MRS. LEENA TUOMINEN (Orcid ID : 0000-0001-7764-7572)

DR. MINNA STOLT (Orcid ID : 0000-0002-1845-9800)

Effectiveness of nursing interventions among patients with cancer: An overview of systematic reviews

SHORT RUNNING TITLE: NURSING INTERVENTIONS AND THEIR EFFECTIVENESS

Leena Tuominen

Minna Stolt

Riitta Meretoja

Helena Leino-Kilpi

Department of Nursing Science, University of Turku, Joukahaisenkatu 3-5, 20014 Turku, Finland.

Correspondence

Leena Tuominen, University of Turku, Department of Nursing Science, Turku, Finland. Email: leetuo@utu.fi

Tel: +358 440 421 371

Aims and objectives: To explore nursing interventions used among patients with cancer and summarise the results of their effectiveness. The ultimate goal was to improve the quality of care and provide best evidence for clinicians to refer to while developing effective nursing interventions.

Background: Nursing interventions refer to actions that nurses take with the aim of improving the well-being of people with cancer-related health and care needs. A plethora of systematic reviews has been conducted in this research area, although with scattered results. We conducted a comprehensive review to identify and summarise the existing evidence.

Methods: This overview of systematic reviews adheres to the PRISMA guidelines. The PubMed, CINAHL, MEDLINE and Scopus databases were searched. Nine reviews reporting findings from 112 original studies published 2007–2017 met the selection criteria. The results of intervention effectiveness were analysed using descriptive quantification and a narrative summary of the quantitative data.

Results: The effectiveness of educational nursing interventions was inconsistent on quality of life, attitudes, anxiety and distress, but positive on level of knowledge, symptom severity, sleep and uncertainty. Psychosocial nursing interventions had a significant effect on spiritual well-being, meaning of life, fatigue and sleep. Psychological nursing interventions reduced cancer-related fatigue. Nursing interventions supporting patients' coping had a significant impact on anxiety, distress, fatigue, sleep, dyspnoea and functional ability. Activity-based interventions may prevent cancer-related fatigue.

Conclusions: Nursing interventions achieved significant physical and psychological effects on the lives of patients with cancer. Multidimensional nature of interventions by combining different elements reinforces the effect. Priorities for future research include identifying the most beneficial components of these interventions.

Relevance to Clinical Practice: Implementation of these nursing interventions into clinical practice is important to improve patients' knowledge and quality of life (QoL) as well as reducing various symptoms and side effects related to cancer and its treatment.

KEYWORDS: cancer, nursing intervention, psychosocial, systematic review

What does this paper contribute to the wider global community?

• This overview provided a comprehensive summary of nursing interventions and their effectiveness among patients with cancer.

• Educational, psychosocial, psychological and interventions supporting patients' coping achieved significant positive outcomes on the lives of patients with cancer.

• Future investigation needs to focus on the most beneficial intervention components to guide clinical practice development.

1 INTRODUCTION

The number of people affected by cancer is growing globally. About 14 million new cases were recorded in 2012, and the number is expected to rise by over 70% over the next two decades. Cancer is one of the leading causes of mortality, accounting for 8.8 million deaths in 2015 (WHO, 2017). In Europe, breast, prostate and colorectal cancers are the most prevalent types, representing half of the five-year prevalent cases in Europe (Forman, Ferlay, Stewart, & Wild, 2014). Cancer diagnosis and treatment have advanced greatly in recent decades. Patients receive tailored medical treatment, cancer survival being a key measure of effectiveness in the field of medicine. Age-standardised five-year relative survival for adult patients with prostate cancer is about 83%, while the figures for those with breast cancer and colorectal cancer are 82% and 57%, respectively (De Angelis et al., 2014). In the future, a growing number of nursing

interventions will be directed towards patients with cancer. Therefore, evidence-based knowledge is needed to help nurse managers as well as clinical nurses to choose the right nursing intervention in clinical practice.

In addition to medical care, there are multifold health needs and concerns among patients living with cancer. Apart from information, ongoing and supportive interaction with health care professionals is essential, including alleviation of fears of recurrence or spreading of the disease (Kotronoulas, Papadopoulou, Burns-Cunningham, Simpson, & Maguire, 2017). We need reliable information regarding the effectiveness of nursing interventions, such as symptom alleviation and safe medication administration (Griffiths, Richardson, & Blackwell, 2012). In this study, effectiveness signifies the degree to which something is successful in producing a desired result (Oxford Dictionaries, 2018). Nursing interventions refer to any actions or activities that nurses take with the aim of improving the well-being of people with cancer-related health and care needs (Richards & Hallberg, 2015).

A variety of studies (Chambers et al., 2014; Gümüs & Çam, 2008; Lovell et al., 2010; Yeşilbalkan, Karadakovan, & Göker, 2009; Schjolberg et al., 2014; Zhang et al., 2014) have described the effectiveness of nursing interventions among patients with cancer, with various outcomes and divergent results. Many of these studies have focused on the side effects of cancer and its treatment, such as fatigue and pain. Nursing interventions consisting of fatigue assessment and management during chemotherapy have proved to be effective (Yeşilbalkan et al., 2009). However, interventions containing information and group sessions had no significant positive effect on fatigue among patients with breast cancer (Schjolberg et al., 2014). An educational intervention including both video and written material was effective on pain management among patients with advanced cancer (Lovell et al., 2010). Some studies have explored the effects of complex nursing interventions that include several components; for example, face-to-face education sessions, a handbook, audiotape and telephone follow-up sessions reduced symptom severity and significantly improved self-efficacy among patients

with colorectal cancer (Zhang et al., 2014). In addition, interventions offering emotional or psychological support have been effective in improving patients' psychosocial adjustment to cancer (Chambers et al., 2014; Gümüs & Çam, 2008).

Interventions related to nurses' roles, such as those of a nurse practitioner and a nurse navigator, have also been explored. Nurse practitioner's telephone-based guidance and support to facilitate chemotherapy-induced side effect management among patients with lung cancer did not reduce symptom burden or likelihood of anxiety or depression as expected (Traeger et al., 2015). The nurse navigators' role has been promising, but not conclusive, in relation to a reduction of depressive symptoms among newly diagnosed patients with lung, breast or colorectal cancer (Ludman et al., 2015). Nurse navigator interventions have however improved physical and social functioning and patient satisfaction (Lee et al., 2011), but not quality of life (QoL) (Wagner et al., 2014).

A preliminary scoping search revealed a plethora of studies and systematic reviews of the effectiveness of nursing interventions among patients with cancer. Although a number of reviews are highlighted and are disease specific, this actual review is not looking at specific cancers per se, but aim to provide a comprehensive overview of systematic reviews prior to the specific issues for specific cancers. This review, therefore, gives an overview of nursing interventions and their effectiveness to help nurse managers as well as clinical nursing in assessing their usability in their own context. Conducting an overview of systematic reviews is considered an appropriate method to summarise the evidence of promising interventions that have been assessed in previous reviews into one accessible document (Becker & Oxman, 2011; De Caro, Marucci, Lancia, & Sansoni, 2016; Joanna Briggs Institute [JBI], 2014; Smith, Devane, Begley, & Clarke, 2011).

2 AIMS

The purpose of this overview is to summarise the results of reviews assessing the effectiveness of nursing interventions among patients with cancer. The ultimate goal is to improve the quality of nursing care among these patients.

