

# Factors Associated With Medication Beliefs in Patients With Cancer: An Integrative Review

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**PROBLEM IDENTIFICATION:** Medication beliefs are linked to medication adherence in cancer treatment. Oral cancer treatments are increasing, making patients responsible for self-managing medication at home.

**LITERATURE SEARCH:** A literature search was performed using CINAHL®, PubMed, and PsycINFO. Included studies were published in English from 2000–2017 and examined medication beliefs among participants aged 18 years or older who were prescribed cancer medication.

**DATA EVALUATION:** Articles were organized by study design, how medication beliefs were measured, and whether psychometric testing was evaluated. Articles were scored to indicate rigor of medication belief measurements. Themes of factors associated with medication beliefs were compiled.

**SYNTHESIS:** The review represented several cancer and cancer medication types. Various methods were used to elicit medication beliefs. Medication beliefs influence decisions to initiate or continue cancer medications, and those beliefs are multifaceted. Nurses have a critical role in evaluating and supporting facilitative medication beliefs.

**IMPLICATIONS FOR RESEARCH:** Nurses can address medication beliefs and clarify treatment misconceptions. Understanding factors influencing medication beliefs can inform future interventions to improve adherence and symptom management.

**KEYWORDS** cancer; medication; medication beliefs; chemotherapy; clinical trials; oral medication

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The development of oral cancer medications (OCMs) has sharply increased since 2004 (Mancini, McBride, & Kruczynski, 2013). More than half of the cancer treatments recently approved by the U.S. Food and Drug Administration (FDA) are in oral form (Center Watch, 2018), and that number is expected to increase with the anticipation of more clinical trials involving OCMs. OCMs often have narrow therapeutic ranges and safety margins (Neuss et al., 2013; Vioral, Leslie, Best, & Somerville, 2014), making managing medication regimens essential for improved patient outcomes.

Medication beliefs are linked to patient outcomes, such as symptom experience and adherence, in a number of chronic illnesses, including cancer (Chater, Parham, Riley, Hutchison, & Horne, 2014; Horne, Weinman, & Hankins, 1999; Kalichman, Kalichman, & Cherry, 2016; Lu et al., 2016; Saratsiotou et al., 2011); however, less is known about factors influencing those beliefs. With OCMs being increasingly prescribed, the responsibility of self-managing medication falls onto patients and their caregivers (Given, Spoelstra, & Grant, 2011). OCM regimens can be complex and involve side effects that can make adherence and symptom management challenging (Given et al., 2011). Cancer is regarded as a chronic condition requiring long-term use of OCMs (National Comprehensive Care Network, n.d.). Therefore, factors associated with cancer medication beliefs that can influence medication taking in the home environment warrant closer exploration.

The aim of this integrative review was to explore medication beliefs and associated factors among patients receiving medication to treat cancer and provide a synthesis of current measures to evaluate medication beliefs. The scope of the review is broad to include all types of cancer medication (oral and IV) because research is scarce regarding beliefs specific to anticancer medications. The PRISMA (Preferred

Reporting Items for Systematic Reviews and Meta-Analyses) checklist helped guide methods for this review (Moher, Liberati, Tetzlaff, & Altman, 2009).

## Methods

### Search Strategies

A literature search was performed using CINAHL®, PubMed, and PsycINFO as primary search engines. Specific search terms were “medication beliefs” OR “treatment beliefs” OR “medication perceptions” OR “treatment perceptions” OR “medication views” OR “treatment views” OR “medication attitudes” OR “treatment attitudes” AND “chemotherapy” OR “oral agents” OR “antineoplastic agents” OR “targeted agents” OR “cancer.” Key terms were incorporated into a complex search strategy to narrow results.

A second search was performed in CINAHL, PubMed, and PsycINFO specific to the Beliefs About Medicines Questionnaire (BMQ) using the following key terms: “Beliefs about Medicine\* Questionnaire” AND “chemotherapy” OR “oral agents” OR “antineoplastic agents” OR “targeted agents” OR “oral cancer medication” OR “anticancer” OR “cancer.” MeSH (Medical Subject Headings) terms were not used because results did not yield applicable literature.

