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Effectiveness of Nursing-Led Pain Management Interventions for Adults with Breast Cancer: A Systematic Review

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Abstract. This systematic review examined nursing-led interventions for managing pain in adults with breast cancer. Following PRISMA, 1,196 records were identified from databases; 1,136 were removed before screening (502 duplicates and 634 marked ineligible by automation tools), 60 records were screened, 55 reports were sought, 41 could not be retrieved, and 14 studies were included. Included studies were classified by population: none of the 14 was restricted to Stage IV breast cancer (Category 1); five involved advanced or metastatic cancer or breast cancer populations (Category 2); and nine came from broader cancer populations or were contextual (Category 3). Findings were synthesized narratively, and study-level sample sizes, comparators, and effect estimates are tabulated; appraisal ratings of the rated studies ranged from moderate to high. Pain education showed a small pooled reduction in pain compared with standard care in broader cancer samples (12 studies; pooled effect −0.36), and one trial in metastatic cancer reported lower pain severity after pain self-management education. In contrast, a meta-analysis of 41 nurse-led symptom-management trials found no clear pain benefit, and a PRO-SELF trial (n = 64) improved self-efficacy, quality of life, and mood without significant pain differences. Two included reports were descriptive conference abstracts and one was a trial protocol, so they provided no comparative pain data. The evidence therefore supports nursing-led education and self-management as promising but indirect strategies for Stage IV breast cancer pain; Stage IV-specific comparative trials are needed. Implementation depends on nurse training, institutional support, medication access, and culturally responsive care.

Keywords: Breast Cancer; Cancer Pain; Nursing-Led Interventions; Pain Management; Palliative Care

Introduction

Cancer-related pain remains one of the most distressing concerns among patients with advanced disease and can substantially diminish quality of life. The burden extends beyond physical discomfort to emotional, psychological, social, and functional distress, particularly among patients with advanced cancer (World Health Organization [WHO], 2019). In the Philippine context, breast cancer remains a major health concern, while patients with advanced disease may encounter limited treatment options and persistent symptom burden (Department of Health [DOH], 2022).

Nurses occupy a central role in the assessment and management of cancer pain because they provide continuous monitoring, medication-related support, patient education, psychosocial care, and non-pharmacological interventions (Alsaiari et al., 2024; Park & Lee, 2022). Nursing interventions may be implemented independently, collaboratively, or through combined approaches. Independent strategies include relaxation, cognitive-behavioral techniques, mindfulness, and patient education, whereas collaborative approaches include participation in pharmacologic management and palliative-care coordination (Guven et al., 2019; Yin et al., 2023). Despite these roles, barriers such as limited access to analgesics, insufficient professional training, and stigma surrounding pain reporting and opioid use may hinder effective pain control, particularly in low-resource settings (Alsaiari et al., 2024; Javier et al., 2016).

Although cancer pain management has been widely studied, evidence that specifically isolates nursing-led approaches for adults with Stage IV breast cancer remains limited. Existing reviews have addressed therapeutic education, symptom management, and related nursing interventions across broader cancer populations rather than exclusively focusing on Stage IV breast cancer (González-Martín et al., 2023; Kelly et

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al., 2022; Park & Lee, 2022). This gap limits the development of standardized nursing-specific protocols that are responsive to the complex physical and psychosocial needs of patients with advanced breast cancer. Culturally responsive care is also important in settings where resource limitations and beliefs about pain and analgesic use influence access, adherence, and symptom reporting (Javier et al., 2016).

Research Questions

The systematic review addressed the following questions:

1. How effective were nursing interventions in reducing pain intensity among adults with breast cancer compared with standard care?
2. What impact did nursing interventions have on secondary outcomes such as quality of life, patient satisfaction, psychological well-being, and functional recovery?
3. What specific nurse-led interventions were utilized for pain management in breast cancer?
4. What systemic factors influenced the implementation and outcomes of nursing-led pain interventions?

Scope and Delimitation of the Study

The review focused on quantitative evidence concerning nursing-led pain management for adults with advanced breast cancer, with emphasis on moderate to severe pain. Searches covered major health and multidisciplinary databases, and the intended publication period favored recent studies; three earlier reports (2003–2016) were nevertheless retained and are labeled as indirect evidence. Outcomes of interest included pain intensity, quality of life, emotional well-being, patient satisfaction, self-efficacy, adherence, and functional ability. Qualitative-only studies, case reports, commentaries, and studies without adequate quantitative information were excluded. Evidence from broader cancer populations is not treated as equivalent to Stage IV breast cancer evidence and is identified as indirect throughout.