3 METHODS

The study design was an overview of systematic reviews, and it was conducted according to the PRISMA guidelines, see Supplementary file 1. Rather than focus on a single intervention, overviews of systematic reviews - also known as umbrella reviews - seek to provide an overview of a topic. They can influence conceptions about the quantity of evidence that is available to inform decision-making (Baker, Costello, Dobbins, & Waters, 2014). Reviews of this kind are useful when a plethora of systematic reviews have already been conducted in the research area of interest as they can provide new insights into the existing evidence base (JBI, 2014) and strengthen the research results that have been proved to be significant.

3.1 Search strategy

The inclusion and exclusion criteria of reviews were determined based on research questions and the PICOS process (patient, intervention, comparator, outcome and study design). Inclusion criteria were as follows: adult patients with cancer, intervention delivered by a nurse, standard care as a comparator, effectiveness of an intervention as an outcome and randomised controlled trial (RCT) design. Exclusion criteria were as follows: end-of-life care, therapy or complementary nursing, lack of a control group, examining outcomes only due to the role of a nurse, survey, observational or qualitative study, development project, theoretical text or opinion paper. We were looking for quantitative reviews of high methodological quality; thus, reviews of low quality were excluded (AMSTAR ≤ 3). The search was conducted during the

spring of 2017. The search strategy was first developed for PubMed and was later adapted for the CINAHL, MEDLINE and Scopus databases in collaboration with an information specialist. The following combinations of key words were used: cancer patient AND nursing interventi* AND outcome* OR effect* OR effic*. Searches were limited to title or abstract but not to article type. The time frame was 2007–2017; however, it was assumed that searching for reviews conducted within the past five to 10 years would yield original research conducted 30-plus years prior to the reviews (JBI, 2014).

3.2 Selecting studies

Study selection involved searching the literature and considering the reviews for study inclusion (Figure 1). During the review process, the reviews were first screened based on title and abstract and next based on full text. First, one member of the research team (LT) conducted the search at the title and abstract levels and made the first selection of 59 reviews based on the exclusion and inclusion criteria. In cases where the information available in the abstract was not clear, the complete text was checked for eligibility. The other researcher (MS) confirmed the search and selection. Reviews were downloaded to a reference management database (RefWorks) and duplicates (n = 17) were removed. Two members of the research team (LT and MS) independently assessed the relevance of the reviews by full text based on inclusion and exclusion criteria. Any disagreements were resolved via consensus between the two, and justification for the excluded reviews was documented. Based on the inclusion criteria, 31 reviews were excluded after reading the full texts. Seven reviews from the reference lists of the included reviews were accepted based on titles and abstracts and five based on full texts.

A total of 16 full-text reviews were included in the quality assessment using the 11-item measurement tool to assess systematic reviews (AMSTAR), which has shown good reliability, construct validity and feasibility for assessing the methodological quality of systematic reviews (Shea et al., 2009). The reviewers (LT and MS) worked independently, rating

each AMSTAR item as 'yes' (clearly done), 'no' (clearly not done), 'cannot answer' or 'not applicable' based on the published review report. Reviews were classified as being of low (≤ 3), medium (4–7) or high quality (8–11). A review that met all of the 11 criteria was considered to be of the highest quality. (Ryan et al., 2014). Common reasons for a review to lose points on AMSTAR were that *a priori* design was not provided or conflict of interest was not included on behalf of the authors. Studies of low quality (AMSTAR ≤ 3) were excluded from the review (Kuchinski, Reading, & Lash, 2009; Matchim & Armer, 2007; de Nijs, Ros, & Grijpdonck, 2008). Another four reviews (de Boer et al., 2015; Chow, Chan, & Chan, 2012; Galway et al., 2012; Meyer & Mark, 1995) were excluded because the effectiveness of nursing interventions was not separable from the results.

Figure 1 Flowchart of the search and selection process

3.3 Charting the data

A data extraction sheet was developed (LT) and assessed (MS) for data collection; it included authors, year, design, cancer type, intervention format, duration, provider and provision time frame, comparators, instruments, outcomes and results. Data from the included reviews were extracted (LT) and verified (MS). Differences were resolved and consensus was reached via discussion.

3.4 Collating, summarising and reporting the results

The synthesis of the main results was presented according to the research questions which were as follows:

1. What nursing interventions are used to improve the effectiveness of nursing among patients with cancer?

2. What is the effectiveness of the nursing interventions among patients with cancer?

First, the studies were grouped according to the primary features of the intervention content. Next, the results provided in the reviews were analysed using descriptive quantification and narrative summary of the quantitative data. After this, the characteristics of the included studies were tabulated. The effectiveness of nursing interventions was assessed based on the narrative synthesis and reported summary measures of each meta-analysis (e.g. risk ratio, effect size, p-values and confidence intervals), and measures of heterogeneity (e.g. I^2). The risk of bias across studies was reported according to the authors of the reviews included. The summary of effectiveness is presented according to whether an intervention is beneficial, whether no difference exists in the investigated comparison, or whether an intervention is less effective than the comparator (JBI, 2014).

4   RESULTS

From an initial pool of 440 references, nine reviews were included in the final review consisting of 112 original studies. The methodological quality was high in six and medium in three reviews (Table 1) according to the AMSTAR assessment tool. (Ryan et al., 2014).

TABLE 1 The methodological quality of included systematic reviews (n=9)

4.1 Characteristics of included reviews

The included nine reviews were published between 2007–2016. The main purpose of the reviews was to assess the effectiveness of nursing interventions in various cancer populations. The meta-analyses (n = 2) included 20 RCT studies and nine quasi-experimental studies in total. The systematic reviews (n = 7) included 79 RCT studies and five non-randomised studies. The

number of databases searched varied from three to 10, and the date range varied typically from

the beginning of the electronic database's availability until the day the search was conducted

(latest 2015). The countries of the original studies were the USA (32), the UK (11), South Korea

(9), Canada (2), Denmark (2), Hong Kong (2), Australia (1), Germany (1), Norway (1),

Netherlands (1) and Sweden (1). Countries were not reported in 49 original studies.

Participants suffered from mixed cancer types (5) or were diagnosed with gynaecological (2) or

lung (1) cancer. However, one review did not report the participants' cancer types.

Interventions were implemented in various phases of the patients' clinical pathways, from those

who were undergoing or about to begin cancer treatment to those who had completed

treatment. The methodological quality of the original studies using various appraisal tools or

statistical methods was assessed in seven of nine reviews as mainly fair or poor. The analysis

methods used were a systematic review, narrative synthesis, meta-analysis or all three (Table

2).

TABLE 2 Characteristics of included reviews (n=9)

4.2 Nursing interventions among patients with cancer

In this study, nursing interventions were categorised as educational, psychosocial, psychological

and activity-based interventions together with interventions supporting patients' coping. A

detailed description is shown in Table 3.

The largest group of nursing interventions consisted of educational interventions,

which were mainly psychoeducational in nature. According to the authors, educational

interventions consisted of information provision, counselling, coaching and guidance (Cook,

McIntyre, & Recoche, 2014; Coolbrandt et al., 2014; Rueda, Solà, Pascual, & Subirana

Casacuberta, 2011; Zhou et al., 2015), as well as encouragement and general support (Hersch,

Juraskova, Price, & Mullan, 2009). In some studies, nursing interventions described as nursing

programmes included educational interventions, but a detailed content description was lacking (Cook et al. 2014; Jacobsen, Donovan, Vadaparampil, & Small, 2007; Rodin et al., 2007).