### Inclusion and Exclusion Criteria

Inclusion criteria comprised research articles published from 2000–2017 in English that included an examination of medication beliefs among participants aged 18 years or older who were prescribed or undergoing medication treatment for cancer. A well-known measure of medication beliefs, the BMQ, was published in late 1999 and is the rationale to include articles published after this time. Articles were excluded if beliefs were not specific to cancer medication treatment, if articles presented medication beliefs of physicians or caregivers, or if articles focused on beliefs about cancer-related pain medication.

### Search Outcome

The initial search produced 259 results. After accounting for duplicate studies, 251 articles remained. The 251 article titles and abstracts were screened. An additional 207 articles were excluded for not meeting inclusion criteria, leaving 44 articles for full-text review of inclusion criteria. Thirty-six articles met full inclusion criteria and were included in the review (see Figure 1).

### Data Evaluation

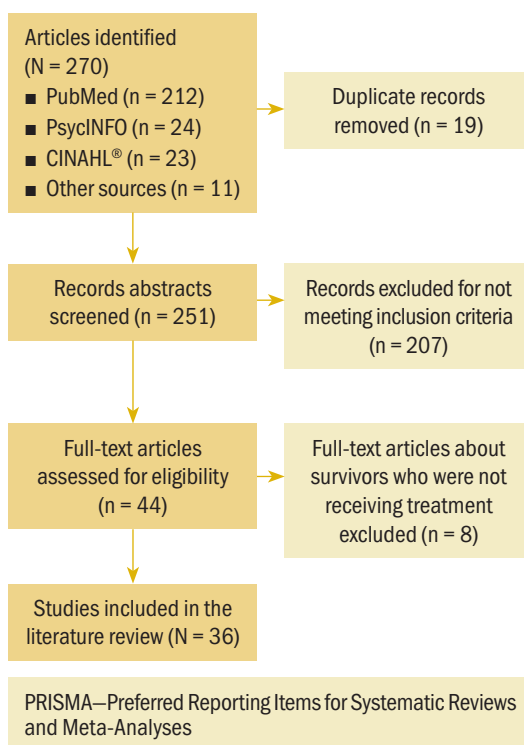
Articles were derived from several diverse methodologies. Using the data analysis strategy set forth by

Whittemore and Knaf (2005), data were reduced by first organizing articles by type of study design. Articles then were organized by how cancer-specific medication beliefs were measured. Articles were further organized by whether psychometric testing was evaluated on the instrument used (excluding those using qualitative methods). The rationale for categorizing articles based on how medication beliefs were measured was to provide a review of the state of the science with what is currently known regarding medication beliefs in individuals with cancer. Articles were given one of five ratings to indicate the rigor of medication belief measurements, with higher numbers indicating stronger methodologic measurements. Literature and systematic reviews were not rated because they simply summarized studies and medication belief measurements. Last, themes of factors associated with medication beliefs were compiled.

## Results

Publication dates for included articles range from 2001–2017. Studies were largely cross-sectional, accounting for 18 of the 36 studies. Five qualitative studies supplied rich data on patients’ perceptions and beliefs about oral chemotherapy and other cancer treatments.

