Symptom Dimensions as Outcomes in Interventions for Patients With Cancer: A Systematic Review

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PROBLEM IDENTIFICATION: Symptom experience in patients with cancer consists of several dimensions, often measured descriptively within various populations but seldom used as intervention outcomes. This review aims at describing symptom dimensions as outcomes of interventions designed to alleviate symptoms in patients with cancer and to describe these interventions' effects on at least two symptom dimensions.

LITERATURE SEARCH: The PRISMA statement for reporting systematic reviews was used. Searches were undertaken in various indexing sites.

DATA EVALUATION: Extracted data included design, participants, intervention and control group treatment, targeted symptom dimension, and summary of results.

SYNTHESIS: 2,041 articles were identified and 15 were included. The symptom dimensions were intensity, distress, prevalence, frequency, consequences, and quality. Eleven interventions had significant effect on symptom dimensions, mostly on intensity and distress.

IMPLICATIONS FOR PRACTICE: Oncology nurses need clinical skills to be able to understand patients' experiences through their narratives. Various interventions are targeted at symptoms, and these need to be implemented to provide evidence-based symptom management.

KEYWORDS symptom experience; patients with cancer; symptom dimensions; symptom intensity; symptom distress

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Patients affected by cancer often experience multiple symptoms, in both the short- and long-term perspective, as a result of the disease and its treatment. Symptoms negatively affect patients' and families' well-being and quality of life (Lang, France, Williams, Humphris, & Wells, 2013). Symptoms are defined as a subjective experience of altered functioning, which cannot be objectively observed (Dodd et al., 2001; Harver & Mahler, 1990). Patient-reported measurements are, therefore, used to assess symptoms, both in clinical practice and in research. The literature identifies an increasing focus on symptom clusters. However, the relation and interaction between symptoms within clusters and between clusters are not well investigated (Miaskowski, 2006; Miaskowski, Aouizerat, Dodd, & Cooper, 2007), nor is the interplay between the different dimensions within a singular symptom. One critical area of concern in cancer care is symptom relief before, during, and after treatment (Oksholm et al., 2015). In addition, how each symptom dimension determines symptom burden remains to be clarified (Wong et al., 2017).

Several nursing theories and models for symptom experience and management exist (Brant, Beck, & Miaskowski, 2010), such as the theory of symptom management (Dodd et al., 2001; Humphreys et al., 2014), the theory of unpleasant symptoms (Lenz, Pugh, Milligan, Gift, & Suppe, 1997), the symptom experience model (Armstrong, 2003), and a negotiated symptom model (Haworth & Dluhy, 2001). In these symptom models, the symptom experience is assumed to be influenced by the nursing consensus concepts: the personal, the environmental, and the health-related domains (Fawcett, 2005). The symptom experience in these models is argued to consist of several dimensions, which has been found to be appropriate, because patients are able to describe

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the dimensions of their symptoms by scoring them at varying levels (Henoch, Bergman, Gustafsson, Gaston-Johansson, & Danielson, 2008; Tishelman et al., 2005; Tishelman, Petersson, Degner, & Sprangers, 2007). The dimensions commonly used in symptom models include (a) prevalence, which is implicit in most models; (b) frequency (Armstrong, 2003; Dodd et al., 2001; Lenz et al., 1997); (c) intensity (Armstrong, 2003; Dodd et al., 2001; Lenz et al., 1997); (d) duration (Dodd et al., 2001; Lenz et al., 1997); (e) level of distress (Armstrong, 2003; Dodd et al., 2001; Fu, McDaniel, & Rhodes, 2007; Lenz et al., 1997; Rhodes, McDaniel, Homan, Johnson, & Madsen, 2000; Rhodes & Watson, 1987); and (f) meaning (Armstrong, 2003; Haworth & Dluhy, 2001). The middle-range theory of unpleasant symptoms developed by Lenz et al. (1997) distinguishes itself from other models because it argues that the dimension quality should be included in the symptom experience. Quality refers to descriptions of how the symptom feels. For example, dyspnea can be a feeling of suffocation, of tightness in the chest, or of not getting enough air (Parshall et al., 2012). Quality can also include descriptions of the location of a given sensation and the degree to which a patient responds to an intervention. Therefore, descriptions of quality may be used to distinguish among various pathological causes or to indicate seriousness. For example, different descriptions of pain could indicate whether the experience relates to nociceptive or neuropathic pain (Wilkie, Huang, Reilly, & Cain, 2001). In addition, the labels of the dimensions differ between studies; in some studies, symptom distress (Hui et al., 2017; Tantoy et al., 2017) is used, whereas others use symptom burden (Körner et al., 2017; Penrod et al., 2017). Instruments that take into account the multidimensional nature of symptoms have been developed (Kirkova et al., 2006). For example, the Memorial Symptom Assessment Scale (MSAS) (Browall, Kenne Sarenmalm, Nasic, Wengström, & Gaston-Johansson, 2013; Portenoy et al., 1994) has been shown to be a valid and reliable measure for assessing symptom distress, severity, and frequency in patients diagnosed with breast cancer. Although the MSAS measures several dimensions of the symptom experience, mostly composite indexes are presented.