Psychosocial (Oh & Kim, 2014; Oh & Kim, 2016; Rodin et al., 2007; Rueda et al., 2011) and psychological (Jacobsen et al., 2007; Rodin et al., 2007) interventions were also common. One form of psychosocial intervention was expressive writing (EW) — a way of coping with emotional strain by writing about one's thoughts and feelings regarding stressful or traumatic experiences (Oh & Kim, 2016). Spiritual interventions defined as any approach involving religious (achieving harmony with God) and existential (finding meaning and purpose in one's life) aspects were categorised as psychosocial in nature (Oh & Kim, 2014). In addition, interventions consisting of breathlessness rehabilitation techniques were used focusing on the emotional experiences of patients with lung cancer (Rueda et al., 2011).

Psychological interventions represented a more heterogeneous set of approaches. In addition to education, they included cognitive-behavioural therapy and supportive-expressive forms of therapy that were used against cancer-related fatigue (Jacobsen et al., 2007). In some studies, problem-solving therapy was used against depression (Rodin et al., 2007). Furthermore, cognitive-behavioural interventions were used, for example, to assist patients in recognising and modifying the factors contributing to distress by changing their thoughts and behaviours in a positive manner. In addition, they were used in solving self-care related problems (Coolbrandt et al., 2014) as well as in offering coping information about analgesic side effects (Hersch et al., 2009).

Interventions including all the components mentioned above were categorised as interventions supporting patients' coping. In addition to education, they included, for example, problem-solving therapy, consulting with a general practitioner and coordinating and monitoring treatment (Rodin, et al., 2007). In addition to education and provision of information the interventions included social, emotional or psychological aspects, as well as physical or practical components related to symptom management (Cook et al., 2014). Nursing

programs emphasised information about the disease, cancer-related breathlessness assessment and management, rehabilitation techniques as well as emotional and psychological support. They provided education on coping strategies without separating the psychological and physical aspects of the symptoms. In addition to education, nursing programmes included tailored nurse-led follow-up in the home environment and a structured assessment of symptom distress. (Rueda et al., 2011.)

Activity-based interventions included exercise in various forms, such as physical training with home-based or supervised programmes. They involved exercise recommendations and featured various types (e.g. aerobic or resistance), modes (e.g. walking or cycle ergometer) and intensities of exercise (Jacobsen et al., 2007).

The formats and sessions of interventions were versatile (Table 3). Formats varied from individual (Cook et al., 2014; Hersch et al., 2009; Jacobsen et al., 2007; Oh & Kim, 2014; Oh & Kim, 2016) and group participation (Cook et al., 2014; Hersch et al., 2009; Jacobsen et al., 2007) to combined individual and group sessions (Oh & Kim, 2014). Sessions varied widely in duration, lasting from 15 minutes to three hours each. The number of sessions ranged from one to 19 (Cook et al., 2014; Coolbrand, et al., 2014). The duration and frequency of interventions varied extensively, for example, from one 45-minute session to three monthly sessions 20 minutes each for 10 months (Cook et al., 2014). The sessions were delivered via telephone, face to face or using a combination of these two methods. Four reviews, however, did not report the session details or the information was lacking from the original studies.

TABLE 3 Summary of the interventions and outcomes of included reviews (n=9)

4.3 Effectiveness of nursing interventions among patients with cancer

The effectiveness of nursing interventions varied noticeably. Effectiveness according to the type of intervention is presented in narrative and numerical form according to the recommendations

of JBI (2014) (Table 4). In addition, a summary of the evidence is presented according to whether the intervention was beneficial (+), whether no difference was found in the investigated comparison (0) or whether the intervention was less effective than the comparator (-) (Table 5) (JBI, 2014). Multiple outcomes were measured using several instruments which are not reported in this study.

4.3.1 Educational interventions

Educational interventions had a beneficial effect on symptom severity (Coolbrandt et al., 2014), such as fatigue (p=0.001) (Rueda et al., 2011), sleep disturbance (p<0.05) (Hersch et al., 2009) and breathlessness (p=0.002) (Rueda et al., 2011). They were also beneficial for patients' attitudes towards analgesics and pain management. Educational interventions improved significantly the level of pain knowledge. However, the impact on patients' pain relief was found to be conflicting. (Zhou et al., 2015.) Educational interventions had a beneficial effect on patients' self-esteem (Rueda et al., 2011) and satisfaction with care (Cook et al., 2014). In addition, evidence-based symptom management caused less worsening of all symptom scores among patients with gynaecological cancer (p<0.001). Furthermore, counselling improved patients' sexual function and attitudes towards health care (Hersch et al., 2009).

Educational interventions indicated inconsistent results on distress (Hersch et al., 2009) and anxiety (Cook et al., 2014; Coolbrandt et al., 2014; Rueda et al., 2011; Zhou et al., 2015). In some studies, a reduction in the overall symptom severity ranged from 7% to 67%, meaning that the effect of the interventions varied greatly at the patient level (Coolbrandt et al., 2014). Educational interventions consisting of home visits at the beginning of treatment and additional visits when required, weekly monitoring and advisory phone calls throughout the treatment process and access to a 24-hour telephone nursing service were effective in reducing symptom severity by 59% (Coolbrandt et al., 2014). In some studies, educational interventions

had a beneficial effect on QoL (Rueda et al., 2011), whereas in other studies, no difference was found in the investigated comparison outcomes (Cook et al., 2014; Rueda et al., 2011; Zhou et al., 2015). Some authors concluded that information alone might not be sufficient for enhancing QoL among patients with gynaecological cancer (Hersch et al., 2009).

4.3.2 Psychosocial and psychological interventions

Psychosocial interventions were effective in addressing treatment and disease-related symptoms, such as fatigue (Jacobsen et al., 2007; Oh & Kim, 2016), helplessness and depression (Rodin et al., 2007). They also helped patients to develop fighting spirit (Rodin et al., 2007). EW had a small but significant positive effect on physical symptoms, such as pain and sleep disturbance, as well as a significant positive effect on health-related QoL (Oh & Kim, 2016). Spiritual interventions had a significant large positive effect on depression, anxiety and spiritual well-being. Spiritual interventions provided by a nurse in more than seven sessions with an individual approach may be effective in improving spiritual or psychological outcomes (Oh & Kim, 2014). Meanwhile, psychological interventions, including cognitive-behavioural, educational, expressive and supportive forms of therapy, had a significant positive effect on cancer-related fatigue. Meta-analytic findings indicated a small yet significant effect for women and patients other than those with breast cancer, favouring group-based interventions (Jacobsen et al., 2007).

4.3.3 Interventions supporting patients' coping

Interventions supporting patients' coping which included education, problem-solving therapy and coordinating and monitoring the treatment, were effective in reducing the diagnoses of major depression and depressive symptoms at three months (p=0.006), and patients in the

intervention group had significantly fewer depressive symptoms (p<0.001). An orientation programme consisting of a tour of the cancer clinic, information and description of treatment procedures yielded a significant positive effect on patients' depressive symptoms relative to patients receiving usual care (p<0.001) (Rodin et al., 2007). Nursing programmes were beneficial for addressing symptoms such as breathlessness and fatigue as well as functional ability among patients with lung cancer. Non-invasive interventions, including rehabilitation technique and emotional support, increased patients' activity levels and functional capacity. They also had clear benefits on anxiety and positive effects on patients' levels of dyspnoea and distress. (Rueda et al., 2011.) Interventions supporting patients' coping had a beneficial effect on patients' uncertainty and self-perceived body image. They also increased the ability of patients to cope with cancer in the long term (p=0.0001) (Cook et al., 2014).

4.3.4 Activity-based interventions

Activity-based interventions may prevent cancer-related fatigue, especially among patients with breast cancer, those with non-metastatic disease and patients going through active treatment favouring home-based over supervised programmes. Participants in activity-based studies (n = 17) were mostly patients with breast cancer, and the methodological quality of the studies was rated as fair (n = 10) (Jacobsen et al., 2007). The outcome measurement tools and details of the intervention were not reported.