Literature Review

Adults with Breast Cancer and Cancer-Related Pain

Adults with Stage IV breast cancer may experience complex and persistent pain that requires individualized and multidimensional management. No included study evaluated nursing-led pain management exclusively in this population; the available evidence comes from mixed advanced or metastatic cancer samples and from broader cancer populations. In those samples, pain relief was reported to be strengthened when it was combined with education and self-management support (González-Martín et al., 2023; Musavi et al., 2021). Exercise has also been examined as an adjunctive strategy for pain among people with cancer (Plinsinga et al., 2023). These findings point toward a holistic approach that addresses pain intensity together with emotional well-being, functional ability, and patient participation in care, but they are indirect evidence for Stage IV breast cancer.

Nursing-Led Pain Management Strategies

Nursing-led interventions described in the reviewed literature include structured pain education, self-management coaching, cognitive-behavioral strategies, relaxation and mindfulness techniques, exercise-based approaches, music therapy, symptom monitoring, palliative-care coordination, and medication-related support. Therapeutic and nurse-led pain education and self-management programs have targeted pain-management knowledge, adherence, and self-efficacy (González-Martín et al., 2023; Hammer et al., 2015; Yin et al., 2023; Zhou et al., 2015). Other reports examined nurse-led symptom management, outpatient palliative care, a nurse-led Tai Chi program, and music-based interventions (Guven et al., 2019; Kelly et al., 2022; Ran et al., 2023; Wang et al., 2022).

Nursing-Led Interventions Compared with Standard Care

Standard cancer pain care commonly includes pharmacological treatment, which remains essential for the control of moderate to severe pain (WHO, 2019). Whether nursing-led educational, behavioral, and psychosocial strategies add benefit beyond standard care is not yet settled. Pooled evidence on therapeutic pain education suggests a small reduction in pain compared with standard care (González-Martín et al., 2023), whereas a meta-analysis of nurse-led symptom-management interventions found no clear pain benefit although other symptoms improved (Kelly et al., 2022). Reports on palliative-care and rapid-access models describe service-level outcomes but did not provide comparative pain data (Guven et al., 2019; Triglianos et al., 2023).

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Outcomes of Nursing-Led Interventions

Beyond pain intensity, the literature reports benefits in selected secondary outcomes. A PRO-SELF-based nursing program improved self-efficacy, quality of life, social support, anxiety, and depression without a significant between-group difference in pain scores (Yin et al., 2023). Nursing interventions were associated with higher hope among patients with cancer (Li et al., 2018), and pain self-management education was associated with better quality of life in metastatic cancer (Musavi et al., 2021). Music interventions reduced anxiety and depression in breast cancer without a significant quality-of-life difference (Ran et al., 2023), and a meta-analysis of psychoeducational interventions reported a beneficial effect on pain in adults with cancer (Devine, 2003). These findings indicate that the value of nursing-led care may extend beyond physical symptom relief.

Methodology

Research Design

The study employed a systematic review design and followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework. The review was designed to synthesize quantitative evidence on nursing-led interventions for pain management among adults with advanced or Stage IV breast cancer. Randomized controlled trials, cohort studies, observational studies, and selected review-level evidence were considered.

Research Locale

Not applicable. The study utilized published research reports and selected grey literature from electronic databases and other literature sources, including PubMed (MEDLINE), CINAHL, ProQuest, Scopus, EBSCOhost, ScienceDirect, Google Scholar, and the Cochrane Library.

Research Participants

The study considered published reports addressing nursing-led or nurse-supported interventions for pain management in adults with advanced breast cancer and reporting quantitative outcomes. The intervention scope included independent non-pharmacological strategies, collaborative medication-related care, and combined approaches. Studies without sufficient quantitative data, pediatric-only studies, case reports, commentaries, and non-English reports were excluded. The included reports were classified into three evidence categories: Category 1, direct evidence (samples restricted to Stage IV breast cancer); Category 2, advanced/metastatic or breast-cancer evidence (samples with advanced or metastatic disease, or with breast cancer of any stage, but not restricted to Stage IV breast cancer); and Category 3, indirect evidence from broader cancer populations (mixed cancer types and stages) or contextual reports.