FIGURE 1. PRISMA Flow Diagram



**TABLE 1. Review of the Literature About Medication and Treatment Beliefs**

Study and Country	Findings	Design, Sample, and Treatment	Medication Belief Measure <sup>a</sup>
Arriola et al., 2014 (United States)	Medication necessity and concerns were significantly associated with self-reported adherence. Necessity was significantly related to frequency of physician communication, but concerns were not. Necessity beliefs significantly mediated the relationship between frequency of physician communication and medication adherence.	<ul style="list-style-type: none"> <li>■ Cross-sectional</li> <li>■ 200 women with a breast cancer diagnosis 6 months to no more than 5 years beyond completion of primary treatment for HR+ breast cancer</li> <li>■ Various adjuvant endocrine therapies</li> </ul>	<ul style="list-style-type: none"> <li>■ BMQ-Specific</li> <li>■ Psychometric testing of measure: Yes/<math>\alpha</math> reported only</li> <li>■ Rating: 3</li> </ul>
Balmer et al., 2001 (United Kingdom)	People with advanced cancer are more willing to accept second-line chemotherapy with a lower chance and shorter duration of benefit compared to healthy laypeople.	<ul style="list-style-type: none"> <li>■ Cross-sectional</li> <li>■ 168 patients (92 with cancer who were previously treated with palliative chemotherapy and for whom second-line treatment was appropriate, and 76 laypeople who were matched as closely to the cancer group as possible)</li> <li>■ Various second-line palliative chemotherapies</li> </ul>	<ul style="list-style-type: none"> <li>■ A questionnaire was developed to indicate whether patients found chemotherapy treatments acceptable based on 2 imaginary scenarios, given stated side effects and risks. Patients were asked what the minimum necessary change of benefit would be to be worthwhile and the minimum benefit duration.</li> <li>■ Psychometric testing of measure: No</li> <li>■ Rating: 1</li> </ul>
Banning, 2012 (N/A)	Contributing factors to nonadherence included lack of interest and dislike of taking medicine. Younger women and those aged younger than 57.6 years were intentionally nonadherent, often refusing to adhere to treatment regimens because of dislike of medication and perceived low benefit with higher risk. Women also perceived a lack of benefit from medicine.	<ul style="list-style-type: none"> <li>■ Literature review using PubMed, Cochrane Library, PsycINFO, British Nursing Index, and Advanced Google Scholar</li> <li>■ 13 studies published from January 1999 to March 2011 that addressed adherence with adjuvant medication in postmenopausal breast cancer</li> <li>■ Various treatments</li> </ul>	<ul style="list-style-type: none"> <li>■ Various</li> <li>■ Psychometric testing of measure: N/A</li> <li>■ Rating: N/A</li> </ul>
Barak et al., 2012 (Israel)	97% of patients thought the goal of adjuvant therapy was to bring about full recovery, and 89% felt that treatment would prevent future recurrence. 54% felt that adjuvant therapy would alleviate various symptoms. 78% agreed that adjuvant therapy had side effects. The group that had doubts about adjuvant therapy included patients with comorbidities.	<ul style="list-style-type: none"> <li>■ Cross-sectional</li> <li>■ 92 women diagnosed with breast cancer (stage I-III)</li> <li>■ Adjuvant chemotherapy</li> </ul>	<ul style="list-style-type: none"> <li>■ A questionnaire regarding adjuvant therapy evaluated the goal of treatment, side effects of treatment, and difficulties of adjuvant therapy, if any.</li> <li>■ Psychometric testing of measure: No</li> <li>■ Rating: 1</li> </ul>
Bender et al., 2014 (United States)	On average, concerns outweighed the necessity of endocrine therapy. Non-adherence to endocrine therapy was significantly associated with perceived burden of self-reported cognitive symptoms, musculoskeletal pain, weight concerns, and gynecologic symptoms.	<ul style="list-style-type: none"> <li>■ Longitudinal</li> <li>■ 91 women who were diagnosed with HR+ stage I, II, or IIIa breast cancer, were able to speak English, were aged 18-75 years, and had at least 8 years of education</li> <li>■ Adjuvant endocrine therapy</li> </ul>	<ul style="list-style-type: none"> <li>■ BMQ-Specific</li> <li>■ Psychometric testing of measure: Yes/<math>\alpha</math> reported only</li> <li>■ Rating: 3</li> </ul>

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**TABLE 1. Review of the Literature About Medication and Treatment Beliefs (Continued)**