In a review of symptom models, Brant et al. (2010) discussed how there are some components missing in the models and argued that the interaction between symptoms and symptom clusters must also be included in the models. The goal of symptom management research is the relief of symptoms, and Brant et al. (2010) argued that the models and theories need to incorporate self-care, self-efficacy, nursing care, and healthcare interventions that are effective in improving symptoms and patient outcomes. The only theory described in the current article that includes symptom management strategies is the theory of symptom management model (Dodd et al., 2001; Humphreys et al., 2014). This theory includes the nature of the strategy, the intervention dose, the recipient of the intervention, and how it should be delivered. In addition, the outcomes relate to symptom status, emotional status, functional status, self-care, costs, quality of life, morbidity, comorbidity, and mortality (Dodd et al., 2001; Humphreys et al., 2014). The symptom status could be interpreted as comprising the dimensions included in symptom experience. Therefore, it could be argued that, where symptom dimensions are presented in a study of a symptom intervention, the outcome should be an improvement in more than one dimension. However, so far, research has not shown that this division is meaningful when evaluating symptom interventions. The purpose of this review was to describe symptom dimensions as outcomes of interventions aimed at alleviating symptoms in patients affected by cancer and to describe interventions aimed at alleviating at least two symptom dimensions in patients affected by cancer. The inclusion criterion was that the outcome of the intervention must concern at least two symptom dimensions.

Methods

In this systematic review, the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analysis) statement for reporting systematic reviews was used as a methodologic tool (Liberati et al., 2009). Systematic searches were undertaken in August 2016 in PubMed, CINAHL®, Web of Science, PsycINFO®, and Scopus using the following search terms: ("Symptom dimension*" OR "Symptom prevalence" OR "Symptom intensity" OR "Symptom distress" OR "Symptom frequency" OR "Symptom burden" OR "Symptom experience" OR "Symptom quality") AND (RCT [in title or abstract] OR Randomized controlled trial [in title or abstract] OR Intervention [in title or abstract] OR Nursing [in title or abstract]) AND (Cancer [in title or abstract] OR neoplasm* [in title or abstract]). Limitations were set, where possible, that each paper should be a journal article, a clinical trial, written in English, and peer-reviewed. No time limitation was set to capture the full body of knowledge about symptom dimensions. These searches yielded 2,041 articles, and, after the removal of duplicates, 1,104 remained.

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Study Selection

The inclusion criteria were that the article was an original article describing an intervention targeted toward symptoms in adult patients (aged 18 years or older) affected by cancer. The outcome should include at least two symptom dimensions. In addition, the design should be an intervention study, either with an intervention group and a control group, or a before-and-after measurement. At least 20 patients should be included. Eligibility assessment was performed independently by two reviewers (half of the sample was reviewed by ML and CO, and half of the sample was reviewed by KA and IH). Disagreements were resolved by consensus among the whole group. After reading titles and abstracts, 1,008 articles were excluded. One reviewer read the full text of the remaining 96 articles and the other authors checked for eligibility. An additional 81 articles were then excluded. Disagreements were resolved by discussions between the authors. The reasons for excluding articles are presented in Figure 1. Articles were mostly excluded because they did not report two or more symptom dimensions as outcomes. A final 15 remained for data analysis.

Data Collection Process

The authors developed a data extraction sheet, pilot tested it on 10 articles, and refined it accordingly. One reviewer (IH) extracted the following data, and a second author checked the extracted data: design, number of patients, diagnosis, intervention, care of control group patients, target symptom dimensions, results on symptom dimensions, and quality of evidence according to the Scottish Intercollegiate Guidelines Network (SIGN) (Harbour & Miller, 2001). The SIGN evidence statements provide guidelines related to the grading of studies eligible for the current study: 1++, indicating randomized, controlled trials (RCTs) with very low risk of bias; 1+, indicating an RCT with low risk of bias; 1–, indicating an RCT with high risk of bias; and 2++, indicating high-quality case control or cohort studies with low risk of confounding bias.