4.3.5 Effectiveness of nursing interventions according to timing and format

It was not possible to draw any conclusions regarding the best timing of the interventions due to the variability of intervention content and outcome measures between the studies. Interventions were executed in various phases during patients' clinical pathways, from

diagnosis to the completion of treatment. In some studies, patients preferred delivery closer to diagnosis or prior to the commencement of chemotherapy. In some studies, the duration of intervention seemed to have no impact on positive outcomes (Cook et al., 2014). However, very brief educational interventions of less than an hour, which contained an instructional video, failed to enhance QoL among patients with gynaecological cancer (Hersch et al., 2009). Educational interventions seemed to be more effective when administered for short periods of time and when knowledge levels improved continuously (Zhou et al., 2015).

TABLE 4 Effectiveness of nursing interventions according to the type of intervention

TABLE 5 Summary of the evidence of the effectiveness

5 DISCUSSION

This overview of systematic reviews summarises the results of nine previous reviews to produce This review is not looking at specific cancers per se, but aims to provide a comprehensive overview of systematic reviews and the general approaches used through nursing interventions. The included reviews consisted of 112 original studies (1980–2015). The methodological quality of the reviews was high in six of the nine reviews. The most common reasons for low methodological quality were lack of *a priori* published protocols or research objectives, lack of a list of excluded studies and conflict of interest of the original study authors. The literature search and selection was well described, and the scientific quality of the original studies was assessed and documented in the reviews. The analysis methods used were systematic reviews, narrative synthesis, meta-analysis and combinations of the three. The original studies were conducted in 11 countries; thus, the subject has attracted interest in European, American, Australian and Asian countries.

5.1 Summary of evidence

According to the results, the interventions used among patients with cancer were educational, psychosocial and psychological interventions supporting patients' coping and activity-based interventions. However, all intervention types contained an educational component. The complexity of nursing interventions is apparent in light of their supportive nature with numerous components and outcomes; thus, categorising these interventions was challenging.

The effectiveness of nursing interventions was significant when using educational and psychosocial interventions and interventions supporting patients' coping. According to a review of medium methodological quality, educational interventions containing information, counselling and emotional support significantly improved the outcomes, such as cancer-related symptoms, distress, uncertainty and depression, as well as physical health among patients with gynaecological cancer (Hersch et al., 2009). However, the sample sizes in the original studies were relatively small, varying from 7 to 73, and there was deficiency in reporting of the randomisation in some studies. Another review of high methodological quality revealed that educational interventions improved patients' knowledge of and attitudes towards pain management. However, the educational interventions were not able to detect changes in patients' QoL, or the assessment methods used were not sufficiently sensitive to detect minor changes in this outcome. Details of the content of these educational interventions were lacking (Zhou et al., 2015). Another review of high methodological quality pointed out that QoL might not be the best measure of the effectiveness of nursing, as it may be affected by the type and stage of cancer as well as by the type of treatment. Therefore, the effect of nurse-led interventions may have less of an impact on QoL among patients with cancer (Cook et al., 2014).

Psychosocial interventions delivered by nurses consisting of religious and spiritual components revealed significant, large and positive effects on meaning of life, well-being, depression and spiritual distress among patients with terminal cancer (Oh & Kim, 2014). The sample sizes of the studies in this high-quality review were relatively small, from 11 to 44.

Selection bias, performance bias, attrition bias and detection bias were rated low in these non-randomised studies. EW was effective only for cancer-related symptoms, but not for QoL and psychological outcomes, as was expected. To improve the effectiveness, authors recommended considering the individual characteristics of the participants, such as educational level, disease stage and treatment trajectory, when administering EW interventions to patients with cancer. (Oh & Kim, 2016.) Psychological interventions were beneficial for cancer-related fatigue among patients with different types of cancer, especially when using group-based interventions (Jacobsen et al., 2007). Due to inadequate reporting, it is not possible to make conclusions regarding the effectiveness of particular types of psychological interventions (cognitive-behavioural therapy, supportive-expressive therapy) in addressing fatigue.

Interventions supporting patients' coping revealed some positive results on well-being and QoL among patients with lung (Rueda et al., 2011) and gynaecological cancer. Specialist nurse interventions, including information, social, emotional or psychological components as well as psychosexual aspects, had no significant effect on psychological outcomes, such as distress, anxiety or depression, among patients with gynaecological cancer. In this review of high methodological quality, authors speculated that control groups might have received attention to a level that diluted the positive effect of the actual intervention being tested (Cook et al., 2014). Nursing interventions using symptom assessment, psychological support with information about the disease and education on coping strategies were effective among patients with lung cancer in the home environment. The results of this high methodological quality review emphasised the importance of specialised nursing care and time spent with patients, whether in the home or clinic setting. According to the authors, a supportive and empathetic relationship between the patient and a trained health professional appears to be key (Rueda et al., 2011). According to the review of medium methodological quality, education, problem-solving therapy and coordinating and monitoring of treatment reduced significantly the diagnosis of major depression and depressive symptoms among patients with cancer. However, potential bias existed in patients' selection and group allocation

in the original studies in this review. Sample sizes varied from 30 to 154 subjects (Rodin et al., 2007).

Activity-based interventions did not have a significant impact on cancer-related fatigue among patients with various types of cancer according to a meta-analysis; however, the results were promising among patients with breast cancer and favoured home-based programmes. Authors reported the type, mode and intensity of exercise on a general level without providing further details of the content of the intervention (Jacobsen et al., 2007).

5.2 Review limitations

It is stated that overviews are only as good as the systematic reviews and original studies on which they are based (Thomson, Russell, Becker, Klassen, & Hartling, 2011). In addition, the limitations of the primary studies brought up in those reviews must be carefully considered (Baker et al., 2014). Next, we consider those limitations.

In this overview, we wanted to explore what interventions have been used among patients with cancer to help policy makers choose the right intervention in clinical practice. Therefore, the scope of the search was extensive, without restriction of any particular cancer type, intervention or outcome, which produced variable results. However, the classification of interventions was difficult due to their complex nature, which resulted in overlapping categories. For example, nursing interventions are seldom purely educational; rather, they also include forms of psychological or social support. Similarly, supportive therapy may also include educational aspects.

The search was conducted only in scientific databases and in the English language. This may pose a risk of all relevant reviews not being identified and included in the review. Based on the research question, only reviews including RCTs or intervention studies were included, which may also have excluded valuable information of patients' experience. The

strength of this review is the systematic and thus reliable process. An information specialist confirmed the search, and two independent researchers conducted the selection of relevant studies, discussing possible disagreements until a consensus was reached. The selection of reviews for inclusion was strictly guided by the research question. Only reviews of medium and high methodological quality were included. To avoid any risk of bias, the data collection form was developed to extract relevant data from the included systematic reviews. In addition, to reduce the risk of reporting bias, interventions provided by others than nurses were excluded from the analysis. In this review, the period for data search was limited to 2007–2017, assuming that the included reviews covered a longer period. However, the results must be interpreted in relation to the fact that in recent years, nursing practices such as e-health have evolved and have been implemented in health care organisations at an accelerating pace.

The reviews included in this overview had several limitations. Interventions were often poorly described and lacked details, which hindered their systematic analysis (Jacobsen et al., 2007; Rodin et al., 2007; Zhou et al., 2016). Furthermore, it was not always clearly stated who had delivered the intervention (Jacobsen et al., 2008; Oh & Kim, 2016; Rodin et al., 2007; Rueda et al., 2011).