Study and Country	Findings	Design, Sample, and Treatment	Medication Belief Measure <sup>a</sup>
Bhattacharya et al., 2012 (United Kingdom)	98% of patients perceived capecitabine as necessary. One-third had strong concerns, particularly about side effects. Patients lacked information about monitoring the efficacy of capecitabine and therapy duration. No significant associations were found between BMQ and self-reported adherence.	<ul style="list-style-type: none"> <li>■ Cross-sectional</li> <li>■ 43 patients with breast or colorectal cancer who were prescribed capecitabine and completed at least one cycle</li> <li>■ Capecitabine</li> </ul>	<ul style="list-style-type: none"> <li>■ BMQ-Specific</li> <li>■ Psychometric testing of measure: No</li> <li>■ Rating: 2</li> </ul>
Bickell et al., 2009 (United States)	Women who had not undergone previous cancer treatment were less likely to know that adjuvant therapies increased survival compared to those who previously had been exposed to cancer treatment. Women who had poor understanding of clear benefits and risks of adjuvant treatments were more likely to underuse treatment. Women who were treated were more likely than untreated women to endure unpleasant or painful treatment for the increased chance of survival.	<ul style="list-style-type: none"> <li>■ Cross-sectional</li> <li>■ 258 women who had newly diagnosed stage I or II breast cancer, were English- or Spanish-speaking, and underwent definitive surgical treatments and required some form of postsurgical adjuvant surgery</li> <li>■ Various adjuvant therapies</li> </ul>	<ul style="list-style-type: none"> <li>■ A survey instrument was designed to assess patients' beliefs, attitudes, and knowledge about breast cancer and adjuvant treatment. Questions focused on protection from cancer recurrence and adverse effects of medication.</li> <li>■ Psychometric testing of measure: Yes/<math>\alpha</math> reported only</li> <li>■ Rating: 1</li> </ul>
Bond et al., 2002 (United States)	Factors regarding perceived positive influences of HRT included lowering risk of heart disease and osteoporosis; helping with hot flashes, mood swings, panic attacks, sleep problems, vaginal dryness, and mental alertness; keeping skin looking young; reducing Alzheimer risk; improving sexual desire and function; preventing uterine cancer; and retaining fertility. Perceived negative factors included increased risk of breast and other cancers, weight gain, inadequate information regarding long-term effects, swollen or sore breasts, bloating, and that the medication is not natural.	<ul style="list-style-type: none"> <li>■ Qualitative focus groups</li> <li>■ 30 women with breast cancer, regardless of age or stage of disease</li> <li>■ Various HRTs</li> </ul>	<ul style="list-style-type: none"> <li>■ Focus group questions that covered positive and negative factors that affected decisions about taking HRT</li> <li>■ Psychometric testing of measure: N/A</li> <li>■ Rating: 0</li> </ul>
Carrion et al., 2013 (United States)	A theme that emerged regarding treatment was reliance on physicians for decisions. Men trusted the physicians' opinions and recommendations based on their training, without understanding the full extent of risks or side effects. Some felt regret related to not talking to more people about options or making decisions quickly because they felt a sense of urgency.	<ul style="list-style-type: none"> <li>■ Qualitative</li> <li>■ 15 foreign-born Latino men from Cuba, Mexico, Colombia, and Venezuela who were diagnosed with cancer within the past 5 years and lived in Florida</li> <li>■ Various treatments</li> </ul>	<ul style="list-style-type: none"> <li>■ Qualitative interview questions regarding what worried patients about the cancer treatment they received and whether they would do anything different regarding treatment</li> <li>■ Psychometric testing of measure: N/A</li> <li>■ Rating: 0</li> </ul>

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**TABLE 1. Review of the Literature About Medication and Treatment Beliefs (Continued)**

