Nursing intervention for osteoporosis patients

A literature review

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Abstract

It is estimated that over 200 million people worldwide have osteoporosis. The prevalence of osteoporosis is continuing to escalate with the increasingly elderly patients. The aim of this study was to conduct a literature review to find out nursing intervention to prevent osteoporosis.

The study was conducted as a literature review and the data was collected using two databases: CINAHL and PubMed. Results from six articles were analyzed using inductive content analysis method, through which five main categories emerged; 1. different nursing interventions for osteoporosis patients 2. Patients' educations 3. Appropriate nursing diagnoses 4. Patients' self-care and 5. Physical exercise for patients

In conclusion, Nursing interventions can reduce the incidence of osteoporosis, accelerate the recovery of osteoporosis, and reduce the risk of osteoporosis. Also, exercise and nutrition influenced osteoporosis patients' bone density at best in the categories analyzed within this review. However, these nursing interventions has a far wider scope of impact that needs to be explored. Further research is recommended to study the nursing interventions for the different ages of osteoporosis patients and all kinds of ways to protect the patients from fracture. Regularly exercise and supplement vitamins and calcium could be studied as an evidence-based option in supportive treatment. Patients education could be further explored as an intervention to study it is influence on patients' condition to protect themselves.

Keywords/tags (subjects)
"Nursing interventions", osteoporosis, "older people", "osteoporosis patients"

Miscellaneous (Confidential information)

Contents

1.Introduction

It is estimated that over 200 million people worldwide have osteoporosis. The prevalence of osteoporosis is continuing to escalate with the increasingly elderly patients. In the European Union, in 2000, the number of osteoporotic fractures was estimated at 3.79 million. A baseline fracture is a very strong predictor of further fractures with 20% of patients experiencing a second fracture within the first year. (Jean-Yves Reginster, Nansa Burlet Bone 2006)

The introduction of the concept of primary osteoporosis, diagnostic criteria and classification, and from genetic, hormones, diet, bad living habits and other aspects of the influence factors of osteoporosis and nursing intervention measures were summarized, pointed out that the prevention of osteoporosis is more important than treatment, prevention should begin in childhood, discover the risk factors of osteoporosis and corrected. Osteoporosis is a serious metabolic bone disorder that results in fractures of the wrist, hip and vertebrae. These fractures frequently occur with little or no trauma. Osteoporosis is seen more frequently in women than men. While the pathogenesis of osteoporosis is incompletely understood at this time. Along the age, this symptom is becoming more and more obvious. This study focuses on nursing interventions to prevent osteoporosis. Because osteoporosis is difficult to diagnose and people with osteoporosis are at a high risk of fractures, or bone breaks, while doing routine activities such as standing or walking.

2. Osteoporosis: symptoms, risk factors and diagnosis

2.1 Signs and symptoms of osteoporosis

The National Osteoporosis Foundation (NOF, 2018) study show that one in two women and up to one in four men over age 50 will break a bone due to osteoporosis in their life time. Osteoporosis also affects young people. (Hardiman & Henriette,2005) Osteoporosis is the most common human

metabolic bone disease and is associated with high levels of disability and mortality. (Cryer & Patel 2005) This is a progressive disease characterized by low bone mass, deteriorating bone structure, and increased bone mass. Brittleness and friability. (Royal College of Physicians (RCP, 1999). The most common sites for fracture are the hip, spine and wrist. According to the World Health Organization, osteoporosis occurs when bone mineral density (BMD) or bone mineral content is below the standard deviation of young adults (-2.5 T score) by more than 2.5 standard deviations. (Hardiman & Henriette 2005)

2.2 Risk factors of osteoporosis

The risk factors of osteoporosis include gender and race. Caucasian women, and women who shield themselves from the sun for cultural reasons are at risk of developing osteoporosis. Also, unhealthy lifestyle such as smoking, excessive alcohol intake and lack of physical activity can increase the chances of developing osteoporosis. Endocrine disorder like secondary amenorrhea and primary hypogonadism can increase the process of osteoporosis. Furthermore, if the patient gets drug therapy long-term heparin; anticonvulsants, phenytoin, it also has the bad influences. Organ transplantation is also a contributing factor for osteoporosis. Cushing's syndrome, the use of steroid and chronic renal failure is contributing factors for osteoporosis. Maternal history of hip fracture for women, and paternal history of hip fracture can also be a risk factor for osteoporosis. (Hardiman & Henriette, 2005)