Results

Description of Included Studies

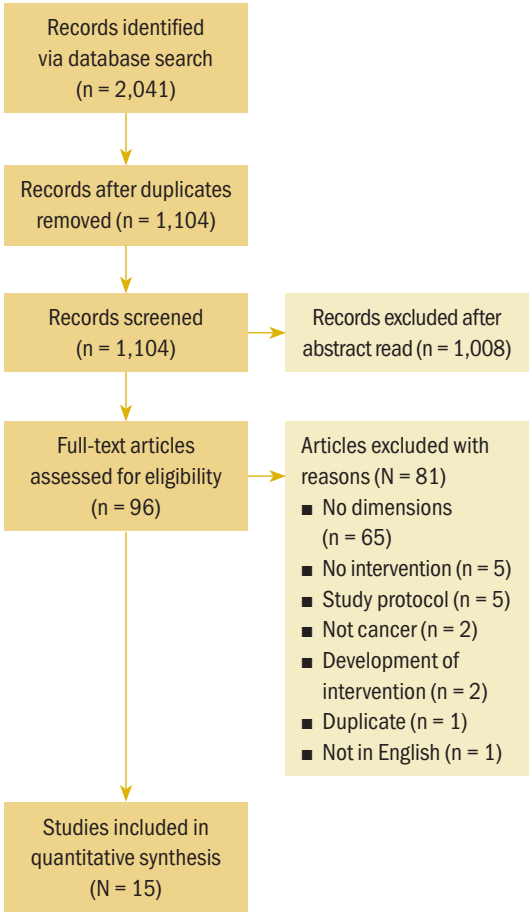
The selection process yielded 15 articles, with 7 published in the United States, 2 each in Australia and the Netherlands, and 1 each from the United Kingdom, Taiwan, Denmark, and Spain. The articles were published from 1999–2015. The patients in the studies included those who were affected by lung cancer, breast cancer (two studies), prostate cancer, ovarian cancer, leukemia, more than one type of cancer, an unspecified type of cancer (seven studies), and one with patients who were treated with stem cell transplantation. The designs in the studies included RCTs (11 studies), pre-/post-test design (three studies), and non-RCT (one study). The number of participants in the studies had a mean value of 135.1 (SD = 107) and a median of 115 (range = 22–380).

Target Symptoms Dimensions

Some studies focused on a single symptom and its dimensions. In these studies, the target symptom dimensions were:

- Psychological distress (Aranda et al., 2012)
- Breathlessness: distress and intensity (Bredin et al., 1999)

FIGURE 1. PRISMA Study Selection Diagram



PRISMA—Preferred Reporting Items for Meta-Analyses and Systematic Reviews

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- Hot flash: severity (Carpenter, Neal, Payne, Kimmick, & Storniolo, 2007; Park et al., 2015), bother (Carpenter et al., 2007), and frequency (Park et al., 2015)
- Pain: intensity (Dalton, Keefe, Carlson, & Youngblood, 2004; Kutner et al., 2008; Kwekkeboom, Kneip, & Pearson, 2003), interference (Dalton et al., 2004; Kutner et al., 2008), worst pain (Kutner et al., 2008), distress (Kwekkeboom et al., 2003), and pain control (Kwekkeboom et al., 2003)
- Fatigue: quality dimensions (de Raaf et al., 2013; van Weert et al., 2006), intensity (Chang et al., 2008), and interference (Chang et al., 2008)
- Urinating: frequency, difficulty, and limiting activities (Serdà & Marcos-Gragera, 2014)

Other studies targeted several symptoms and symptom dimensions concurrently:

- Chemotherapy symptoms: prevalence, severity, and bother (Aranda et al., 2012)
- Symptom burden (an aggregated score of all intensity scorings) (de Raaf et al., 2013), severity (Donovan et al., 2014; Jarden, Nelausen, Hovgaard, Boesen, & Adamsen, 2009; Lewis et al., 2015) and distress (Donovan et al., 2014; Jarden et al., 2009); consequences of symptoms (Donovan et al., 2014), controllability of symptoms (Donovan et al., 2014), prevalence (Lewis et al., 2015), and bother (Lewis et al., 2015)

Complex Interventions

The interventions were characterized as complex if they were interventions consisting of more than one component. Nine studies were characterized as complex and, of those, seven showed significant differences in at least one dimension. Additional information on the studies is presented in Table 1.

Two studies used education or information DVDs. Aranda et al. (2012) designed an intervention to prepare patients with various cancers for chemotherapy by providing a DVD with information, a question prompt list, self-care information, and education consultation. The patients also received a telephone and face-to-face follow-up. Carpenter et al. (2007) distributed a DVD with video clips to patients experiencing hot flashes after breast cancer. The video clips showed three situations: resting at home, doing housework, and at work in an environment where the intervention could be used. The proposed physiologic mechanism of action on core body temperature was demonstrated. Voice and text instructed the women to "stop, breathe, and focus" to help them remember how to use the behavioral intervention. The intervention should be used as soon as a hot flash is perceived (Carpenter et al., 2007).

Two studies included nursing clinic visits. In a study by Bredin et al. (1999), patients affected by lung cancer visited a nursing clinic, where a range of strategies were adopted, including breathing control, activity pacing, relaxation techniques, and psychosocial support (Bredin et al., 1999). de Raaf et al. (2013) designed a patient-tailored treatment for patients affected by various cancers. A nurse specialist coordinated an intervention targeting the physical symptoms of pain, nausea, vomiting, constipation, diarrhea, lack of appetite, shortness of breath, cough, and dry mouth. The nurse specialist asked patients to rate symptom intensity in the past week on a numeric rating scale, ranging from 0 (no suffering) to 10 (unbearable suffering) (de Raaf et al., 2013).