Research Instrument

A standardized data extraction approach was used to gather information from the included reports. The extracted information covered the author, year, country, study design, sample size, population, intervention, comparator, outcomes, and implementation factors.

Methodological quality was assessed using the Newcastle-Ottawa Scale for cohort and observational studies and the Cochrane Risk of Bias 2 framework for randomized controlled trials. The ratings assigned during appraisal were presented in Table 2. The integrative review and reports added after the original appraisal (Devine, Plinsinga et al., and Zhou et al.) were not rated. The trial protocol was also not rated because it reported no outcome data.

Data Gathering Procedure

The literature search was conducted using PubMed (MEDLINE), CINAHL, ProQuest, Scopus, EBSCOhost, ScienceDirect, Google Scholar, and the Cochrane Library, together with selected grey literature sources. Search terms combined concepts related to nursing interventions, nursing care, pain management, Stage IV or advanced breast cancer, non-pharmacological interventions, palliative care, and quality of life. Boolean operators, synonyms, truncation, and Medical Subject Headings were used to broaden the retrieval of relevant reports. Titles and abstracts were screened, duplicates and records marked ineligible by automation tools were removed, and potentially eligible reports underwent retrieval and full-text assessment. The numbers at each stage are presented in Figure 1 and reconciled arithmetically in Table 1. Secondary review and consensus procedures were used to reduce selection bias. A structured narrative synthesis was employed because of variations in intervention types, study designs, outcome measures, and clinical contexts. No new pooling was attempted. Effect estimates, including mean differences, standardized mean differences, and P

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values, were extracted as reported in each source and presented in Table 4. Interventions were grouped into independent, collaborative, or combined strategies. Findings were compared with each study's stated comparator, including usual or standard care where reported, and interpreted according to evidence category. Reports without comparative pain data, including descriptive reports, a trial protocol, and a contextual diagnostic cohort, were not used to support effectiveness claims. The review also examined systemic factors affecting implementation.

Results and Discussions

Search Results

A total of 1,196 records were identified through database searching (registers, n = 0). Before screening, 1,136 records were removed: 502 duplicates and 634 records marked ineligible by automation tools, with none removed for other reasons (1,196 − 502 − 634 = 60). The remaining 60 records were screened and 5 were excluded (60 − 5 = 55). Fifty-five reports were sought for retrieval; 41 could not be retrieved (55 − 41 = 14), and the remaining 14 reports were assessed for eligibility. No reports were excluded at this stage, so 14 studies were included. Only 14 of the 55 reports sought (25.5%) were retrieved, which is addressed under the limitations below.

