

Nursing care for patients with bone metastases undergoing radiotherapy: a scoping review

Cuidados de enfermagem aos pacientes com metástases ósseas submetidos à radioterapia: revisão de escopo

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ABSTRACT

Objective: to map studies on nursing care for patients with bone metastases undergoing radiotherapy. **Methods:** scoping review conducted in nine databases, according to the guidelines of the Joanna Briggs Institute. Scientific articles available for full open access, in any language, regardless of the method used, were included. **Results:** 13 studies were analyzed, with a predominance of literature reviews. The themes were: health education to patients and companions about events related to the skeleton; pain assessment and management; prevention of pathological fractures; management of spinal cord compression; assessment of hypercalcemia; ensuring safety in the administration of oral bisphosphonates; quality of life assessment; and monitoring of progress, adverse events, and therapeutic outcomes. **Conclusion:** nurses provide important ongoing support to patients, monitor progress, side effects, and therapeutic outcomes, and prevent and manage skeletal-related events. **Contributions to practice:** the study highlighted the main nursing care to patients with bone metastases in radiotherapy treatment, being relevant to give theoretical subsidy to professionals directing their assistance, especially in the oncology area.

Descriptors: Nursing Care; Neoplasm Metastasis; Bone and Bones; Radiotherapy.

RESUMO

Objetivo: mapear estudos sobre os cuidados de enfermagem aos pacientes com metástases ósseas submetidos à radioterapia. **Métodos:** revisão de escopo realizada em nove bases de dados, segundo as diretrizes do Instituto Joanna Briggs. Foram incluídos artigos científicos disponíveis para acesso aberto na íntegra, em qualquer idioma, independentemente do método utilizado. **Resultados:** foram analisados 13 estudos, com predomínio de revisões de literatura. As temáticas foram: educação em saúde a pacientes e a acompanhantes, sobre os eventos relacionados ao esqueleto; avaliação e manejo da dor; prevenção da fratura patológica; manejo da compressão medular; avaliação da hipercalemia; garantia da segurança na administração de bifosfonatos orais; avaliação da qualidade de vida; e monitorização do progresso, eventos adversos e resultados terapêuticos. **Conclusão:** os enfermeiros fornecem importante suporte contínuo aos pacientes, monitoram o progresso, os efeitos colaterais e os resultados terapêuticos, bem como previnem e manejam os eventos relacionados ao esqueleto. **Contribuições para a prática:** o estudo destacou os principais cuidados de enfermagem aos pacientes com metástases ósseas em tratamento radioterápico, sendo relevante para dar subsídio teórico aos profissionais direcionando sua assistência, especialmente na área da oncologia.

Descritores: Cuidados de Enfermagem; Metástase Neoplásica; Osso e Ossos; Radioterapia.

Introduction

The phenomenon of metastases remains poorly understood and is the leading cause of death for more than 90% of cancer patients⁽¹⁾. Bone is the third most common metastatic site of dissemination after the liver and lungs⁽²⁾. The changes caused in the bone microenvironment result in complications referred to as Skeletal Related Events (SRE), including pain, pathologic fracture, spinal cord compression, and hypercalcemia⁽³⁻⁴⁾.

These complications impact on patient survival and quality of life, in addition to increasing hospital costs and mortality risks⁽⁵⁾. They also generate sensory and/or motor dysfunctions that impair mobility, limiting the performance of daily tasks and self-care⁽⁶⁾. Disorders such as depression and anxiety are also common and can lead to social isolation. In addition, there is a need for chronic use of opioids⁽⁷⁾.

Radiotherapy is fundamental in the management of bone metastases, being effective both for the reduction of the tumor mass and pain relief. This therapy promotes ossification of lesions by stabilizing the affected bone. Desensitization of nerve endings has also been documented, and treated patients generally experience pain relief within two weeks of starting treatment⁽⁸⁻⁹⁾.

Patients have had better bone health management in the face of advances in radiation therapy, SRE-specific drugs, and oncology nursing practices that benefit their quality of life and survival⁽⁴⁾.

In this context, about the disease, the assessment of the nurse is fundamental since this professional performs health education for patients and families and interacts with the multi-professional team when coordinating the provision of optimal care to the patient⁽¹⁰⁾. The nurse is also responsible for playing a crucial role in the treatment plan of the patient with bone metastasis, implementing interventions that promote positive outcomes to prevent complications⁽¹¹⁾.