Three studies included education or therapy sessions. Brown et al.'s (2006) intervention included eight 90-minute sessions during four weeks for patients affected by various cancers. The patients received written materials covering the eight sessions. Each session focused on at least one of five quality-of-life domains. A psychiatrist or a psychologist led the sessions, depending on the topic. An advanced practice nurse, a chaplain, or a social worker cofacilitated each session. Sessions began with 20 minutes of exercises conducted by a physical therapist, followed by educational information, cognitive-behavioral strategies, discussion, and support (Brown et al., 2006). Dalton et al. (2004) adopted cognitive-behavioral therapy (CBT) techniques and delivered these to patients affected by various cancer diagnoses in five one-hour treatment sessions, lasting about 50 minutes each. Patients completed homework and a pain diary (Dalton et al., 2004). Jarden et al. (2009) combined stationary cycling, stretching, resistance training, progressive relaxation, and psychoeducation for patients undergoing stem cell transplantation.

Serdà and Marcos-Gragera (2014) designed an intervention for patients affected by prostate cancer in two stages, where stage 1 related to global postural re-education and stage 2 related to pelvic floor muscle training. The training aimed at controlling urinary incontinence by improving the pelvic floor muscle strength and, therefore, compensating for the insufficiencies in the damaged sphincters and decreasing urine retention. van Weert et al. (2006) used a multidimensional rehabilitation program, including exercise, sports and games, information, and psychoeducation for cancer survivors.

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TABLE 1. Overview of the Studies Included for Systematic Review

Source and Quality	Design, Sample, and Target Symptom Dimension	Groups	Results on Symptom Dimensions
Complex interventions			
Aranda et al., 2012 (Australia) 1+	■ RCT of 192 patients with breast, gastrointestinal, and hematologic cancers ■ Psychological distress and chemotherapy symptoms	Intervention: ChemoEd ■ Preparing patients for potentially threatening procedures ■ Tailoring to the specific needs of individuals ■ Emphasizing evidence-based self-care ■ Psychosocial support Control: Routine prechemotherapy education	ChemoEd did not significantly reduce patient distress. A significant decrease in prevalence and severity of and bother related to vomiting (all p = 0.001) were observed at T3. In addition, subgroup analysis of patients with elevated distress at T1 indicated a significant decrease (p = 0.035) at T2 but not at T3 (p = 0.055).
Bredin et al., 1999 (United Kingdom) 1+	■ RCT of 119 patients with lung cancer ■ Distress related to breathlessness and intensity (best and worst)	Intervention: Nursing clinic The intervention consisted of a range of strategies combining breathing control, activity pacing, relaxation techniques, and psychosocial support. Control: Best supportive care	■ Improved intensity at best (median = 1.3 versus 7, p = 0.03) ■ Distress related to breathlessness improved slightly (median = 0 versus 10, p = 0.09).
Brown et al., 2006 (United States) 1+	■ RCT of 115 patients with cancer ■ Fatigue quality dimension	Intervention: Eight 90-minute sessions during a four-week period. Participants were given written materials for review. Sessions began with 20 minutes of exercise followed by education, cognitive-behavioral strategies, discussion, and support. Control: Standard medical care	No significant differences in fatigue. Trends in the mean Profile of Mood States Fatigue–Inertia subscale scores (60.3 versus 67.4, p = 0.065) and SDS Fatigue question (58.5 versus 62.5, p = 0.098) at week 8, favoring the control (i.e., standard care) group.
Carpenter et al., 2007 (United States) 2+	■ Pre-/post-test design with 40 patients with breast cancer ■ Hot flash severity and bother	Intervention: A DVD with video clips demonstrating the intervention during three situations: resting at home, doing housework, and at work	Significant decrease in hot flash severity ($\bar{X}$ = 7.18 versus 6.54, p = 0.003) and hot flash bother ($\bar{X}$ = 6.79 versus 6.19, p = 0.012)
Dalton et al., 2004 (United States) 1–	■ RCT of 121 patients with cancer ■ Pain intensity and interference	Intervention: CBT was delivered in five one-hour treatment sessions, lasting about 50 minutes each. Patients completed homework and a pain diary. Control: Standard CBT or usual care	When compared to standard CBT patients, profile-tailored CBT patients experienced substantial improvement from baseline to immediately postintervention in worst pain (–2.1 versus –0.5 or 0, p = 0.05, 0.3), least pain (–1.1 versus 0.3, p = 0.04), and less interference of pain with sleep (–3.4 versus –1.9 or –1.2, p = 0.02).
de Raaf et al., 2013 (Netherlands) 1–	■ RCT of 152 patients with cancer ■ MFI-dimensions (quality) symptom burden is an aggregated score of all intensity scorings in the European Organisation for Research and Treatment of Cancer Quality of Life Core 30 questionnaire	Intervention: Patient-tailored treatment for the physical symptoms of pain, nausea, vomiting, constipation, diarrhea, lack of appetite, shortness of breath, cough, and dry mouth. Patients rated intensity on a numeric rating scale. Control: Usual care	Significant improvements over time in favor of the intervention for the primary outcome general fatigue, with significant group differences at month 1 (effect size = 0.26, p = 0.007) and month 2 (effect size = 0.35, p = 0.005). Improvements in favor of the intervention were found for the following secondary outcomes: fatigue dimensions reduced activity and reduced motivation, fatigue, symptom burden, interference of fatigue with daily life, and anxiety (all p = 0.03).