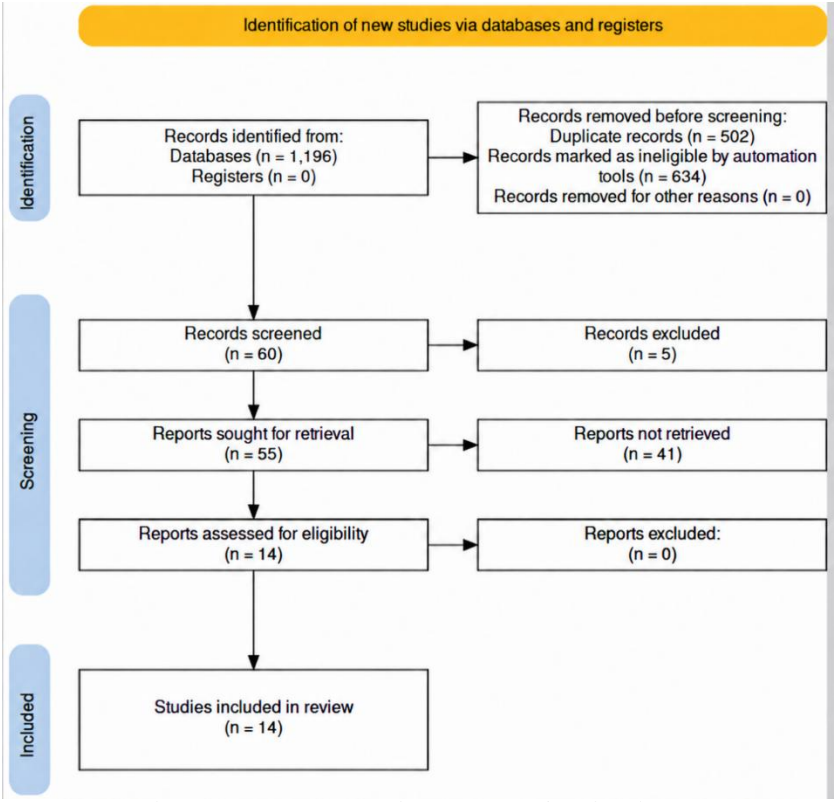


Figure 1. *PRISMA 2020 Flow Diagram of Study Selection*

Characteristics of the Included Studies and Evidence Classification

The 14 included reports comprised seven systematic reviews or meta-analyses, one integrative review, two randomized controlled trials, one randomized-trial protocol, and three cohort or descriptive reports, two of which are conference abstracts (Table 1). Interventions included exercise, nurse-led Tai Chi, self-management and pain education, symptom monitoring, psychosocial support, palliative-care and rapid-access models, music therapy, and comprehensive symptom management. Classified by population, no study provided direct evidence for Stage IV breast cancer (Category 1: 0 studies). Five studies (Category 2) involved advanced or metastatic cancer in mixed tumor types (Guven et al., 2019; Musavi et al., 2021; Triglianos et al., 2023) or breast cancer of unspecified stage (Ran et al., 2023; Wang et al., 2022), but none reported results specific to advanced breast cancer. Nine studies (Category 3) drew on broader cancer populations (Devine, 2003; González-Martín et al., 2023; Hammer et al., 2015; Kelly et al., 2022; Li et al., 2018; Plinsinga et al., 2023; Yin et al., 2023; Zhou et al., 2015) or were contextual (Dave et al., 2022).

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Table 1. Characteristics, Population, and Evidence Category of the Included Studies

Study	Cat.	Design	Sample	Population	Quality rating
1. Guven et al. (2019)	2	Descriptive cohort report (conference abstract)	174 patients	Oncology outpatients, mostly advanced (stage IV) disease; GI, lung, and GU tumors predominant	Moderate (6/9)
2. Musavi et al. (2021)	2	Randomized controlled trial	82 patients	Adults with metastatic cancer (mixed sites)	High (8/9)
3. Ran et al. (2023)	2	Systematic review and meta-analysis of RCTs	10 RCTs; 593 patients	Breast cancer patients (stage not restricted)	High (9/9)
4. Triglianos et al. (2023)	2	Pre-post descriptive report (conference abstract)	53 patients	Patients with suspected cancer; 79% of solid-tumor patients metastatic at diagnosis; 8% breast	Moderate (5/9)
5. Wang et al. (2022)	2	Randomized controlled trial protocol (no results)	Planned n = 40	Women with breast cancer (stage not restricted)	Not rated (protocol)
6. Dave et al. (2022)	3 (contextual)	Prospective cohort; no nursing intervention	10,830 women	Symptomatic women attending a breast diagnostic clinic	Moderate (6/9)
7. Devine (2003)	3	Meta-analysis of psychoeducational interventions	25 studies	Adults with cancer	Not rated
8. González-Martín et al. (2023)	3	Systematic review and meta-analysis	12 studies; 709 in intervention groups	Adults with cancer pain of at least 1 month; breast cancer most frequent diagnosis	High (9/9)
9. Hammer et al. (2015)	3	Integrative review	Multiple studies	Adults with cancer	Not rated
10. Kelly et al. (2022)	3	Systematic review and meta-analysis	149 studies (n = 107,286); 41 in meta-analysis	People with cancer (all types)	High (9/9)
11. Li et al. (2018)	3	Meta-analysis of RCTs	9 RCTs	Patients with cancer	High (8/9)
12. Plinsinga et al. (2023)	3	Systematic review and meta-analysis of RCTs	71 RCTs; 5,877 participants	People with cancer	Not rated
13. Yin et al. (2023)	3	Randomized controlled trial	64 (34 intervention, 30 control)	Patients with cancer-related chronic pain	High (8/9)
14. Zhou et al. (2015)	3	Systematic review of nurse-led education studies	6 studies	Oncology outpatients with cancer pain	Not rated

Note. Cat. = evidence category: 1 = direct evidence for Stage IV breast cancer (none identified); 2 = advanced/metastatic cancer or breast-cancer evidence, not restricted to Stage IV breast cancer; 3 = indirect evidence from broader cancer populations or contextual report. Quality ratings are those assigned during appraisal; reports added after appraisal are marked not rated.