Thus, it is important to investigate the literatu-

re production in this scenario. Thus, this research aimed to map studies on nursing care for patients with bone metastases undergoing radiotherapy.

Methods

This is a scoping review that followed the method proposed by the Joanna Briggs Institute (JBI)⁽¹²⁻¹³⁾ and the recommendations of the international guide Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist⁽¹⁴⁾. The research protocol was registered in the Open Science Framework (<https://osf.io/pw6sf/>).

Previously, a search was conducted, but no protocols or reviews on the topic were found in the following sources: International Prospective Register of Systematic Reviews (PROSPERO), Medical Literature Analysis and Retrieval System Online (MEDLINE), Cochrane Database of Systematic Reviews (Wiley) and JBI database.

As a strategy to construct the research question, the Participants, Concept and Context (PCC) tool⁽¹³⁾ was used, in which P (participants) was assigned: patients with bone metastases; C (Concept) - nursing care; C (Context) - radiotherapy. Thus, the following question was formulated: What are the main nursing care given to patients with bone metastases submitted to radiotherapy?

The bibliographic survey occurred in the month of May 2022, in the databases: Database of Nursing (BDENF) and Latin American and Caribbean Literature on Health Sciences (LILACS), via Virtual Health Library (BVS); Cumulative Index to Nursing and Allied Health (CINAHAL); Cochrane Library, via the portal of the Coordination for the Improvement of Higher Level Personnel (CAPES); EMBASE; MEDLINE, via National Library of Medicine (PubMed); Scientific Electronic Library Online (SciELO); Scopus Elsevier and Web of Science (WoS).

The following descriptors were used, from the Health Science Descriptors (DeCS)/ Medical Subject Headings (MeSH)/Emtree (linked to the Embase In-

dex): “bone and bones”; “neoplastic metastasis”; “radiotherapy”; “nursing”; “bone and bones”, “neoplasm metastasis”; “radiotherapy”; “nursing”, as well as the

keywords “care” and “care”. These were combined using the Boolean operators AND and OR. Figure 1 shows the search syntax adopted according to the data sources used.

Source of data	Syntax for searching
BDENF	(“osso e ossos”) AND (“metástase neoplásica”) AND (radioterapia) AND (enfermagem)
CINAHL	AB “bone and bones” AND AB “neoplasm metastasis” AND TX radiotherapy AND TX nursing
Cochrane Library	(“bone and bones”):ti,ab,kw AND (“neoplasm metastasis”):ti,ab,kw AND (radiotherapy):ti,ab,kw AND (nursing):ti,ab,kw
EMBASE	(“bone and bones”):ti,ab,kw AND (“neoplasm metastasis”):ab,ti AND radiotherapy AND nursing)
LILACS	((“bone and bones”) AND (“neoplasm metastasis”) AND (radiotherapy) AND (nursing OR care))
MEDLINE	((“bone and bones”) AND (“neoplasm metastasis”) AND (radiotherapy) AND (nursing))
SCIELO	(“osso e ossos”) AND (“metástase neoplásica”) AND (radioterapia) AND (enfermagem)
SCOPUS	(title-abs-key (“bone and bones”) AND title-abs-key (“neoplasm metastasis”) AND title-abs-key (radiotherapy) AND title-abs-key (nursing))
Web of Science	“bone and bones” (All Fields) AND “neoplasm metastasis” (All Fields) AND radiotherapy (All Fields) AND nursing (All Fields)

Figure 1 – Syntax for searching articles. Belém, PA, Brazil, 2022

The selection of articles was also carried out through the Portal of Periodicals of CAPES, through remote access to the content of the Federated Academic Community (CAFe- in Portuguese), a resource signed by the Federal University of Pará.

The following inclusion criteria were adopted: scientific articles available for full open access, in any language, from 2002 to 2022, regardless of the method used. Articles with expert opinion and letters to the editor were excluded, with the help of the Rayyan platform. The temporality was determined by changes in the technologies employed in radiotherapy, resulting in changes in nursing care⁽⁸⁾.

From the database search, the titles and abstracts were first read, according to the inclusion criteria, by two researchers, independently. The conflicts between these researchers were decided by a third researcher.

The selected articles were read in their entirety, exhaustively, and a search was made in their references to expand the sample. The data extracted included details on the authorship, year of publication, country of origin, journal of publication, objectives, study design, level of evidence, sample, and main results.

These data were structured and grouped in the Microsoft Excel 2019[®] program.