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TABLE 1. Overview of the Studies Included for Systematic Review *(Continued)*

Source and Quality	Design, Sample, and Target Symptom Dimension	Groups	Results on Symptom Dimensions
Complex interventions *(continued)*			
Jarden et al., 2009 (Denmark) 1–	■ RCT of 42 patients undergoing myeloablative allogeneic hematopoietic stem cell transplantation ■ Prevalence, severity, and distress	Intervention: Stationary cycling, stretching, resistance training, progressive relaxation, and psychoeducation Control: Conventional treatment and care, including standard care for physical activity	Significant differences between intervention and control, $p < 0.01$. Prevalence of diminished concentration, memory problems, nausea, nervousness, stomach pain, skin disturbances, muscle aches, anxiety, difficulty swallowing, stress, vomiting, headache, joint aches, and severity of ($p < 0.05$) fatigue, loss of appetite, diminished concentration, sleep difficulties, nausea, nervousness, stress, and other physical or bodily symptoms
Serdà & Marcos-Gragera, 2014 (Spain) 1+	■ RCT of 66 patients with prostate cancer ■ Frequency, difficulty, limit activities, VAS	Stage 1. Global postural education Stage 2. Pelvic floor muscle training	Improvements in intervention group in difficulty in urinating ($p = 0.026$), in urinating more often ($p < 0.001$), urinating limit activities ($p = 0.001$), and VAS of urinary incontinence ($p < 0.001$)
van Weert et al., 2006 (Netherlands) 1 +	■ Pre-/post-test of 72 cancer survivors ■ Dimensions in MFI	Multidimensional rehabilitation program that includes exercise, sports and games, information, and psychoeducation.	General fatigue at T0: 15 (3.9) at T1: 12.9 (4.7) effect size: −0.48, $p < 0.001$; physical fatigue at T0: 14.9 (4.2) at T1: 11.6 (4.2), effect size: −0.78, $p < 0.001$; reduced activity at T0: 12.9 (4) at T1: 10.7 (4.1), effect size: −0.54, $p < 0.001$; reduced motivation at T0: 10.4 (3.7) at T1: 9.1 (3.6), effect size: −0.35, $p < 0.01$; mental fatigue at T0: 13.2 (4.1) at T1: 11.7 (4.2), effect size: −0.36, $p < 0.01$
Single interventions			
Chang et al., 2008 (Taiwan) 1–	■ RCT of 22 patients with acute myelogenous leukemia ■ Fatigue intensity and fatigue interference	Intervention: A three-week walking exercise program that consisted of 12 minutes of walking in the hospital hallway for five days per week Control: A research assistant spent 12 minutes with the patients.	Patients in the intervention group had lower levels of fatigue intensity ($z = 3.33, 3.4, 2.36$ for worst fatigue intensity; $z = 3.4, 3.77, 2.01$ for average fatigue intensity) and interference, symptom distress, anxiety, and depressive status than the control group.
Donovan et al., 2014 (United States) 1–	■ RCT of 65 patients with recurrent ovarian cancer ■ Symptom severity, symptom-related distress, consequences of symptoms, controllability of symptoms	Intervention: Participants were educated with the Written Representational Intervention to Ease (WRITE) Symptoms and completed the symptom representation questionnaire to identify three target symptoms. Education was provided for those symptoms. Control: Wait list	The WRITE Symptoms group reported lower distress than those in the control group ($t[88.4] = 2.57$; $p = 0.012$), with a similar trend for symptom severity ($t[40.4] = 1.95$; $p = 0.058$). Repeated measures analysis also supported a group effect, with those in the WRITE Symptoms group reporting lower symptom distress than those in the control condition ($F[1, 56.7] = 4.59$; $p = 0.037$).
Kutner et al., 2008 (United States) 1+	■ RCT of 380 patients with advanced cancer ■ Mean pain, worst pain, pain interference	Intervention: Massage. Control: Simple touch, which was designed to control for the time, attention, touch, and healing intent components of the intervention	Massage was superior for both pain and mood ($\bar{X}$ difference = 0.9 and 0.61 points, respectively, $p < 0.001$). No between-group mean differences over time in pain.