PICO Components of the Included Studies

The PICO synthesis (Table 2) shows considerable variation in population specificity. Interventions ranged from exercise and education to psychosocial support and palliative-care models. Comparators were usual or standard care in most trials and reviews, for example in 7 of the studies in the pain-education meta-analysis (González-Martín et al., 2023) and in 36 of 43 comparisons in the nurse-led symptom-management meta-analysis (Kelly et al., 2022), while the trial in metastatic cancer used a no-education control (Musavi et al., 2021) and the descriptive reports had no concurrent comparator (Guven et al., 2019; Triglianos et al., 2023).

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Table 2. PICO Components of the Included Studies

Study	Population	Intervention (nursing role)	Comparison	Outcomes
1. Dave et al. (2022)	Symptomatic women at a breast diagnostic clinic	observational; breast pain as exposure)	Not applicable	Breast cancer diagnosis
2. Devine (2003)	Adults with cancer	Psychoeducational interventions	Not reported	Pain
3. González-Martín et al. (2023)	Adults with cancer pain of at least 1 month	Therapeutic pain education; nurse-led in 2 studies	Standard cancer care (7 studies); no control (2 studies)	Pain intensity; knowledge; quality of life; catastrophizing
4. Guven et al. (2019)	Oncology outpatients, mostly advanced disease	Embedded palliative-care clinic (physician, internist, nurse)	None (descriptive)	Symptom burden (ESAS); interventions; 30-day mortality
5. Hammer et al. (2015)	Adults with cancer	Self-management interventions	Not applicable (integrative review)	Adherence; self-efficacy
6. Kelly et al. (2022)	People with cancer	Multicomponent nurse-led interventions	Usual care (36/43); attention control (4); unclear (3)	Pain and other symptoms
7. Li et al. (2018)	Patients with cancer	Nursing interventions for hope	Control group (not described in abstract)	Hope
8. Musavi et al. (2021)	Adults with metastatic cancer	Face-to-face pain self-management education (3 steps)	Questionnaire and pain checklist only (no education)	Pain severity (7 weeks); quality of life (1 and 3 months)
9. Plinsinga et al. (2023)	People with cancer	Exercise interventions	Non-exercise or usual care	Pain
10. Ran et al. (2023)	Breast cancer patients	Music intervention	Control (not specified in abstract)	Anxiety; depression; quality of life; pain
11. Triglianos et al. (2023)	Patients with suspected cancer	Rapid-access clinic with nurse navigator and symptom management	Pre-launch period (14 patients)	Wait time; emergency department use
12. Wang et al. (2022)	Women with breast cancer	Nurse-led Tai Chi, 12 weeks, 45 min twice weekly (planned)	Waiting-list control with usual care	Quality of life (primary); pain VAS and SF-MPQ (secondary; planned)
13. Yin et al. (2023)	Patients with cancer-related chronic pain	PRO-SELF-based multidisciplinary pain nursing program	Routine cancer pain nursing	Pain; adherence; self-efficacy; quality of life; anxiety; depression
14. Zhou et al. (2015)	Oncology outpatients with cancer pain	Nurse-led educational interventions for pain management	Not stated in abstract	Pain intensity; knowledge and attitudes; anxiety, depression, satisfaction, quality of life

Research Question 1: How effective were nursing interventions in reducing pain intensity among adults with breast cancer compared with standard care?