As for the level of evidence, the following classification was used: Level I. Systematic review studies or meta-analysis of randomized controlled trials; Level II. Well-designed randomized controlled clinical trials; Level III. Well-designed clinical trials without randomization; Level IV. Well-designed cohort and case-control studies; Level V. Systematic reviews of descriptive and qualitative studies; Level VI. Evidence from a descriptive or qualitative study; and Level VII. Opinion of authorities and/or reports⁽¹⁴⁻¹⁵⁾.

Results

The primary search in the nine data sources resulted in a total of 355 publications. After screening, according to the inclusion criteria, the titles, and abstracts of 183 papers were read. Of these, 29 were selected to be read in full for eligibility. The final selection was composed of 13 articles. Figure 2 shows the details of this selection according to the recommendations of the Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR)⁽¹⁴⁻¹⁵⁾.

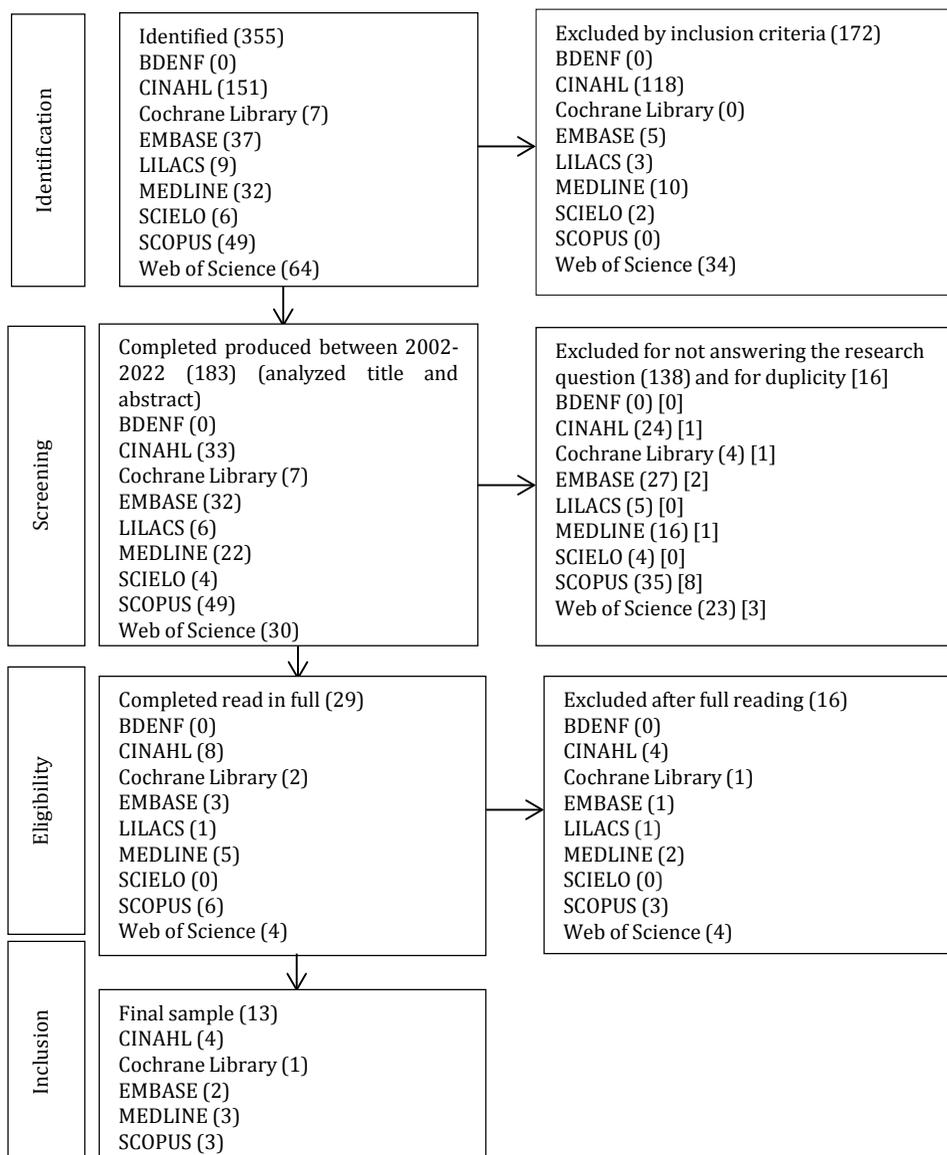


Figure 2 – Flowchart of selection of studies identified in the PRISMA-ScR recommendations. Belém, PA, Brazil, 2022

The studies were published between 2009 and 2022, with emphasis on 2018, with three records (23.1%). As for the country of origin, Canada presented four publications (30.8%), followed by England and Turkey, both with two records included. China, the United States of America, the Netherlands, and India had one article included, representing 7.7% each. This review also included one (7.7%) multicenter article.