2.3 Pathogenesis

Normal bone formation and bone resorption are closely related, however, in osteoporosis the net rate of bone resorption exceeds the rate of bone formation. This results in a decrease in bone mass, typically affecting the trabeculae, without there being a deficit in bone mineralization such as with osteomalacia (bone softening). Up to 90% of bone mass is deposited during skeletal growth followed by a period of consolidation, which continues for up to 15-30 years (Sutcliffe 2005). Oestrogen deficiency is a significant cause of accelerated bone loss during peri menopause and affects circulating levels of cytokines such as interleukin, interleukin, tumor necrosis factor alpha and granulocyte-macrophage colony-stimulating factor. A reduction in the level of oestrogen causes the level of cytokines to rise and therefore increases bone resorption through increased recruitment, differentiation and activation of osteoclasts (large, multi-nuclear cells

associated with the resorption of bone). The prevalence of osteoporosis in women consequently increases with age following the menopause (J, 2008)

2.4 Diagnosis

During the formation and development of osteoporosis, cytokines are involved in the process of bone metabolism, which accelerates or delays bone remodeling by promoting or inhibiting the development and activity of osteoblasts and osteoclasts. This process is necessarily accompanied by P1NP and Changes in bone metabolism indicators such as CTX. Osteoporotic bone loss is consistent with high bone turnover, and bone metabolism markers reflect overall bone turnover and can be used to determine bone loss. (Hao Shen & Haiyan Zhao, 2017.)

2.5 Prevention and Management

Given the long-term morbidity and increased mortality associated with osteoporotic fractures, the possibility of osteoporosis is something that practice nurses should consider in patients with risk factors, and as part of their management of other long-term conditions, including diabetes. Resources are now available to make it easier to calculate risk, without resorting to dual X-ray absorptiometryscanning where this is less likely to be necessary. (Sutcliffe&Anne,2012) Considering for patients with severe disease, Keen (2006) suggest that anabolic therapy with parathyroid hormone, and all patients at risk of developing osteoporosis should be given lifestyle advice regarding dietary intake of calcium and vitamin D and regular weight-bearing exercise. (Keen, 2006). On the other hand, Lindsay (1987) believes that for women, estrogen, calcium supplementation and exercise may prevent, control and management osteoporosis. There are significant differences between osteoporotic drugs. Anti-bone resorption therapy may result in a significant reduction in fractures, and a large increase in bone mass may be associated with a decrease in bone strength and a constant or increased fracture rate. (juliet , 2012)

In summary, although there are various drugs for the treatment of osteoporosis on the market, such as hormones, bisphosphonates, etc., the drugs and treatments used in different stages of osteoporosis are still uncertain and inaccurate. There has been significant progress in the management of osteoporosis in recent years, resulting in a greater choice of therapeutic

interventions for the physician. Nearly all the treatments currently available are antiresorptive agents, which prevent bone loss and, in some cases, have been shown to reduce fracture risk. Some of these agents appear to have site-specific effects in the skeleton and may therefore not protect against all types of osteoporotic fracture. However, other drugs, such as hormone replacement therapy and possibly bisphosphonates, appear to reduce fracture risk in both the spine and hip.

2.6 Prognosis

The fracture itself is rarely fatal, but the complications of the fracture can lead to an increase in mortality. Hip fractures can lead to inconvenience and complications such as deep vein thrombosis and/or pulmonary embolism and pneumonia. The 6-month mortality rate after hip fracture was found in people aged 50 years and older was about 13.5%, and nearly 13% of them needed comprehensive assistance in mobilization after hip fracture.

Vertebral fractures have little effect on mortality but are highly likely to cause severe neurogenic chronic pain and may be difficult to control. Multiple vertebral fractures can lead to severe kyphosis, and the pressure on the internal organs is highly likely to impair human breathing. Osteoporotic fractures are not only associated with death and other complications, but also associated with a decline in health-related quality of life. (SK, 2009) This disease causes about a million fractures each year, mainly in the lumbar spine, buttocks and wrists. Rib fractures are also common in men.