Effectiveness of Nursing Interventions in Reducing Pain Intensity

Study-level comparative pain data were extractable from six sources (Table 3). Among broader cancer samples (Category 3), exercise was associated with lower pain than non-exercise or usual care (SMD −0.45, 95% CI −0.62 to −0.28; 71 RCTs; very low certainty; Plinsinga et al., 2023), and pain education produced a small pooled reduction in pain compared with standard care (pooled effect −0.36, 95% CI −0.47 to −0.25; 12

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studies), driven by mean and current pain rather than worst pain (González-Martín et al., 2023). By contrast, a meta-analysis of nurse-led symptom-management interventions found no clear pain benefit over usual care (unidimensional pain measures: mean difference −2.11, 95% CI −5.52 to 1.31; 10 trials, 1,229 participants; low certainty), even though other symptoms improved (Kelly et al., 2022), and a PRO-SELF-based nursing program did not significantly change pain scores relative to routine pain nursing (n = 64; Yin et al., 2023).

In metastatic cancer (Category 2), a randomized trial of pain self-management education (n = 82) reported pain severity trends that differed significantly from controls over seven weeks (P < 0.0001), but results specific to breast cancer were not reported and nurse delivery was not stated in the abstract (Musavi et al., 2021). In breast cancer, a meta-analysis of music interventions reported reduced pain (standardized mean difference −3.47, 95% CI −6.45 to −0.48; 10 trials, 593 patients), although the very wide interval and the fact that music was not necessarily delivered by nurses limit inference (Ran et al., 2023). Two descriptive reports (Guven et al., 2019; Triglianos et al., 2023) and one trial protocol (Wang et al., 2022) provided no comparative pain results. Three further reviews reported benefit (decreased pain intensity after nurse-led education in 6 studies, Zhou et al., 2015; a beneficial pain effect of psychoeducation across 25 studies, Devine, 2003; adherence and self-efficacy, Hammer et al., 2015), but effect sizes were not extracted. Taken together, evidence that nursing-led interventions reduce pain compared with standard care is mixed, is most consistent for education-based approaches, and is indirect for Stage IV breast cancer.

Table 3. Study-Level Findings on Pain and Other Outcomes Compared with the Stated Comparator

Study (Cat.)	Pain finding versus comparator	Other outcomes	Limitations for Stage IV breast cancer
1. Musavi et al. (2021) (2)	Pain severity trend over weeks 1–7 differed between groups (P < 0.0001)	Quality of life better at 1 and 3 months (P < 0.0001)	Single trial (n = 82); mixed metastatic cancers; breast-specific data not reported
2. Ran et al. (2023) (2)	SMD −3.47 (95% CI −6.45 to −0.48), favoring music	Anxiety SMD −2.12 (−3.17 to −1.07); depression −0.77 (−1.47 to −0.07); quality of life −0.07 (−0.48 to 0.34), not significant	Very wide CI; music not necessarily nurse-delivered; breast cancer of any stage
3. Guven et al. (2019) (2)	No comparative pain data; pain was the chief complaint in 26% of patients	Median 4 other severe symptoms; 30-day mortality 17%	Descriptive abstract; no comparator; mixed tumors
4. Triglianos et al. (2023) (2)	No pain scores reported	Wait for first oncology consult 17 to 5 days; ED visit between clinic and specialty visit 8%	Descriptive abstract; no statistics; 8% breast cancer
5. Wang et al. (2022) (2)	No results (protocol); pain is a planned secondary outcome	Planned primary outcome: quality of life	Protocol; planned n = 40; stage not restricted
6. Yin et al. (2023) (3)	No significant difference in pain scores (P > 0.05)	Better self-efficacy, quality of life, social support; lower anxiety and depression (P < 0.001)	Single RCT (n = 64); chronic cancer pain; mixed cancers
7. González-Martín et al. (2023) (3)	Pooled effect −0.364 (95% CI −0.474 to −0.253); benefit for mean and current pain, none for worst pain	Knowledge improved; catastrophizing reduced; no clear quality-of-life benefit	12 studies; moderate heterogeneity (I^2 about 47%); fair-to-good quality; mixed cancers
8. Kelly et al. (2022) (3)	MD −2.11 (95% CI −5.52 to 1.31), 10 trials; SMD −0.06 (−0.37 to 0.25), 2 trials; no evidence of benefit (low certainty)	Evidence of benefit for other symptoms; pain was the exception	41 studies in meta-analysis; all cancer types; no breast-specific subgroup
9. Li et al. (2018) (3)	No pain outcome	Hope increased after nursing intervention (9 RCTs; I^2 = 76.1% post-test)	Not pain-focused; mixed cancers
10. Plinsinga et al. (2023) (3)	SMD −0.45 (95% CI −0.62 to −0.28) favoring exercise (71 RCTs)	Not extracted	Very low certainty; exercise not necessarily nurse-led; all cancer types
11. Zhou et al. (2015); Devine (2003); Hammer et al. (2015) (3)	Pain intensity decreased after nurse-led education (6 studies); beneficial pain effect of psychoeducation (25 studies); effect sizes not extracted	Zhou: knowledge and attitudes improved, minimal effect on anxiety, depression, quality of life; Hammer: adherence and self-efficacy	Indirect; older reviews; comparative magnitude unknown
12. Dave et al. (2022) (3, contextual)	Not applicable (no intervention)	Breast pain was not associated with a breast cancer diagnosis	Diagnostic cohort; not an effectiveness study