Theory guides the development of interventions and explains why a phenomenon occurs the way it does. This information is important for clinicians as they select the most appropriate interventions in clinical practice. (Fleury & Sidani, 2012). It is important to connect the intervention mechanism to the theory base and philosophical background of the intervention to provide reliable guidelines for clinical practice. In the reviews of this overview, the development of an intervention or description of its underlying theory was reported in only one out of nine reviews (Coolbrandt et al., 2014). The original studies paid less attention to the processes and mechanisms underlying interventions' effect or lack thereof (Coolbrandt et al., 2014; Jacobsen et al., 2007). Therefore, it is not possible to draw conclusions as to which parts of the interventions or which circumstances affected the outcomes (Coolbrandt et al., 2014).

The reviews consisted of studies, which differed widely in producing statistically significant results due to various reasons. First, some studies had small samples and limited statistical power for detecting the effect (Coolbrandt et al., 2014; Hersch et al., 2009). Second, the dosage and timing of the interventions may have influenced the outcomes, for example, the EW intervention had a small yet significant effect only on physical but not psychological outcomes, probably because the duration of EW (20 minutes) might have been insufficient to write about traumatic experiences related to cancer diagnosis and treatment (Oh & Kim, 2016). The intervention may not have an impact on outcome variables if not delivered at the most appropriate time, thus neglecting the preparatory stages of intervention development, and piloting may result in weaker interventions (Cook et al., 2014; Coolbrandt et al., 2014). Third, the control condition intervention, such as neutral writing, may cause an 'intervention-like' effect and thus dilute the positive effect of the actual intervention being tested (Cook et al., 2014; Oh & Kim, 2016). Fourth, an unexpectedly low incidence and intensity of symptoms may cause lack of results (Coolbrandt et al., 2014). Thus, it is important to consider who the target group of the intervention is. Finally, the timing of follow-up assessments (Oh & Kim, 2016) and the length of follow-up periods for detecting post-intervention benefits (Hersch et al., 2009) are important considerations.

Attrition was problematic in the majority of the original studies (Coolbrandt et al., 2014; Rodin et al., 2007; Rueda et al., 2011), indicating that patients might have perceived the delivered intervention as an additional burden (Coolbrandt et al., 2014). The rapid deterioration and death of the participants may lead to a dropout rate as high as 40% (Rueda et al., 2011). High (> 20%) loss to follow-up may lead to a potential selection bias with regards to the results (Hersch et al., 2009). Thus, it is important to develop interventions that are not too complicated to avoid the loss of follow-up opportunities in a population with a substantial disease burden (Rueda et al., 2011). Other reasons for the high discontinuation rates may have been lack of time and the preference not to discuss emotional matters (Rodin et al., 2007).

There are several priorities for future research in the field of cancer nursing. Future investigations of the most beneficial intervention components could provide information on how to focus the content and delivery of these interventions. To detect the best effects, critical aspects to consider are sample size, intervention dosage and timing as well as the control condition. Transparency in reporting multiphase interventions enhances not only the reliability of interventions but also facilitates their implementation in clinical practice. The organisational, systemic and contextual components of interventions should be evaluated to identify factors that hinder or facilitate their acceptability. Implementation and process evaluation is needed to assure interventions' feasibility for patients and those who deliver them. Patients with cancer represent a vulnerable group, which is why interventions should not pose an additional burden to them. Time-consuming or laborious interventions may lead to high drop-out rates and diminish the interventionist's commitment to the protocol. Cancer is increasingly affecting people worldwide and a large number of nursing interventions concern this patient group. Future research should focus on interventions that saves resources and are relatively easy to implement in daily practice. Large-scale longitudinal research with follow-up measures is needed to identify long-term effects, especially on the lives of patients who have survived cancer or live with chronic illness.

6   CONCLUSION

This overview provided a comprehensive summary of nursing interventions and their effectiveness among patients with cancer with the limitations considered earlier. The findings revealed that educational, psychosocial and psychological interventions and interventions supporting patients' coping have a positive effect on various health and care needs among patients with cancer, such as symptoms related to cancer and its treatment including fatigue, pain, and breathlessness, which may all deteriorate patients' QoL. Most of the interventions were multidimensional in nature, indicating that the best effect is gained through combining

different elements that strengthen each other's effect. Priorities for future research include identifying the most beneficial components of these interventions.

The overview of systematic reviews is an increasingly common and useful method for summarising the results of many studies. In the future, as the number of publications increases, the overview of systematic reviews may be valuable for summarising review results in a coherent way.

7   RELEVANCE TO CLINICAL PRACTICE

This overview verified that nursing interventions for cancer patients are multifold and have positive effects on several patient-related outcomes. Implementation of these effective interventions is important to provide evidence-based care for patients with cancer. Nurse managers and clinical nurses can use the results of this overview as they make decisions about which interventions may be the most promising in a particular context.

Nurses' role in cancer care is extensive: that of teacher, consultant and provider of support to patients. Symptom alleviation by using educational interventions combined with psychosocial support requires further development of interventions as symptoms are a significant part of the illness of patients with cancer.   Due to the short inpatient periods, support is increasingly more often offered at patients' homes face to face or through various telecommunication systems. A supportive and empathetic relationship between the patient and nurse can improve the effectiveness of the intervention.

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CONTRIBUTIONS

Study design: LT, MS, RM, HL-K; data collection and analysis: LT, MS, RM, HL-K; manuscript

preparation: LT, MS, RM, HL-K.

ETHICAL APPROVAL

We declare that there are no human or animals involved in the study.

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TABLE 1 The methodological quality of included systematic reviews (n=9)

Author, year	1	2	3	4	5	6	7	8	9	10	11	AMSTAR
Rueda et al. (2011)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	10
Coolbrandt et al. (2014)	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N	9
Cook et al. (2014)	N	Y	Y	Y	N	Y	Y	Y	Y	Y	N	8
Oh and Kim (2014)	N	Y	Y	Y	N	Y	Y	Y	Y	Y	N	8
Oh and Kim (2016)	N	Y	Y	Y	N	Y	Y	Y	Y	Y	N	8
Zhou et al. (2015)	N	Y	Y	Y	N	Y	Y	Y	Y	Y	N	8
Rodin et al. (2007)	N	Y	Y	Y	N	Y	Y	Y	Y	N	N	7
Hersch et al. (2009)	N	Y	Y	Y	N	Y	Y	Y	N	N	N	6
Jacobsen et al. (2007)	N	N	Y	Y	N	Y	Y	Y	Y	N	N	6

AMSTAR: a measurement tool to assess systematic reviews; quality rating high: 8–11; quality rating medium: 4–7. Y: yes; N: no. 1. Was an 'a priori' design provided? 2. Was there duplicate study selection and data extraction? 3. Was a comprehensive literature search performed? 4. Was the status of publication (i.e. grey literature) used as an inclusion criterion? 5. Was a list of studies (included and excluded) provided? 6. Were the characteristics of the included studies provided? 7. Was the scientific quality of the included studies assessed and documented? 8. Was the scientific quality of the included studies used appropriately in formulating conclusions? 9. Were the methods used to combine the findings of studies appropriate? 10. Was the likelihood of publication bias assessed? 11. Was the conflict of interest included?