3. Aim, purpose and research questions

The aim is to conduct a literature review to find out nursing intervention to prevent osteoporosis.

The purpose is to reduce the incidence of osteoporosis through preventive care and to help nurses provide better care of patients with osteoporosis.

Research question: what can be done to improve nursing care for osteoporosis patients?

4. Methodology

4.1 Literature review

Literature review is different from that of research papers, which is composed by researchers who have read literature on a certain topic in advance, understand, sort out, integrate, comprehensively analyze and evaluate it. It contains the following four parts: abstract, introduction, main body and references. A true literature review is critical or interpretative. It requires the disclosure of the generative process of research literature and the presentation of the logical steps of the research literature at different levels. It allows the reader to critically examine starting point of the research and the developmental stages. It summarizes earlier researches and help shape the subject matter. It allows the reader to know where to continue from and where the new study is needed. Thus, forming the innovative research, literature review is not only to prove that the literature related to research topic, cannot stay on simple linear description. It focuses on the academic innovation, and the analysis of the predecessors' research results obtained. It analyzes the advantages and gradually exposes the deficiencies and limitations, to find out the breakthrough and transcend path. （Lynn, 2010）

4.2 Scientific article selection process

Literature search and the data for this literature review was collected from the article databases of CHINHL and PubMed. We also use the relevant books in JAMK library to achieve the data. Different key words were tested in the beginning of the data search. The results were obtained with the combination of the words osteoporosis or nursing intervention and osteoporosis. The search results were broad, due to an intentional choice to try to ensure all the relevant data will be included. The obtained data was glanced through and the abstracts were read. Articles were chosen based on the abstracts and full text. After reading through the studies the final selection was done base on the predetermined inclusion criteria.

The inclusion criteria for this literature review data were:

- Study in English or Chinese.
-Scientific publication, doctoral and master’s thesis included
- Peer-reviewed studies
- Published between years 2008 and 2018
- Full text access
- Responds to the research questions
- Studies the nursing interventions for osteoporosis

All the other studies were excluded from the data for this study. (Lynn, 2010)

4.3 Data extraction and synthesis of data

The selected data was analyzed by using content analysis. The categories are derived from the data in inductive content analysis. An approach based on inductive data moves from the specific to the general. In this study the inductive content analysis will be used to analyses the data. (Elo & Kyngäs 2008) Inductive analysis processes are consisting of three main phases: preparation, organizing and reporting.

In the first step the data was reduced into smaller units. The second phase consists of clustering the data, which means separating it into groups and subcategories. The third step is abstraction in which subcategories with similarities in their contents are connected and general categories are formed. (Kankkunen & Vehviläinen 2009) We read all the articles carefully and tested each of them to find out which data answers the research question. The data were then extracted and grouped in to similar themes. The purpose of grouping data is to reduce the number of categories by folding similar or dissimilar data into a wider range of higher-order categories (Burnard & Downe ,1993). When all articles have been carefully read and reduced, the differences are listed according to our research questions and content, and then the data is divided into groups and sub-categories. The sub-categories that will be generated during the clustering phase will give the names that represent their contents. In the final phase of the analysis, subcategories with similar content will be associated with the main category.

5. Results

We identified five main categories from six articles as follows: 1. Different nursing interventions for osteoporosis patients 2. Patients' educations 3. Appropriate nursing diagnoses 4. Patients' self-care and 5. Physical exercise for patients

Different nursing interventions for osteoporosis patients:

This study indicate that muscle strength of lower limbs is important in reducing the incidence of falls. Nurses can help patient strengthen their muscles and engaged in core stability training, through multi-methods. Nurses can support patient who have weak muscles and difficulty in core stability training through card making, to ensure the implementation of training, improve the balance ability of patients, especially the elderly people (Park et. al 2017). To promote the normal

functioning and well-being of women with osteoporosis, health professionals should consider planning physical exercise. This can help improve the sensory losses and possible fears of falls, as well as establishing balance exercises to prevent falls. This can also delay dependency of the elderly with osteoporosis. (Bezerra MLR et al. 2016)