Research Question 2: What impact did nursing interventions have on secondary outcomes such as quality of life, patient satisfaction, psychological well-being, and functional recovery?

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Impact on Secondary Outcomes

Secondary outcomes were reported more consistently than pain. A PRO-SELF-based nursing program improved self-efficacy, quality of life, social support, anxiety, and depression ($P < 0.001$) despite no significant pain difference (Yin et al., 2023). Nursing interventions increased hope among patients with cancer (Li et al., 2018), and pain self-management education improved quality of life at one and three months in metastatic cancer (Musavi et al., 2021). Music interventions reduced anxiety and depression in breast cancer but produced no significant change in quality of life (Ran et al., 2023). Pain education improved knowledge and reduced catastrophizing without a clear overall quality-of-life benefit (González-Martín et al., 2023), and nurse-led symptom-management interventions showed evidence of benefit for symptoms other than pain (Kelly et al., 2022). Descriptive reports documented service-level outcomes such as shorter waiting times and fewer emergency visits (Triglianos et al., 2023). Outcomes such as patient satisfaction and functional recovery were reported only in the studies summarized without effect sizes (Table 3) and therefore cannot be quantified here.

Research Question 3: What specific nurse-led interventions were utilized for pain management in breast cancer?

Nurse-Led Interventions Utilized

Three broad categories of intervention emerged. Independent strategies included patient education and self-management coaching (González-Martín et al., 2023; Hammer et al., 2015; Musavi et al., 2021; Yin et al., 2023; Zhou et al., 2015), exercise (Plinsinga et al., 2023), music therapy (Ran et al., 2023), and a planned nurse-led Tai Chi program (Wang et al., 2022). Collaborative strategies involved symptom monitoring, medication-related care within prescribed regimens, palliative-care coordination, and navigation delivered with other professionals (Guven et al., 2019; Kelly et al., 2022; Triglianos et al., 2023). Combined multimodal approaches integrated these elements; the multicomponent nurse-led interventions in the largest review were mostly delivered individually, face to face, in hospital settings (Kelly et al., 2022). Evidence that combined approaches are more effective than single-component approaches was not demonstrated by the included studies.

Research Question 4: What systemic factors influenced the implementation and outcomes of nursing-led pain interventions?

Systemic Factors Affecting Implementation and Outcomes

Implementation is likely to be affected by nurse training and competency, staffing, institutional protocols, access to palliative-care and psychological services, medication availability, patient literacy, and cultural beliefs. Limited opioid access, inadequate specialized training, and the absence of structured pain-management pathways have been described as barriers in Southeast Asia (Javier et al., 2016), and nurses' knowledge gaps and perceived barriers have been documented in a scoping review (Alsaiari et al., 2024). Service-model reports show that palliative-care and rapid-access clinics rely on multidisciplinary teams and referral pathways (Guven et al., 2019; Triglianos et al., 2023). The included studies did not test these systemic factors directly, so their influence on outcomes remains inferential.

Synthesis of Nurse-Led Interventions in Pain Management

The overall synthesis positions nursing-led pain management as a multidimensional model that combines symptom assessment, education, behavioral strategies, medication-related support, and psychosocial care (Table 4). Education and self-management show the most consistent, though small, pain benefit in broader cancer populations (González-Martín et al., 2023; Musavi et al., 2021; Zhou et al., 2015), whereas nurse-led symptom management and PRO-SELF-based programs show clearer benefits for secondary outcomes than for pain (Kelly et al., 2022; Yin et al., 2023). Exercise, Tai Chi, and music interventions illustrate how non-pharmacological strategies may complement standard pain management (Plinsinga et al., 2023; Ran et al., 2023; Wang et al., 2022).