Regarding study design, the sample consisted

of six literature reviews (46.15%), four descriptive studies (30.77%), two randomized studies (15.38%) and one non-randomized controlled study (7.69%). Regarding the level of evidence of the studies, level V was the most prevalent (46.15%), followed by levels VI (30.77%), II (15.38%) and III (7.69%).

Figure 3 characterizes the sample included in this review as to authors, year of publication, country, journal, study design, sample, and main results.

Authors/ Year/Country/ Journal	Delineation/ Level of Evidence	Sample	Main results
Fitch et al. 2009/ Canada Clin J Oncol Nurs ⁽¹⁶⁾	Review of Literature/V	Not described	The role of nurses in managing patients with metastatic bone disease is multifaceted, involving performing pain assessments and counseling patients and caregivers about potential skeletal-related events and how to prevent and manage them.
Beaumont, Leadbeater 2011/England Nurs Stand ⁽¹⁷⁾	Review of Literature/V	Not described	- Nurses should be aware of the signs and symptoms of bone metastasis complications, which can impair quality of life. - Pain assessment is crucial because its increase can signal disease progression.
Fitch 2012/Canada Can Oncol Nurs J ⁽¹⁸⁾	Descriptive study/VI	69 patients	- Oncology nurses must assess patients' unique needs in multiple areas (for example, physical, psychosocial, spiritual, informational, practical). - It is important that nurses and patients enter dialogue to determine what is a concern and what assistance for that concern may be available. This will be valued from the patient's perspective.
Farrel 2013/England Br J Nurs ⁽¹⁹⁾	Review of Literature/V	Not described	The physical and psychological impact of bone metastases cannot be underestimated, and nurses are well positioned to improve the quality of life of their patients.
Campbell-Baird et al. 2015/United States of America Supportive Care Cancer ⁽²⁰⁾	Review of Literature/V	Not described	- Radiation therapy is widely employed as a treatment for both pain relief and prevention of disease progression. - Nurses can play a key role in educating patients about the importance of antiresorptive therapies for the prevention and management of skeletal-related events commonly associated with bone metastases.
Sharma, Purkayastha 2017/India Asia Pac J Oncol Nurs ⁽²¹⁾	Descriptive study (Case Report)/VI	2 patients	Nursing care is of utmost importance to promote patient comfort, provide information related to pain control, assist with behavioral and physical interventions, prevent, and alleviate side effects, and promote patient compliance with therapy and necessary follow-up.
Geerling et al. 2018/ Netherlands Radiother Oncol ⁽²²⁾	Randomized Study/II	354 patients	Controlled pain (intensity<5) was achieved more quickly and by more patients with painful bone metastases undergoing radiation therapy by the addition of nurse-led pain education.
Cinar et al. 2018/ Turkey Int J Caring Sci ⁽¹¹⁾	Descriptive study/VI	75 patients	There is an inverse relationship between pain and patients' performance status. Nurses perform effective pain management; they act in health education improving treatment adherence, performance status, self-care, and quality of life.
Serçe et al. 2018/ Turkey Integr Cancer Ther ⁽²³⁾	Non-random- ized controlled trial/III	60 patients	Acupressure is applicable by nursing staff to cancer patients with bone metastasis, after receiving brief training, and can make a difference in relieving patients' pain.
Tan et al. 2019/China Int J Clin Exp Med ⁽⁶⁾	Randomized Study/II	137 patients	For patients with bone metastasis from malignant tumors, nursing care for pain can improve the effectiveness of combined treatment with radiotherapy and zoledronic acid, improve anxiety and depression, and improve quality of life and nursing satisfaction.
Drudge-Coates et al. 2020/Multicenter Supportive Care Cancer ⁽⁴⁾	Descriptive study/VI	283 participants	- Oncology nursing practice can benefit patients not only by providing better bone health management, but also by improving their quality of life and survival. - There is a need for considerable improvement in the education and training of specialist nurses.
Pituskin, Fairchild 2021/Canada Semin Oncol Nurs ⁽²⁴⁾	Review of Literature/V	Not described	The oncology nurse plays a key role in providing regular symptom consultations and physical assessments, offering supportive care, and connecting multidisciplinary specialists to patients.
Pituskin et al. 2022/ Canada Semin Oncol Nurs ⁽¹⁰⁾	Review of Literature/V	Not described	Nursing provides essential contributions in the holistic treatment and management of symptoms in patients undergoing radiation therapy for painful bone metastases. The roles of nursing in radiation oncology have been poorly elucidated in the existing literature.