Nearly all treatments currently available are antiresorptive agents, which prevent bone loss and, in some cases, have been shown to reduce fracture risk. Some of these agents appear to have site-specific effects in the skeleton and may therefore not protect against all types of osteoporotic fracture. However, other drugs, such as hormone re-placement therapy and possibly bisphosphonates, appear to reduce fracture risk in both the spine and hip. The predominant effect of antiresorptive agents is to prevent bone loss, although small increases in bone mass may occur as a result of infilling of the remodeling space and/or secondary mineralization. Theoretically, these drugs are likely to be most effective when used in the prevention of bone loss, before disruption of cancellous bone microstructure has occurred. In contrast, anabolic agent s, which have the potential both to increase bone mass significantly and restore bone architecture, may be more appropriate in patients with advanced bone loss and fracture. (E.Compston, 2012)

Patients educations:

Nurses must find out about the awareness of osteoporosis among older people and can use educational interventions to assist older people to again knowledge about osteoporosis. Nurses can test older peoples' knowledge about osteoporosis by using pre and post questions and answers, including osteoporosis knowledge, health belief, self-efficacy scale, and knowledge about nutrition. This can improve knowledge of osteoporosis, self-efficacy of osteoporosis, and help to increase dietary calcium and vitamin D intake in the elderly. (Lin et.al 2018) Drug therapy interventions in postmenopausal women with osteoporosis can supplement calcium and vitamin D alone, significantly reducing fracture risk and reducing risk. (Margery et al. 2006) Vitamin D is essential for bone metabolism related functions as it is a prohormone that acts as a major regulator of calcium homeostasis and bone metabolism. It is necessary for nurses to educate older patients in to take Vitamin D supplements. Nurses also need to develop social practices of primary care and prioritize the practice of health education, as this is an important tool in promoting health of older people with osteoporosis, which will contribute to quality of life. (Bezerra MLR et al. 2016)

Appropriate nursing diagnoses:

Providing appropriate nursing diagnoses can support and assist nurses to make plans that supports self-care for menopausal women with osteoporosis. Such nursing diagnosis promotes "readiness for enhanced self-health management". (Bezerra MLR et al. 2016)

Patient Self-care:

Encouraging patients' self-care can help patients engage in practice of activities that can be performed by the individual so that wellbeing and life are kept. Nursing assessment must be performed to find out whether a person can be independent in self-care or whether they need help to do it. (Bezerra MLR et al. 2016)

Physical exercise for patients:

Osteoporosis is a bone disease characterized by impaired bone strength, which increases the risk of a person suffering from a fracture. Fractures can also lead to loss of function and negatively affect mental state.

A study showing the effects of exercise on bone mineral density. The most effective type of exercise intervention for femoral neck bone mineral density (BMD) appears to be non-weight-bearing high-force exercise, with the following progressive resistance training. The most effective intervention for spinal BMD is the joint exercise program. In some studies, the fall was reported as Adverse events had no effect on the overall number of fractures. The study also showed that the quality of the meta-analysis research report is very low, especially in terms of sequence generation, allocation concealment, blinding and follow-up failure, so it can only be properly referenced. （E. Howe et.al 2011）

Given the importance of bone health, US surgeons have for the first time published a comprehensive report on bone health and treatment. One report recommends a pyramidal approach to osteoporosis, including calcium and vitamin D supplementation, physical activity and prevention of falls as the first line to prevent fractures. The second level includes the secondary causes of osteoporosis; the third and highest levels include medication. (Margery et al. 2006)

The results of the study showed that the effect of exercise on bone mineral density was relatively small compared to the control group, but it may be important. And exercise may be a safe and effective way to avoid bone loss in postmenopausal women. （E. Howe et.al 2011）

6. Discussion

6.1 Discuss

Edward L. (2001) pointed out although people with osteoporosis have an increased mortality due to complications of the fracture. Similarly, the results of this study show
that nurses can support patient who have weak muscles and difficulty in core stability training through card making, ensure the implementation of training, improve the balance ability of patients, especially the elderly people. (lin et al.2018)