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Table 4. Synthesis of the Evidence by Population Category

Evidence category	Studies (n)	What the evidence shows	Applicability to Stage IV breast cancer
1. Direct: Stage IV breast cancer	0	No study restricted to this population	No direct evidence; no conclusion can be drawn directly
2. Advanced/metastatic cancer or breast cancer (not restricted to Stage IV breast cancer)	5	One trial in metastatic cancer reported lower pain severity after pain self-management education (n = 82); music meta-analysis in breast cancer reported lower pain with very wide CI; two descriptive reports and one protocol gave no comparative pain data	Partially applicable; breast-specific advanced-disease results not reported
3. Indirect: broader cancer populations or contextual	9	Exercise: modest pain reduction (very low certainty); pain education: small pooled pain reduction; nurse-led symptom management: no clear pain benefit; PRO-SELF program: no pain difference but better self-efficacy, quality of life, and mood; hope increased	Indirect; may inform, but does not establish, practice for Stage IV breast cancer

Applicability to Stage IV Breast Cancer

The three categories support different strengths of inference. Because Category 1 evidence is absent, no conclusion about nursing-led pain management specific to Stage IV breast cancer can be drawn directly. Category 2 evidence concerns advanced or metastatic cancers of mixed type, or breast cancer of unspecified stage, and only one trial reported comparative pain data in a metastatic population (Musavi et al., 2021). Category 3 evidence provides the largest and most methodologically robust information on pain education and nurse-led symptom management, but it comes from mixed cancer populations and should be treated as indirect evidence that may inform, rather than establish, practice for Stage IV breast cancer. Claims in this article about effectiveness are therefore limited to the populations in which they were measured.

Limitations of the Evidence

Several limitations qualify the findings. Heterogeneity in interventions, comparators, and outcome measures prevented pooling, and effect sizes were not extracted for three Category 3 sources. Fourth, several effect estimates come from reviews whose pooled results have wide confidence intervals or low certainty.

Ethical Considerations

The systematic review used secondary data from published studies and did not involve direct interaction with human participants; informed consent was therefore not applicable, and no identifiable participant information was collected, so confidentiality and anonymity were not at risk. Ethical approval was obtained from the San Pedro College Research Ethics Committee as part of the parent study. The review adhered to principles of academic integrity, transparent reporting, accurate attribution, and impartial synthesis. Study selection, data extraction, and quality appraisal were conducted with procedures intended to reduce reviewer bias.

Conclusion

The systematic review concludes that, for adults with Stage IV breast cancer, the evidence on nursing-led pain management is indirect. Education- and self-management-based nursing interventions showed the most consistent, though small, pain benefit compared with standard care in broader cancer populations, whereas nurse-led symptom-management interventions did not show a clear pain benefit. Nursing-led interventions were also associated with improvements in secondary outcomes such as self-efficacy, quality of life, hope, anxiety, and depression, although these varied across studies. The findings support a model in which nurses contribute to pharmacological care and symptom surveillance and to interventions that address the cognitive, emotional, social, and functional dimensions of cancer pain, but they should be applied to Stage IV breast cancer cautiously. The sustainability of these interventions depends on adequate training, institutional support, standardized protocols, resource availability, and culturally responsive implementation.

Recommendations

Integrate structured educational and self-management nursing interventions, including pain education, relaxation, mindfulness, and other appropriate non-pharmacological strategies, into oncology and palliative-care pain protocols as adjuncts to standard pharmacological care, while monitoring pain outcomes. Develop clear institutional definitions and standards for nursing-led, collaborative, and combined pain-management interventions to improve consistency in practice and research. Strengthen advanced pain-management education and competency development for oncology and palliative-care nurses. Establish

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interdisciplinary pain-management teams in which nurses have a defined role in assessment, education, psychosocial support, symptom monitoring, and care coordination. Improve access to essential pain-management resources and culturally responsive patient education, particularly in low-resource settings. Conduct high-quality comparative studies that specifically enroll adults with Stage IV breast cancer, report disease stage and comparator care, and use standardized pain outcome measures, so that direct evidence (Category 1) becomes available.

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