TABLE 2 Characteristics of included reviews (n=9)

Review	Objective	Total number/ sample size, participants	Number of databases / date range	Type, number, country of original studies	Methodological quality, appraisal tool	Type of review/ method of analysis
Cook et al. (2014)	Test the efficacy of specialist nurse interventions in women with gynecological cancer	632/ 17-137 Patients with gynecological cancer	9 / 1993–2014	RCT(6)+ non-RCT (3); UK (2), USA (4), Canada (1), Sweden (1), Denmark (1)	Mostly low or unclear quality Cochrane Collaboration tool	Systematic review Narrative analysis
Coolbrandt et al. (2014)	Evaluate the effectiveness of complex nursing interventions on chemotherapy related symptom burden	1701/ 18-276 Patients with mixed cancer types	4/ 1995 – 2012	RCT (11); Australia (1), Germany (1), UK (2), USA (3), NR (4)	Most often 7 criteria of 14 were reported, The Dutch Cochrane Center RCT appraisal form, Methodological index of non-RCT studies	Systematic review Meta-analysis limited to ratios of means allowing the comparison of studies
Hersch et al. (2009)	Assess the effectiveness of psychosocial interventions on QoL	560/ 7-73 Patients with gynecological cancer	3/ 1980–2008	RCT (6); USA (4), UK (1), Canada (1)	Risk of bias in randomisation, blinding, loss of follow-up and selection issues Appraisal tool not used	Systematic review
Jacobsen et al. (2007)	Assess the efficacy of psychological and activity-based interventions	24 psychological studies/ 30-627;	3 /–2005	RCT (41); Countries NR	Good (3) fair (31) or poor (7) quality The Cochrane Collaboration	Systematic review Meta-analysis (30)

	on cancer-related fatigue	17 activity based studies/ 14-155 Patients with mixed cancer types			tool	Narrative synthesis
Oh and Kim (2014)	Assess the effect of expressive writing (EW) interventions	457/ 23-84 Patients with mixed cancer types	10 / – 2013	RCT (1), non-RCT (8); Hong Kong (1), Korea (8)	Mostly low risk of selection, attrition and reporting bias. Cochrane Collaboration tool	Meta-analysis
Oh and Kim (2016)	Assess the effects of a spiritual interventions	2510/ 24-507 Patients with mixed cancer types	9 / – 2015	RCT(19), quasi experimental study (1); USA (16), UK (2), South Korea (1), Danmark (1)	Mostly low risk of selection, attrition and reporting bias, high risk of performance bias. Cochrane Collaboration tool	Meta-analysis
Rodin et al. (2007)	Assess the efficacy of non-pharmacological treatments for depression among patients with cancer	513/ 30-154 Patients with mixed cancer types	5 /–2005	RCT (2), cohort study (1); Countries NR	NR	Systematic review Narrative synthesis
Rueda et al. (2011)	Assess the effectiveness of non-invasive interventions in improving symptoms, psychological functioning and QoL of	721 22-202 Patients with lung cancer	6 / – 2011	RCT (7); UK (4), USA (2), Hong Kong (1)	Risk of bias in blinding (6/7), selection bias (4/7) Cochrane Collaboration tool	Systematic review Narrative synthesis

	patients with lung cancer					
Zhou et al. (2015)	Assess the effects of nurse-led educational interventions on cancer pain	778 74-227 NR	9 / – 2014	RCT (7), quasi-experimental study (1); USA (4), Norway (1), Netherlands (1)	Risk of bias in blinding allocation (5/6), outcomes assessors (3/3), allocation concealment (3/3) JBI checklist	Systematic review Narrative synthesis Meta-analysis (2)

RCT: randomised controlled trial; NR: not reported; JBI: Joanna Briggs Institute.

TABLE 3 Summary of the interventions and outcomes of included reviews (n=9)

Review	Type	Intervention Format	Dosage	Outcome
Coolbrandt et al. (2014)	Educational intervention; information provision, counselling	Combinations of face-to-face and telephone contacts	Number of contacts tailored ranging 3–10. Duration 4–5 months. Total contact time 1–7 h.	Symptom severity
Hersch et al. (2009)	Educational intervention; counselling, education, provision of information	Individually / in groups Sessions at home Clinical visits Interview and relaxation exercise Phone calls Videotape	Discussion with CNS 25 min. / Prior to surgery ≥3 times / After surgery 8 contacts within 4 weeks / At home or clinic videotape 45 min./ Symptom management 6 weekly sessions each 20–30 min / 8 contacts with APN	Quality of life Self-esteem Body image Uncertainty Functional adjustment Distress Depression Anxiety Attitude to medical care Pain management barriers Pain knowledge Pain intensity Sexual functioning
Zhou et al. (2015)	Educational intervention; The representational intervention to decrease cancer pain (RIDcancerPAIN) and PRO-SELF™-pain control program, Passport to Comfort-intervention, Pain education programs	Home visits Telephone interview Video + pamphlet Group or individual	Duration from 20 to 90 min. Home visits at weeks 1,3,6 and telephone interview at weeks 2,4,5	Pain intensity Quality of life Attitudes towards analgesics and pain management Anxiety, depression
Oh and Kim (2014)	Psychosocial intervention; a spiritual intervention, a meaning-of-life intervention, a logo therapy-based resilience promotion program	Individual, combined individual and group	Mean of 8 sessions. Duration 3–6 weeks. Contact time 15–60 min.	Spiritual well-being Meaning of life Depression Anxiety Distress

Oh and Kim (2016)	Psychosocial intervention; expressive writing	Provided at patient's home	Writing 20 min. for 4 consecutive days. 3–6 sessions. Contact time 15–90 min. Duration 3 days– 6 weeks; one-week and one-day interval common	Physical symptoms Anxiety Depression Perceived stress or distress Mood disturbance Health related quality of life Intrusive thoughts Avoidance behavior
Jacobsen et al. (2007)	Psychological intervention; cognitive–behavioral therapy, educational programs supportive-expressive group therapy Activity based intervention; exercise recommendations and various types, modes and intensities of exercise.	Psychological: Group or individual. Activity-based: Home based and supervised programs	NR	Fatigue Vigor
Rodin et al. (2007)	Interventions supporting patients' coping: Education, problem-solving therapy, coordinating and monitoring the treatment. Orientation program consisting of tour of the oncology clinic and provision of information. Cognitive-existential therapy and relaxation.		Up to 10 30-min.sessions of problem solving therapy. Others NR.	Depressive symptoms
Rueda et al. (2011)	Interventions supporting patients' coping: Non-invasive interventions	Non-invasive interventions: Training sessions, written and DVD/video material, a	One hour long clinic session + a telephone call one week after the last training session	Quality of life Well-being Anxiety Distress Fatigue Breathlessness

	based on rehabilitation techniques, dyspnoea management, breathlessness training in breathing, pacing, anxiety management and relaxation Nursing programs based on nurse-led follow-up and symptom assessment Educational interventions of symptom self-care management	telephone contact after the last training session Nursing programs: Homecare, a telephone contact, written material and discussion		Functional ability
Cook et al. (2014)	Interventions supporting patients' coping: information and rehabilitation, social, emotional or psychological; physical or practical and psychosexual elements	Video, support-group, nurse-led rehabilitation programme, nurse-led telephone follow-up	The number of contacts 1–30. Contact time 20 min.–3 hours Duration 45 min.–10 months	Quality of life Satisfaction with care Psychological outcomes (uncertainty, body-image, coping)

CNS: clinical nurse specialist; APN: advanced practice nurse; RIDcancerPAIN: the representational intervention to decrease cancer pain; NR: not reported.