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TABLE 1. Overview of the Studies Included for Systematic Review *(Continued)*

Source and Quality	Design, Sample, and Target Symptom Dimension	Groups	Results on Symptom Dimensions
Single interventions *(continued)*			
Kwekkeboom et al., 2003 (United States) 1–	■ Pre-/post-test, pilot study of 62 patients with cancer ■ Intensity, distress, and control over pain	Intervention: A 12-minute instruction in analgesic imagery, which offered suggestions to help the patient become comfortable and guided the patient through pleasant nature imagery	Average pain intensity score was lower than baseline for 56 participants ($\bar{X}$ change = 2.25, SD = 1.46); however, it remained unchanged or increased from baseline for 8 patients ($\bar{X}$ change = 0.69, SD = 0.96). The decrease in pain intensity was statistically significant (t[53] = 11.31, p < 0.01).
Lewis et al., 2015 (Australia) 1–	■ Non-RCT, with before and after implementation of EBG, for 290 patients with cancer receiving chemotherapy ■ Prevalence, severity, and bother	Intervention: EBG for nausea, vomiting, mouth care, diarrhea, constipation, and tiredness (stage 2) Control: Before implementation of guidelines (stage 1)	Stage 2 participants did better at managing feeling low (OR = 2.33; 95% CI [1.47, 3.7], p < 0.001) and vomiting (OR = 2.37; 95% CI [1.13, 4.97], p = 0.022). Bother was greater in stage 2 at baseline for vomiting (p = 0.04), pain (p = 0.017), feeling tired (p = 0.038), feeling anxious or worried (p = 0.001), and feeling low (p = 0.024). By one month, only feeling anxious or worried (p = 0.023) and feeling low (p = 0.006) differed. Severity was greater in stage 2 at baseline for pain (p = 0.025) and feeling anxious or worried (p = 0.008). By one month, only feeling anxious or worried (p = 0.01) differed.
Park et al., 2015 (United States) 1+	■ RCT of 289 patients with breast cancer ■ Hot flashes score and frequency	Intervention: Magnesium (800 mg or 1,200 mg) Control: Two or three capsules placebo	Mean hot flash scores, mean hot flash frequencies, and associated changes during the treatment period were similar for each group.

CBT—cognitive behavioral therapy; CI—confidence interval; EBG—evidence-based guidelines; MFI—Multidimensional Fatigue Inventory; OR—odds ratio; RCT—randomized, controlled trial; SIGN—Scottish Intercollegiate Guidelines Network; T—time; VAS—visual analog scale
Note. Quality was scored according to SIGN evidence statements, where 1+ indicates an RCT with low risk of bias and 1– indicates an RCT with high risk of bias.

Single Interventions

Six studies described single interventions and, of these, four showed significant differences in symptom dimensions. The single-intervention studies related to physical exercise programs, writing exercises, massage, guided imagery, implementation of evidence-based care, or complementary medicine, such as magnesium. Chang et al. (2008) applied a walking exercise program (WEP) based on the principles of frequency, duration, and intensity of activity suggested by the American College of Sports Medicine and a literature review of patients affected by leukemia. The three-week WEP consisted of 12 minutes of walking in the hospital hallway five days per week (Chang et al., 2008). Donovan et al. (2014) designed a Written Representational Intervention to Ease (WRITE) Symptoms for patients affected by recurrent ovarian cancer. Participants completed the Symptom Representation Questionnaire to identify their three target symptoms. Self-care guides for each symptom were mailed or emailed to reinforce the education provided by the research nurse. The guides were based on the format used by Yarbro, Frogge, and Goodman (2004), providing a description of the symptom, strategies to prevent and/or manage the symptom, and a summary of important information to communicate with healthcare providers. Symptom management recommendations in the guide included two broad categories: symptom management that requires intervention by a healthcare provider (e.g., medication, procedures, referrals) and self-management strategies (Donovan et al.,

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2014). Kutner et al. (2008) applied a massage intervention to patients affected by advanced cancer. The massage included light/gentle effleurage, petrissage, and myofascial trigger point release. Effleurage is a smooth, gliding stroke; petrissage is squeezing, rolling, and kneading the muscles (Kutner et al., 2008). Kwekkeboom et al. (2003) used a 12-minute instruction in analgesic imagery, offering suggestions to help patients with various cancer diagnoses to become comfortable, and guided them through pleasant nature imagery, including a walk along a river, sitting in a field among wildflowers, and viewing a sunset (Kwekkeboom et al., 2003). Lewis et al. (2015) introduced evidence-based self-care guidelines to patients receiving chemotherapy and measured outcomes before implementation of guidelines and after (Lewis et al., 2015). The intervention designed by Park et al. (2015) included prescribing magnesium in different doses to patients affected by breast cancer to improve hot flashes.

