiveness of osteoporosis management. Nurses should monitor patient outcomes by assessing physical function, mobility, and adherence to prescribed treatments. Regular follow-up visits and bone density assessments are essential for tracking the progression of osteoporosis and adjusting the care plan as needed. Nurses should also evaluate the impact of osteoporosis on the patient's quality of life, including any changes in the ability to perform activities of

daily living and any psychosocial challenges they may face. Through ongoing evaluation, nurses can identify potential complications, such as new fractures or adverse reactions to medications, and promptly intervene to prevent further deterioration in the patient's health. This proactive approach ensures that patients with osteoporosis receive the most effective care throughout the course of their disease, ultimately improving their health outcomes and quality of life. In summary, long-term nursing care of osteoporosis involves a multifaceted approach that includes regular assessment, patient education, medication management, fall prevention, psychosocial support, and ongoing evaluation. Nurses play a critical role in improving patient outcomes by ensuring adherence to treatment plans, educating patients on lifestyle modifications, and coordinating interdisciplinary care. Through these efforts, nurses can help patients with osteoporosis live healthier, more independent lives, minimizing the risk of fractures and enhancing overall well-being.

Conclusion:

Osteoporosis is a major health concern, particularly for aging populations, as it leads to increased bone fragility and a heightened risk of fractures. The long-term management of osteoporosis is essential for reducing the incidence of fractures and maintaining overall bone health, which significantly impacts patients' quality of life. Nurses play an indispensable role in providing comprehensive care for individuals with osteoporosis, encompassing both medical and psychosocial support. One of the fundamental components of nursing care is the ongoing assessment of bone health. Regular screenings, such as bone mineral density tests, enable nurses to track changes in the patient's condition, assess fracture risk, and evaluate the effectiveness of prescribed treatments. Nurses must also evaluate patients' adherence to medications, as noncompliance is a significant challenge in osteoporosis management. Effective nursing interventions include ensuring that patients understand the importance of medications such as bisphosphonates and calcium supplements, as well as the role of lifestyle modifications in managing the disease. Patient education on dietary changes, physical activity, and fall prevention strategies is crucial to empower patients to take an active role in their care. Nurses are also responsible for promoting exercise, particularly weight-bearing exercises, which can help maintain bone density and reduce the risk of fractures. In addition, nurses must support patients in managing pain, especially for those who have experienced fractures or other complications of osteoporosis. Ensuring that patients have access to appropriate resources, including rehabilitation services and social support, is essential for improving outcomes. The interdisciplinary approach to osteoporosis management further enhances the quality of care. Collaboration with healthcare providers, including primary care physicians, dietitians, and physical therapists, ensures that all aspects of the patient's care are addressed. Social workers and case managers also provide crucial support by helping patients navigate any financial or emotional challenges related to the disease. Ultimately, the long-term management of osteoporosis requires a holistic approach that includes comprehensive assessment, ongoing monitoring, lifestyle interventions, and continuous patient education. Nurses are key to facilitating these aspects of care, helping patients achieve better health outcomes and improving their quality of life. With the right support and interventions, individuals with osteoporosis can manage the disease effectively and prevent its most debilitating complications.

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مراجعة شاملة لهشاشة العظام: التقييم التمريضي، التدخلات، واستراتيجيات الإدارة

الملخص:

الخلقية: هشاشة العظام هي حالة مزمنة وتقدمية تتميز بانخفاض كثافة العظام وتدهور الأنسجة العظمية، مما يزيد من خطر الكسور. تؤثر بشكل رئيسي على كبار السن، خاصة النساء بعد انقطاع الطمث والأشخاص الذين يعانون من حالات طبية معينة أو يتناولون أدوية تؤثر على صحة العظام. يمكن أن تؤدي المضاعفات، خاصة الكسور، إلى تأثيرات كبيرة على جودة الحياة. تعتبر التدخلات التمريضية حاسمة في الإدارة طويلة الأمد لهشاشة العظام، حيث تركز على الوقاية من الكسور، وتثقيف المرضى، وتعزيز سلوكيات نمط الحياة الصحية.

الهدف: يهدف هذا المقال إلى استكشاف دور التمريض في إدارة هشاشة العظام، بما في ذلك التقييم، والتدخلات، واستراتيجيات الرعاية الشاملة لتحسين نتائج المرضى. الطرق: تم إجراء مراجعة شاملة للأدبيات لتحديد أفضل الممارسات في رعاية التمريض لمرضى هشاشة العظام. شملت المراجعة دراسات حول التشخيصات التمريضية، وتقييم المرضى، وتعديلات نمط الحياة، وإدارة الأدوية، وتثقيف المرضى. كما تم فحص فعالية التدخلات المختلفة لتعزيز صحة العظام والوقاية من الكسور.

النتائج: تشمل الرعاية التمريضية الفعالة لهشاشة العظام التقييم المنتظم لكثافة المعادن العظمية، ومراقبة علامات الكسور، والتعليم المستمر للمرضى. يلعب الممرضون دورًا رئيسيًا في تعزيز استخدام مكملات الكالسيوم وفيتامين د، وتشجيع التمارين التي تحمل الوزن، وضمان التزام المرضى بالعلاجات الدوائية. التعاون بين التخصصات أمر ضروري لتوفير رعاية شاملة.

الخلاصة: تعتبر الرعاية التمريضية طويلة الأمد لهشاشة العظام أمرًا بالغ الأهمية في إدارة طبيعة المرض المزمنة، ومنع الكسور، وتعزيز جودة حياة المرضى. يجب على الممرضين التركيز على التقييمات الشاملة، وتثقيف المرضى، والرعاية المنسقة لتحسين نتائج العلاج. تعد المتابعة المستمرة وتعديلات نمط الحياة، مثل تشجيع ممارسة التمارين وتناول نظام غذائي متوازن، أمرًا أساسيًا لإدارة المرض بشكل فعال.

الكلمات المفتاحية: هشاشة العظام، الرعاية التمريضية، الوقاية من الكسور، صحة العظام، تثقيف المرضى، إدارة الأدوية، تعديلات نمط الحياة.