TABLE 4 Effectiveness of nursing interventions according to the type of intervention

Type of intervention	Studies / partici pants	Effectiveness of intervention	Hete roge neit y I²	Author/ year
		Educational interventions		
Psychoeducational	1/NR	No significant effect on quality of life	NR	Cook et al. (2014)
Educational	1/NR	No positive effect on anxiety	NR	Cook et al. (2014)
	1/NR	No positive effect on depression	NR	Cook et al. (2014)
	1/NR	High satisfaction with care (mean score 3.38 on scale 0-4)	NR	Cook et al. (2014)
Specialist nurse intervention	1/41	No significant differences on distress.	NR	Hersch et al. (2009)
Specialist nurse intervention	1/17	No significant differences on distress, anxiety or depression	NR	Hersch et al.(2009)
Educational	3/NR	The level of pain knowledge was significantly better	NR	Zhou et al. (2015)
	2/NR	Improved patients' attitudes towards analgesic and pain management.	NR	Zhou et al. (2015)
	4/NR	No positive effect on quality of life	NR	Zhou et al. (2015)
	2/NR	No statistically significant impact on pain relief after 1 month OR (95% CI) −0.45 [−1.49–0.59], p = 0.40] and 2 months OR (95% CI) −0.60 [−1.22 ~ 0.02], p = 0.06	NR	Zhou et al. (2015)
	1/NR	No statistical difference on patient anxiety and depression	NR	Zhou et al. (2015)
Video	1/NR	No positive effect on self-esteem	NR	Cook et al. (2014)
Information provision and counselling	11/NR	Reduction in symptom severity by 7–67 %. Ratios of means ranged 0.33-0.93.	NR	Coolbrandt et al. (2014)
Information, counselling, emotional support	1/145	Improvement in uncertainty (p<0.01)	NR	Hersch et al. (2009)
Information and emotional support	1/36	Significantly less anxiety about sex (p<0.05)	NR	Hersch et al. (2009)
		Less sleep disturbance (p<0.05)	NR	Hersch et al. (2009)
		Better global health status (p<0.05)	NR	Hersch et al. (2009)
Evidence based symptom management	1/142	Less symptom distress (p=0.04)	NR	Hersch et al. (2009)
		Less worsening on all symptom scores (p<0.001)	NR	Hersch et al. (2009)
		Improved uncertainty (p<0.01)	NR	Hersch et al.

				(2009)
Individualised discussion of side-effects	1/43	No group differences on attitudes towards pain management	NR	Hersch et al. (2009)
		No group differences on side effects	NR	Hersch et al. (2009)
		No group differences on pain intensity	NR	Hersch et al. (2009)
		No group differences on quality of life	NR	Hersch et al. (2009)
		No group differences on adequacy of analgesic use	NR	Hersch et al. (2009)
Education, coaching	1/140	Significant positive effects on anxiety (p=0.001)	NR	Rueda et al. (2011)
		Significant positive effects on breathlessness (p=0.002)	NR	Rueda et al. (2011)
		Significant positive effects on fatigue (p=0.011)	NR	Rueda et al. (2011)
		Significant positive effects on functional ability (p=0.000)	NR	Rueda et al. (2011)

	Psychosocial interventions			

Religious / spiritual interventions	4/ 82+84	A significant large positive effect on spiritual well-being SMD (95 % CI) −0.78 [−1.3, −0.27]	I^2 59%	Oh and Kim (2014)
	3/ 77+77	A significant large positive effect on depression SMD (95 % CI) −1.36 [−1.84, −0.88]	I^2 45%	Oh and Kim (2014)
	2/ 40+41	A significant large positive effect on anxiety SMD (95 % CI) −1.23[−1.76, −0.7])	I^2 24%	Oh and Kim (2014)
Existential interventions	1/ 44+40	A significant but moderate positive effect on meaning of life SMD (95 % CI) −0.51 [−0.94, −0.07]	NR	Oh and Kim (2014)
Expressive writing	6/266+ 268	A significant small positive effect on physical outcomes fatigue, pain, and sleep disturbance SMD (95 % CI) − 0.26 [− 0.43, − 0.09]; p = 0.003	I^2 0 %	Oh and Kim (2016)
	3/ 94+92	No significant positive effect on anxiety SMD (95 5 CI) 0.11 [−0.18, 0.39]; p = 0.11	I^2 0%	Oh and Kim (2016)
	6/363+ 486	No significant positive effect on depression SMD (95 % CI) −0.08 [−0.22, 0.06]; p = 0.027	I^2 0%	Oh and Kim (2016)
	5/204+ 179	No significant positive effect on stress or distress SMD (95 % CI) −0.09 [−0.3, 0.11]; p = 0.36	I^2 0%	Oh and Kim (2016)
	4/175+ 299	No significant positive effect on mood disturbance SMD (95 % CI) −0.05 [−0.24, −0.14]; p =	I^2 27%	Oh and Kim (2016)

		0.6		
	6/308+ 313	A significant positive effect on health related quality of life SMD (95 % CI) –0.12 [–0.36, 0.11], p=0.31	I² 46%	Oh and Kim (2016)
	7/420+ 521	No significant positive effects on intrusive thoughts (that is unwanted and recurrent thoughts about a stressful experience) SMD (95% CI) –0.03 [–0.17, 0.1]; p = 0.62	I² 9%	Oh and Kim (2016)
	4/198+ 302	No significant positive effects on avoidance behaviors (consciously recognized avoidance of certain thoughts and feelings) SMD (95 % CI) –0.04 [–0.23, 0.14]; p = 0.65)	I² 22%	Oh and Kim (2016)
Psychological interventions				
Cognitive–behavioral, educational, expressive and supportive forms of therapy	18 /1232+ 1378	A significant positive effect on fatigue d= 0.09; 95 % CI [0.02–0.17]	NR	Jacobsen et al. (2007)
	6/483+ 559	No significant positive effect on vigor d= 0.02; 95 % CI [-0.11–0.14]	NR	Jacobsen et al. (2007)
Interventions supporting patients' coping				
Education or information; social, emotional or psychological; physical or practical; psychosexual	4/NR	Improvement in quality of life (p = 0.002; p= 0.04; p= 0.02; NR)	NR	Cook et al. (2014)
	1/NR	Less sleep disturbance (p = 0.02)	NR	Cook et al. (2014)
	1/NR	Less uncertainty (p=0.006)	NR	Cook et al. (2014)
	1/NR	No significant positive difference on uncertainty	NR	Cook et al. (2014)
	1/NR	No significant positive effect on quality of life	NR	Cook et al. (2014)
	1/NR	A significant increase in coping between 3-12 months (p=0.0001)	NR	Cook et al. (2014)
	2/NR	Satisfaction with individualized pain intervention 86%; satisfaction with nurse telephone follow-up mean score 8.24 (0-10)	NR	Cook et al. (2014)
Education, problem solving therapy, coordinating and monitoring the	1/NR	Significantly fewer depressive symptoms in intervention group (p<0.001). Reduced diagnoses of major depression and depressive symptoms	NR	Rodin et al. (2007)

treatment		at 3 months (p=0.006), marginally significant at 6 months (p=0.06).		
Orientation program (tour in the oncology clinic, provision of information)	1/NR	Significantly fewer depressive symptoms relative to control group (p<0.001).	NR	Rodin et al. (2007)
Cognitive-existential therapy and relaxation	1/NR	No significant positive difference in depression.	NR	Rodin et al. (2007)
Non-invasive interventions; rehabilitation technique, emotional support	1/34	Clear benefits on breathlessness	NR	Rueda et al. (2011)
		Increasing activity levels and functional capacity	NR	Rueda et al. (2011)
		Positive effect on anxiety	NR	Rueda et al. (2011)
Breathlessness management program	1/119	Positive effect on dyspnea and distress	NR	Rueda et al. (2011)
		No positive effect on the survival	NR	Rueda et al. (2011)
Nurse follow-up	1/203	No positive effect on the survival	NR	Rueda et al. (2011)
Activity based interventions				
	17/NR of which 12/833 meta-analysis	No significant positive effect on fatigue d= 0.05; 95 % CI [−0.08–0.19]	NR	Jacobsen et al. (2007)

NR: not reported; OR: odds ratio; CI: confidence interval; SMD: standardised mean difference; d: effect size.