Health education is a low-input, high-efficiency and effective means of prevention and treatment of osteoporosis. Nurses must find out about the awareness of osteoporosis among older people and can use educational interventions to assist older people to again knowledge about osteoporosis. Hardiman (2005) find out a lifestyle like smoking、 excessive 、alcohol and lack of exercise and increase the chance of getting osteoporosis .So if we urge the patient have a habit, The chance of getting osteoporosis can be lowed. Among older people we can use educational interventions to assist older people to again knowledge about osteoporosis by using pre and post questions and answers, including osteoporosis knowledge, health belief, self-efficacy scale, and knowledge about nutrition. (lin et al.2018)

Appropriate nursing diagnoses makes it easy to develop a patient care plan. Each patient's condition may be different. Effective care measures based on the patient's actual condition can help the patient recover as quickly as possible. Sutcliffe (2012) thinks that the long-term morbidity and increased mortality associated with osteoporotic fractures, the possibility of osteoporosis is something that practice nurses should consider in patients with risk factors, and as part of their management of other long-term conditions, including diabetes. Therefore, I believe that proper nursing diagnosis can help prevent, cure and recover osteoporosis.

Patient self-care allows patients to self-activity on weekdays to restore their condition and prevent re-occurrence of osteoporosis. Each patient is more aware of his or her own situation and can find problems in time. They can also do their own daily self-care according to their own situation. Richard Keen BSc (2006) has an opinion to cope with, which is Anabolic therapy with parathyroid hormone and all patients at risk of developing osteoporosis should be given lifestyle advice regarding dietary intake of calcium and vitamin D and regular weight-bearing exercise. In my opinion, patients can take care of themselves through the advice given by the nurse. The nurse explains and advises the patient, and the patient can carry out self-care according to his or her own situation.

This article shows that physical exercise truly has some good effect for osteoporosis patients. Tracey E Howe et al. (2011) thought that physical exercise may be an important part in the effect of bone mineral density, and it will be safe and effective way to avoid bone loss in postmenopausal women. And in the background part, Lindsay (1987) believes that for women, estrogen, calcium supplementation and exercise may prevent, control and management osteoporosis. In general, physical exercise have a significant effect on the prevent, management and recovery, especially for the postmenopausal women.

Though the article shows serval ways in prevention osteoporosis, such as calcium supplementation (Robert Lindsay, 1987), regular weight-bearing exercise (RichardKeen, 2006), Anti-bone resorption therapy (Juliet E. Compston, 2012), promoting or inhibiting the development and activity of osteoblasts and osteoclasts (Hao Shen, Haiyan Zhao, 2017). Although there are various ways for the treatment of osteoporosis, different ways in different stages such as the ages and severity of illness of osteoporosis are still uncertain and inaccurate. It shows that this article still has limitations.

6.2 Ethical considerations, validity and reliability

The main principles of ethics include respect for human dignity, privacy and autonomy. These principles also include avoiding misinformation and data forgery. People must be careful about their work and keep a good track record of the research activities. The study was conducted from the perspective of a nurse, and the data and results produced in this study were presented in an honest and systematic manner.

The ethics of research is indispensable, which is reflected in the protection of the privacy of experimental subjects and the assurance of the accuracy of experimental data. The main principle of morality is to respect the privacy and dignity of others. Almost all the articles included in this study asked permission from their participants and ensured their privacy. These principles also include the truth of experimental data and conclusions. One of our articles implemented the nursing interventions in a ward of a hospital. It did not discuss the ethical issues, but this study got permission from the patient. One of the other articles also did not mentioned ethical issues, but the candidates who were from 23 different community centers, were recruited through an announcement made by the public office, by two health care providers. The Institutional Review Board of the hospital approved the design and protocol of that study. All patients were informed that their medical data might be used in a scientific study. All patients provided consent. The other two articles discussed ethical issues, and got re-search approved from the National Health Council.

We tried to abide by the principle of integrity and avoid prejudice. Although it is not intended, in this study, the publication bias is obvious because the authors are student and has limited access to articles free of charge for students. However, all three authors who are studying as beginners may influence the quality of the research in terms of data representation and reliability.