Effects on Symptom Dimensions

The interventions had different effects on different dimensions (see Table 2). The symptom dimensions that were alleviated by the interventions were for single symptoms, such as breathlessness intensity but not distress, although there was a nonsignificant trend that these were improved (Bredin et al., 1999), and hot flash severity and bother were alleviated in Carpenter et al. (2007) but not in Park et al. (2015). Pain intensity was alleviated in two studies (Dalton et al., 2004; Kwekkeboom et al., 2003) and pain interference was alleviated in one study (Dalton et al., 2004), but, in another study, no differences were noted between the intervention and control group in either interference or worst pain (Kutner et al., 2008). In Brown et al. (2006), no significant differences were noted in the fatigue quality dimensions, but there were improvements in two other studies (de Raaf et al., 2013; van Weert et al., 2006) in physical fatigue, increased activity, improved motivation, and mental fatigue. There also were improvements in fatigue intensity and interference (Chang et al., 2008). Urinating frequency, difficulty urinating, and limiting activities were all alleviated by the intervention in Serdà and Marcos-Gragera (2014).

Significant decreases were noted in prevalence, severity, and bother of vomiting as a chemotherapy-induced symptom (Aranda et al., 2012). Symptom severity was alleviated in one study (Jarden et al., 2009). Symptom distress, but not intensity, was alleviated in one study (Donovan et al., 2014).

Summary of Symptom Dimensions

Symptom dimensions are sparsely used as outcomes in symptom intervention studies. Some studies seem to label the symptom dimensions differently. In the following list, symptom dimensions that are similar have been arbitrarily grouped together. The most frequently used dimensions relate to the following:

- Intensity (Bredin et al., 1999; Chang et al., 2008; Dalton et al., 2004; Kwekkeboom et al., 2003; Lewis et al., 2015), severity (Aranda et al., 2012; Carpenter et al., 2007; Donovan et al., 2014; Jarden et al., 2009; Park et al., 2015), and difficulty (Serdà & Marcos-Gragera, 2014)
- Distress (Bredin et al., 1999; Donovan et al., 2014; Jarden et al., 2009; Kwekkeboom et al., 2003), bother (Aranda et al., 2012; Carpenter et al., 2007; Lewis et al., 2015), burden (de Raaf et al., 2013), and interference (Chang et al., 2008; Dalton et al., 2004; de Raaf et al., 2013; Kutner et al., 2008)
- Prevalence (Aranda et al., 2012; Jarden et al., 2009; Lewis et al., 2015)
- Frequency (Park et al., 2015; Serdà & Marcos-Gragera, 2014)
- Consequences (Donovan et al., 2014), limiting activities (Serdà & Marcos-Gragera, 2014), and control (Donovan et al., 2014; Kwekkeboom et al., 2003)
- Quality (Brown et al., 2006; de Raaf et al., 2013; van Weert et al., 2006)

Differences were noted in which dimensions are alleviated by the interventions, and one intervention could alleviate one dimension but not another. More complex interventions seem to use more outcome dimensions and also have an effect on more dimensions.

Discussion

There is a growing body of evidence that symptom experience is multidimensional (Armstrong, 2003; Brant et al., 2010; Dodd et al., 2001; Humphrey et al., 2014; Lenz et al., 1997), but the dimensions were found to be sparsely used as outcomes in symptom interventions studies. One reason for this could be that studies are easier to design and implement with a single outcome measure, or that it is easier to use available instruments.

In some instruments, several dimensions are measured, but a composite measure is presented, as in the MSAS (Portenoy et al., 1994) or the Symptom Distress Scale (McCorkle & Young, 1978) and, accordingly, these studies were excluded. The reason for presenting composite measures might be that one wants to acknowledge the multidimensionality of

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the symptom experience, but it is easier to present only one measure as the outcome. Implicit in this way of presenting data is that each dimension is given a minor significance. In addition, the patients who complete a symptom assessment within several dimensions are given a larger workload of completing multiple questions about the same symptom, and this often involves the participation of severely diseased patients, sometimes with life-threatening illnesses, who need to focus on their own well-being rather than on completing lengthy questionnaires.

When symptoms are presented, there is an agreement of what is meant by the label of the symptom, but the current study shows that the terms for the dimensions differ between studies, making it difficult to compare the results of the interventions. The studies in the current review used at least two dimensions, but there is no evidence of which dimension is most important or if the dimensions are equally important. Tishelman et al. (2005) found that symptom intensity and symptom distress were not equivalent in that breathing, pain, and fatigue caused the most distress, but fatigue had the highest intensity. Symptom distress was also found to be most consistent over time, but symptom intensity varied. If that is a stable result, the dimension that might be most possible to be influenced by an intervention could be symptom intensity. In most of the studies included in the current review, symptom dimensions were not measured longitudinally. Healthcare providers