TABLE 5 Summary of the evidence of the effectiveness

Outcome	Interventions and effect (+ / 0 /-)					Author, year
	Educational	Psycho-social	Psycho-logical	Interventions supporting patients' coping	Activity based	
Quality of life	+					Rueda et al. (2011)
		0				Oh and Kim (2016)
	0			0/+		Cook et al. (2014)
	0					Rueda et al. (2011)
	0					Hersch et al. (2009)
Spiritual well-being		+				Oh and Kim (2014)
Satisfaction with care	+			+		Cook et al. (2014)
				+		Rueda et al. (2011)
Meaning of life		+				Oh and Kim (2014)
Anxiety	+					Rueda et al. (2011); Coolbrandt et al. 2014
				+		Rueda et al. (2011)
		+				Oh and Kim (2014)
		0				Oh and Kim (2016)
	0					Hersch et al. (2009)
	0					Cook et al. (2014)
Anxiety about sex	+					Hersch et al. (2009)
Distress	+					Hersch et al. (2009)
				+		Rueda et al. (2011)
	0					Hersch et al. (2009)
		0				Oh and Kim (2016)
Symptom severity	+					Hersch et al. (2009); Coolbrandt et al. (2014)
Fatigue		+				Oh and Kim (2016)
	+			+		Rueda et al. (2011)
					+	Jacobsen et al. (2007)
			+			Jacobsen et al. (2007)
Vigor			0			Jacobsen et al. (2007)
Depression	0					Hersch et al. (2009); Cook et al. (2014)
	+					Rodin et al. 2007
				+/0		Rodin et al. 2007
		+				Oh and Kim (2014)
		0				Oh and Kim (2016)
Breathlessness	+					Rueda et al. (2011)
				+		Rueda et al. (2011)
Sleep disturbance		+				Oh and Kim (2016)
				+		Cook et al. (2014)
	+					Hersch et al. (2009)
Mood disturbance		0				Oh and Kim (2016)

Concept				Reference
Coping			+	Cook et al. (2014)
Attitudes towards analgesic use	+			Zhou et al. 2015
Attitudes towards pain management	0			Hersch et al.(2009)
Pain relief	0			Zhou et al. (2015)
		+		Oh and Kim (2016)
The level of pain knowledge	+			Zhou et al. (2015)
Sexual functioning	+			Hersch et al. (2009)
Uncertainty	+			Hersch et al. (2009)
			0/+	Cook et al. (2014)
Body image, body esteem	+			Hersch et al. (2009); Cook et al. (2014)
Fighting spirit		+		Rodin et al. (2007)
Helplessness		+		Rodin et al. (2007)
Intrusive thoughts		0		Oh and Kim (2016)
Avoidance behaviors		0		Oh and Kim (2016)
Functional ability	+		+	Rueda et al. (2011)

Keywords: cancer patient AND interventi* AND outcome* OR effect* OR effic*
440 references based on title: CINAHL, (207), PubMed (52), MEDLINE (97), Scopus (84)

59 references accepted based on title and abstract

17 duplicates removed

42 references accepted for full text examination

31references excluded: not intervention study (14), not available (59, not review (1), other than cancer patients as a target group (1), therapy (1), not English language (4), terminally ill (4), supplement of RCT (1)

7 reviews screened from the reference lists based on abstract

2 reviews screened from the reference lists excluded based on full text: not intervention study

16 full text reviews critically appraised

3 reviews excluded based on low methodological quality (AMSTAR < 4)

4 reviews excluded: results of nursing interventions were not separable
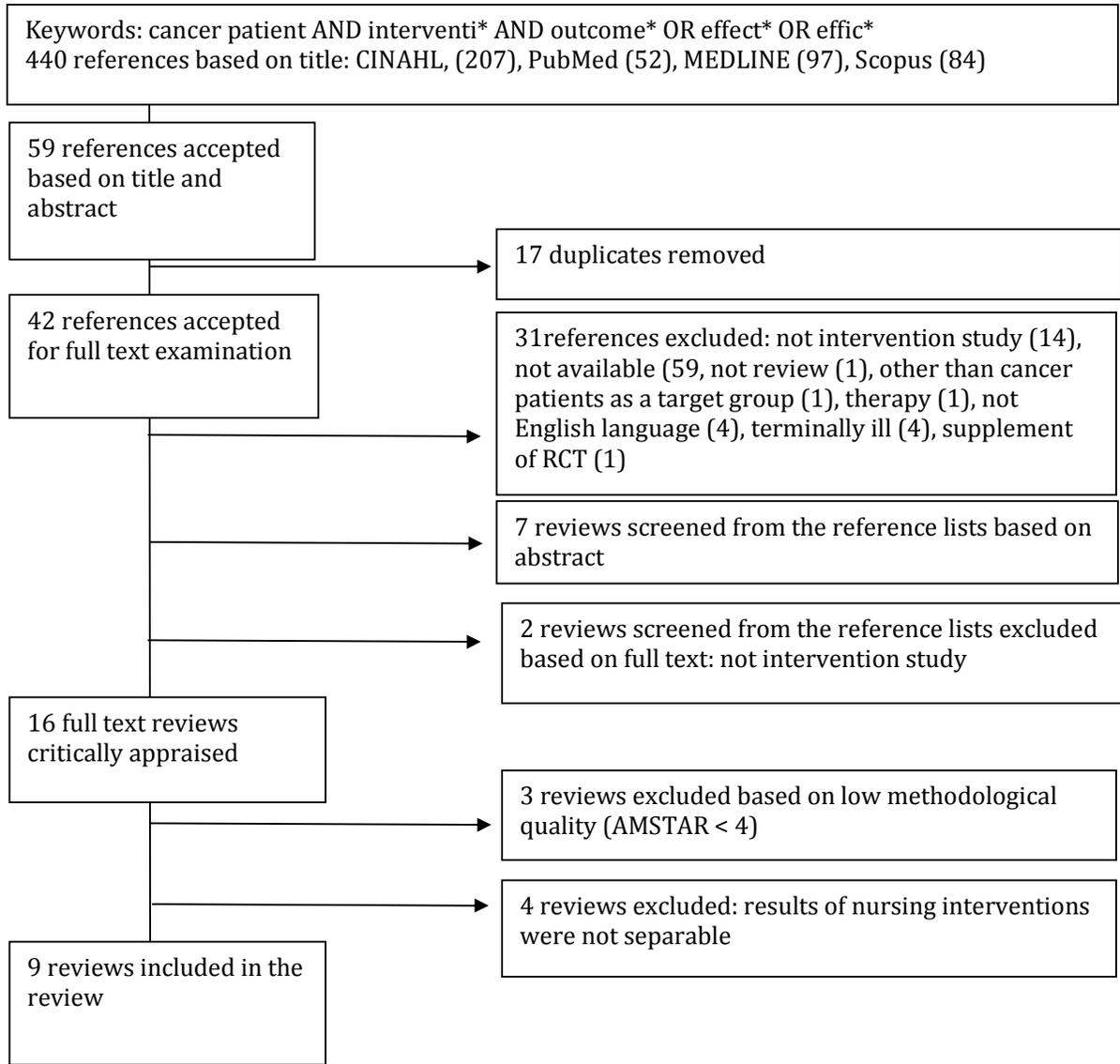
9 reviews included in the review

Figure 1 Flowchart of the search (2007-2017) and selection process