6.3 Conclusion and recommendation for further studies

The main conclusion of this article is that early identification and diagnoses of osteoporosis facilitates the investigation and intervention process. It also promotes appropriate educational intervention and promotes critical reflection on self-care to promote the health of menopausal women. Having regularly exercise is a very important part for menopausal women who at risk of developing osteoporosis. Vitamin and calcium supplementation are also an effective way to improve bone density. The use of educational interventions can improve the knowledge about osteoporosis, which can in-crease self-efficacy about dietary calcium and vitamin D intake in elderly populations. Based on the previous research, it is recommended to develop a more standardized and convenient follow-up study for elderly osteoporosis patients.

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8. Appendices

Author(s), (year), country	Purposes	Method	Key findings

Bezerra MLR et al. (2016) Brazil	To identify the nursing diagnoses of the domain health promotion and the defining characteristi cs in menopausal women with osteoporosis the light of Orem's theoretical framework.	This is a descriptive, cross-sectional study. For this study were women in menopause and post-menopause, between 45 and 65 years old, with a diagnosis of osteoporosis and presenting physical and emotional conditions favorable to answer the questions.	The identification of nursing diagnoses facilitates the investigative and interventional process, adds technical enhancement, propels the educational role concerning the nursing, and promotes critical reflection on self-care in promoting the health of menopausal women with osteoporosis.
Park et.al (2017)	To evaluate the changes in osteoporosis knowledge, osteoporosis self-efficacy, fall self-efficacy, physical exercise and changes in dietary pat tern of calcium and vitamin D intake after osteoporosis education.	individualized education program to allow for differences in antecedent educational levels regarding several aspects of osteoporosis,	Educaitons : Interventional studies consistently demonstrated that knowledge of osteoporosis, osteoporosis self-efficacy and fall self-efficacy levels improved after intervention.

Lin et.al (2018)	To observe the effect of core stability training on preventing falls in elderly patients with osteoporosis	120 patients who were hospitalized inDepartment of Rehabilitation, Quanzhou Zhenggu Hospital, Fujian University of Traditional Chinese Medicine ward from July 2015 to June 2016 and diagnosed with osteoporosis in the elderly (Morse falls assessed as high risk) were randomly divided into control group and experimental group.	Nursing interventions : Strengthen the nursing intervention of elderly osteoporosis patients, increase the core stability training, form multi-method joint nursing, and weaken the core stability training action difficulty through card making, ensure the implementation of training, improve the balance ability of the elderly patients and the muscle strength of the lower limbs, which is beneficial to Recovery of the back and back activity can definitely reduce the incidence of falls

Juliet E.Compston (2012)	To prevent and manage the osteoporosis	In the US, the remaining lifetime risk of a fragility fracture in 50-year-old Caucasian women and men is estimated at 40 and 13%, respectively; demographic changes throughout the world over the next 50 years will result in dramatic increases in the number of fractures caused by osteoporosis, even if secular trends in fracture incidence remain relatively stable.	Osteoporosis Bone Mass Bisphosphonates Hormone Replacement Therapy Alendronate

Tracey E Howe et.al (2011)	To examine the effectiveness of exercise interventions in preventing bone loss and fractures in postmenopausal women.	During the update of this review we updated the original search strategy by searching up to December 2010 the following electronic databases: the Cochrane Musculoskeletal Group's Trials Register; the Cochrane Central Register of Controlled Trials (CENTRAL) (The Cochrane Library, 2010 Issue 12); MEDLINE; EMBASE; HealthSTAR; Sports Discus; CINAHL; PEDro; Web of Science; Controlled Clinical Trials; and AMED. We attempted to identify other studies by contacting experts, searching reference lists and searching trial registers.	Exercise [physiology];Bone Density [physiology];Fractures, Bone [*prevention & control, therapy]; Osteoporosis, Postmenopausal [*prevention & control, therapy;Randomized Controlled Trials as Topic;

Margery (2006) Netherlands	To reducing the rate of fractures and to improve treatment continuation rates	In the United States, 26% of women aged ≥65 years and >50% of women aged ≥85 years have osteoporosis. Over 1.5 million fractures per year are attributable to osteoporosis; these fractures result in 500,000 hospitalizations, 800,000 emergency room visits, 2.6 million physician visits, 180,000 nursing home placements, and $12 billion to $18 billion in direct healthcare costs each year.	Bone loss Calcium/vitamin D supplementation Fractures Menopause Osteoporosis Pharmacotherapeutic intervention