TABLE 2. Overview of the Interventions' Effect on the Symptom Dimensions

Intervention	Studies	Intensity Effect	Distress Effect	Quality Effect
Analgesic imagery	Kwekkeboom et al., 2003	■ Pain intensity	–	–
Education[a]	Serdà & Marcos-Gragera, 2014; van Weert et al., 2006	■ Difficulty urinating	■ Limiting activities	■ Physical fatigue ■ Reduced activity ■ Reduced motivation ■ Mental fatigue
Education, information on DVD, with follow-up	Aranda et al., 2012; Carpenter et al., 2007	■ Vomiting severity ■ Hot flash severity	■ Bother of vomiting ■ Bother of hot flash	–
Education or therapy sessions	Brown et al., 2006; Dalton et al., 2004; Jarden et al., 2009	■ Worst pain intensity ■ No effect on symptom intensity	–	■ No differences in fatigue quality
Evidence-based self-care guidelines	Lewis et al., 2015	■ Pain severity	■ Bother of vomiting ■ Pain ■ Feeling tired	–
Magnesium	Park et al., 2015	■ No effect	–	–
Massage	Kutner et al., 2008	■ No effect	–	–
Nursing clinic visits	Bredin et al., 1999; de Raaf et al., 2013	■ Intensity of breathlessness	■ Fatigue interference with life	■ Fatigue dimensions of reduced activity and reduced motivation
Walking exercise program	Chang et al., 2008	■ Fatigue intensity	■ Fatigue interference	–
WRITE Symptoms	Donovan et al., 2014	–	■ Distress	–

[a] Includes an effect on frequency of urination
WRITE—Written Representational Intervention to Ease

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should explore which dimensions affect patients' well-being most. Although patients have been found to score symptom distress and symptom severity on different levels (Tishelman et al., 2005), how patients communicate their perceptions of separate symptoms is sometimes problematic. A study of women affected by ovarian cancer found that they experience multiple symptoms, but they did not discuss their symptoms with healthcare professionals and did not receive symptom management recommendations (Donovan, Hartenbach, & Method, 2005). It was concluded that women would benefit from more active symptom assessment, which also was acknowledged by Sarna (1998), who designed an intervention with symptom assessment and found less symptom distress in the intervention group. If communication about single symptoms is difficult, then it would be even more difficult to communicate about multiple symptom dimensions for patients.

In the current review, it was shown that complex interventions seem to have a better effect on more than one dimension. There is an agreement that complex interventions need to be developed to have an effect on patients' suffering (Campbell et al., 2000; Craig et al., 2008). A complex intervention could be characterized as such by (a) the existence of several interacting components within the experimental and control interventions, (b) the complexity of behaviors required by those delivering or receiving the intervention, (c) the number of groups or organizational levels targeted by the intervention, (d) the variability of outcomes, and (e) the degree of flexibility or tailoring of the intervention permitted (Craig et al., 2008). In the current article, the authors labeled an intervention as complex if there were more than one component included in the intervention, which is in line with Craig et al. (2008). However, Craig et al. (2008) also included the variability of outcomes in their definition of complexity; with such a criterion, all the studies in the current article would be considered as complex. When designing a complex intervention, the outcomes need to be decided in advance, and, if symptom dimensions are considered to be an important part of the patients' symptom experience, the outcomes in symptom studies should include one or more symptom dimensions.

The frontier of symptom research was, in 2004, symptom clusters, and it was argued that researchers need to determine which dimensions of a symptom are critical for the assessment of a symptom within a symptom cluster (Miaskowski, Dodd, & Lee, 2004). In most studies, symptom clusters are measured in one dimension. It could be argued that symptom dimensions and symptom clusters are different and complementary understandings of symptoms. Symptom dimensions are aimed at dividing the symptom experience into several pieces, but symptom clusters are aimed at finding multiple symptoms that are linked to each other. More research is needed to determine which symptom dimensions should be included in a symptom cluster; it might be that different dimensions from each different symptom should be included. In some studies and in some instruments, such as the MSAS, multiple dimensions are clustered together to a composite measure, sometimes called symptom burden. There is a need to explore whether symptom cluster could be considered as a symptom burden measure.

KNOWLEDGE TRANSLATION

- Two or more symptom dimensions are seldom used as outcomes in intervention studies for patients with cancer.
- Various interventions targeted at symptoms exist and must be implemented to provide evidence-based symptom management.
- Additional studies are needed to determine the appropriate symptom dimensions as outcomes in symptom research and in practice.

Implications for Nursing

Symptom relief before, during, and after treatment is crucial in oncology nursing, and oncology nurses need to acknowledge patients' experience of symptoms. So far, research has stated that symptoms need to be structurally assessed and managed, but, because the symptom experience is complex, to only measure intensity might be insufficient. As long as no consensus exists about how to assess the total symptom experience, oncology nurses need to develop clinical skills to be able to understand and extract and, thereby, assess the patients' experiences through listening to their narratives. The current article also showed that various interventions are targeted at symptoms, and those interventions need to be implemented in practice to provide evidence-based symptom management.

Conclusion

Although symptom dimensions are included in nursing symptom theories, very few studies were found that used two or more symptom dimensions as outcome measures in symptom intervention studies. Intensity and distress were the most frequently used

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dimensions. Additional studies are needed to determine the appropriate dimensions in symptom studies. Various interventions were found in the included studies, but their robustness, their influence on the experience of single symptoms and on symptom clusters, and the most appropriate way to implement them, need to be explored.

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