Figure 3 – Characterization of the publications included in the review. Belém, PA, Brazil, 2022

The highlights regarding nursing care presented in these studies are health education of patients and caregivers about skeletal-related events; pain assessment and management; prevention of pathologic fracture; management of spinal cord compression; assessment of hypercalcemia; ensuring safety in the administration of oral bisphosphonates; quality of life assessment; and monitoring progress, adverse events, and therapeutic outcomes.

Discussion

The nurse plays a crucial role in assisting patients with bone metastases undergoing radiotherapy. The basis of their knowledge must cover various aspects during the assistance to explain the mechanism of action of radiotherapy and the profile of adverse events^(17,20). One of the main approaches of these professionals regarding skeletal-related events is health education focused on prevention. This was very highlighted in the studies selected in this review^(11,16,18,20-21); however, no work presented quantitative data regarding the potential for improvement in the nursing actions focused on these events.

Pain assessment is fundamental, since its increase may signal disease progression, and the inclusion of other healthcare professionals may be necessary, with the nurse's role being the coordination of these different aspects of patient care⁽¹⁷⁾. A nurse working in radiotherapy must evaluate the patient's pain level by using pain measurement scales, record which analgesics are used and whether they are effective, analyze the related adverse events and possible drug interactions⁽¹¹⁾.

As for evidence in pain assessment and control, a multicenter study⁽²²⁾ evaluated the effect of nurse-led education (group 1) in patients undergoing radiotherapy for painful bone metastases compared to Usual Care (group 2).

In this study, 354 patients were randomized and followed up at weeks 1, 4, 8 and 12. In group 1, personalized education about pain and its mana-

gement was provided. At week 12, more patients in group 1 (70%) than in group 2 (47%) had controlled pain ($p=0.013$). In addition, patients in the first group achieved a pain score <5 more quickly compared to patients in the second group (31 versus 54 days, respectively, $p=0.026$)⁽²²⁾.

In a study of 75 patients diagnosed with bone metastasis, pain and performance status were assessed using the Visual Analog Scale (VAS) and the Eastern Cooperative Oncology Group Performance Score (ECOG). These instruments were applied before, during and after radiotherapy, determining that there was an inverse relationship between pain and the patients' performance status: as pain was reduced, performance status improved⁽¹¹⁾.

Bone pain was also analyzed in a randomized study conducted in a radiotherapy center, in which patients who received regular care (control group) and patients who received regular care combined with pain care (observation group) were grouped. At the end of the analysis, the rate of patients with 0-degree ostealgia remained higher in the observation group than in the control group ($p<0.05$)⁽⁶⁾.

The effect of acupressure on pain was investigated in 60 patients with bone metastasis and in a radiotherapy unit, using the Visual Analog Scale. This technique, originating in Chinese medicine, is an application that provides energy circulation and balance in the body. It is performed by means of physical pressure on different points on the surface of the body in case of pain. In this case, it is applicable by nursing staff, after receiving brief training, and can make a difference in relieving patients' pain. However, other well-designed trials still need to be conducted⁽²³⁾.

Pathological fracture is an event related to the skeleton, associated with decreased survival and functional independence of patients, and therefore limits their autonomy⁽¹⁶⁾. As for its prevention, it is particularly important that nurses have a high level of knowledge about bones⁽⁴⁾ and educate patients regarding fracture risk reduction, incorporating changes in lifestyle and environment to prevent falls⁽¹⁶⁾.

With metastases to the femur, humerus and spine, the risk is high, since fractures are more common through the lytic mechanism, in weight-bearing bones⁽¹⁹⁻²⁰⁾. Occasionally, this event is the first sign of bone metastasis. Sudden, intense pain may indicate a fracture resulting from structural bone instability, which may be caused by daily activities, or minor injury^(17,20).

The knowledge of 283 oncology specialist nurses was investigated regarding the factors affecting their provision of support in the management of bone metastases and bone loss induced by cancer treatment. In this study, knowledge of risk factors for hip fracture ranged from 28.6% for rheumatoid arthritis to 74.6% for age > 65 years. Approximately one-third reported a high level of confidence in the management of bone metastases (39.9%)⁽⁴⁾.

Common barriers to better care and specialized treatment reported in this study were: lack of training, funding, knowledge, or professional development. Thus, indicating the need for new nursing education initiatives focused on bone health management⁽⁴⁾. Nurses are often the first to recognize symptoms suggestive of SRE and can assist in urgent diagnosis, as these events pose significant risks to morbidity and survival^(17,20).

Spinal cord compression is characterized as an oncologic emergency that requires immediate treatment. Common signs and symptoms include back pain, limb asthenia, and sensory disturbances. Bladder and bowel function disturbances are often associated with late consequences of this event, which can cause irreversible paraparesis or paraplegia if not detected and treated early. Nurses are essential in the management of symptoms⁽¹⁶⁻¹⁷⁾.

Hypercalcemia (severe SRE) is caused by increased calcium release from the bones and dysregulation by the kidneys. A serum calcium greater than 2.6 mmol/l is indicative of hypercalcemia, although patients may be asymptomatic. Common symptoms include nausea, increased thirst, decreased appetite, fatigue, and confusion⁽¹⁹⁾. If severe hypercalcemia

is left untreated, it can lead to cardiac arrhythmias, coma, and death. Treatment is by intravenous hydration and the use of bisphosphonates such as zoledronic acid⁽¹⁶⁻¹⁷⁾.

In this sense, nurses also provide guidance on supportive therapies, such as antiresorptive therapy, for example, the use of bisphosphonates, with the aim of preventing, delaying, or treating SRE, being necessary for the effective management and maintenance of bone health⁽²¹⁾. Its main common side effects are fatigue, transient bone pain, nausea, and decreased appetite. The importance of additional counseling on the timing of medication to reduce the risk of gastric irritation should be emphasized. Such guidance is essential for treatment adherence^(17,19).

Quality of life assessment is essential, as it allows nurses to monitor patients' well-being, as well as their abilities in daily activities. It is recommended that validated instruments are used that are appropriate to the reality of the target audience. It is worth noting that changes in this area during treatment require changes in the management of the disease^(16,20).

These professionals must assess the unique needs of patients and caregivers in multiple areas, performing regular symptom consultations and detailed physical assessments, providing supportive care, and connecting multi-professional specialists. In addition, they must monitor the entire course of radiotherapy treatment and outcomes to see potential risks of SRE, or to manage it^(10,18,24).

In this sense, through all the analyses, nurses are in the unique and personal position of providing clinical and practical information to ensure that patients can make intelligent and informed treatment decisions that may result in better solutions in the treatment of bone metastasis with radiotherapy⁽²⁰⁾.

Study limitations

The scarcity of specific studies on nursing care in patients with bone metastases undergoing radiotherapy limited this analysis. Furthermore, there are

few studies with robust methodological design; most publications focus on pain assessment, which is paramount, however, other events related to the skeleton need more emphasis on nursing management.

Contributions to practice

The study highlighted the main nursing care for patients with bone metastases undergoing radiotherapy, being relevant to give theoretical support to professionals, directing their assistance, especially in oncology. This is relevant since such professionals, as health educators, must be able to train patients and companions, developing effective strategies to disseminate knowledge, including among the health team.

Conclusion

This review enabled the mapping of studies on nursing care in patients with bone metastases undergoing radiotherapy. Nurses provide important ongoing support to patients, monitor progress, side effects, and therapeutic outcomes, as well as prevent and manage skeletal-related events through the care they provide. In addition, they can adopt management strategies to ensure patient safety and comfort and maximize compliance with effective treatment regimens, minimizing the risk of skeletal-related events.

Authors' contribution

Conception and design or analysis and interpretation of data; Writing of the manuscript or relevant critical review of the intellectual content; Responsibility for all aspects of the text in ensuring the accuracy and completeness of any part of the manuscript: Sagica TP. Conception and design or analysis and interpretation of data and Writing of the manuscript or relevant critical review of the intellectual content: Oliveira SSS, Pereira OV.

Relevant critical revision of the intellectual content and Final approval of the version to be published: Ramos AMPC.

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