Study and Country	Findings	Design, Sample, and Treatment	Medication Belief Measure <sup>a</sup>
Chen et al., 2013 (United States)	92% of those who had inaccurate beliefs about radiation therapy also had inaccurate beliefs about chemotherapy; this relationship was significant. Inaccurate beliefs were associated with older age and non-Caucasian race.	<ul style="list-style-type: none"> <li>■ Cross-sectional</li> <li>■ 384 patients at Veterans Affairs centers who had lung cancer (within 3 months of diagnosis) and were aged 21 years or older</li> <li>■ Various treatments</li> </ul>	<ul style="list-style-type: none"> <li>■ Researchers evaluated inaccurate beliefs about chemotherapy, with response options ranging from very likely to not at all. Benefits of chemotherapy were evaluated.</li> <li>■ Psychometric testing of measure: No</li> <li>■ Rating: 1</li> </ul>
Chen et al., 2014 (Taiwan)	Patients feared that interruptions or changes in imatinib would cause resistance. Side effects altered medication taking. Misconceptions regarding side effects as a sign of disease progression were noted. Some patients complained about lack of relevant information to monitor side effects. Imatinib was perceived as superior to chemotherapy and interferon because of low toxicity, mild side effects, and oral administration.	<ul style="list-style-type: none"> <li>■ Qualitative</li> <li>■ 42 patients with chronic myeloid leukemia at oncology outpatient clinics within a medical center</li> <li>■ Imatinib</li> </ul>	<ul style="list-style-type: none"> <li>■ Qualitative interview questions elicited medication beliefs by asking patients how they felt about cancer medication, how they knew cancer medication was working, and experiences with their cancer medication.</li> <li>■ Psychometric testing of measure: N/A</li> <li>■ Rating: 0</li> </ul>
Corter et al., 2013 (New Zealand)	Patient medication beliefs about endocrine therapy were significantly associated with fear of recurrence. Women receiving adjuvant endocrine therapy may be balancing the conflict between medication necessity and concern beliefs.	<ul style="list-style-type: none"> <li>■ Cross-sectional</li> <li>■ 153 postmenopausal women who had no prior history of breast cancer before being diagnosed with early-stage HR+ breast cancer</li> <li>■ Adjuvant endocrine therapy with an aromatase inhibitor</li> </ul>	<ul style="list-style-type: none"> <li>■ BMQ-Specific</li> <li>■ Psychometric testing of measure: Yes/<math>\alpha</math> reported only</li> <li>■ Rating: 3</li> </ul>
Duric et al., 2008 (Australia)	Patient and partner preferences and factors associated with motivation for treatment differed. Factors influencing judgments about the benefits needed to make adjuvant chemotherapy worthwhile can be conceptualized along 4 dimensions: lengthening life (main benefit); impairing QOL (main harm); demographic, social, and environmental; and attitudes.	<ul style="list-style-type: none"> <li>■ Cross-sectional</li> <li>■ 46 dyads of women who had completed adjuvant chemotherapy for breast cancer within 3–34 months and their partners (interviewed separately)</li> <li>■ Various adjuvant chemotherapies</li> </ul>	<ul style="list-style-type: none"> <li>■ Hypothetical questionnaire regarding adding time to a given life expectancy and another question about adding to the percentage chance of surviving a fixed length of time</li> <li>■ Psychometric testing of measure: No</li> <li>■ Rating: 1</li> </ul>
Fink et al., 2004 (United States)	Women with neutral or negative beliefs about the value of tamoxifen were more likely to discontinue tamoxifen therapy. Beliefs about the risks and benefits of tamoxifen were predictive of adherence.	<ul style="list-style-type: none"> <li>■ Longitudinal (data collection at 3, 6, 15, and 27 months after definitive surgery for breast cancer)</li> <li>■ 597 women who were diagnosed with breast cancer, were aged 65 years or older, had stage I–III cancer, and had no prior history of breast cancer or were simultaneously diagnosed with second primary breast cancer</li> <li>■ Tamoxifen</li> </ul>	<ul style="list-style-type: none"> <li>■ Perceptions of the risks and benefits of tamoxifen, measured by 11 questions. Responses ranged from very influential to not influential at all.</li> <li>■ Psychometric testing of measure: No</li> <li>■ Rating: 1</li> </ul>

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**TABLE 1. Review of the Literature About Medication and Treatment Beliefs (Continued)**

Study and Country	Findings	Design, Sample, and Treatment	Medication Belief Measure <sup>a</sup>
Grunfeld et al., 2005 (United Kingdom)	Self-reported nonadherent patients had significantly lower perceived necessity for tamoxifen compared to those who were adherent. Adherent patients expressed benefits of tamoxifen, including decreased risk of developing breast cancer and maintaining health.	<ul style="list-style-type: none"> <li>■ Cross-sectional</li> <li>■ 110 women in remission from primary breast cancer with no recurrence</li> <li>■ Tamoxifen</li> </ul>	<ul style="list-style-type: none"> <li>■ BMQ-General and -Specific in addition to two questions regarding the main benefits of taking tamoxifen and reasons for not taking tamoxifen</li> <li>■ Psychometric testing of measure: No</li> <li>■ Rating: 2</li> </ul>
Heisig et al., 2016 (Germany)	All measures were pretreatment, prior to endocrine therapy. Negative BMQ necessity-concern balance (more medication concerns than necessity beliefs) was associated with lower treatment efficacy expectations, lower adherence intention, lower cancer stage, no knowledge of the tumor's receptor status, higher somatosensory amplification, higher education, medication harmfulness beliefs, and negative pretreatment appraisal. Patients expressed concern that endocrine therapy disrupts life.	<ul style="list-style-type: none"> <li>■ Cross-sectional</li> <li>■ 166 women aged 18-80 years who were diagnosed with HR+ breast cancer with an indication for adjuvant endocrine therapy and who had surgery for breast cancer</li> <li>■ Various endocrine therapies</li> </ul>	<ul style="list-style-type: none"> <li>■ The BMQ-Specific and -General and a questionnaire used to assess side-effect expectations from the endocrine therapy</li> <li>■ Psychometric testing of measure: No</li> <li>■ Rating: 2</li> </ul>
Hirose et al., 2009 (Japan)	Patients with lung cancer were significantly more likely than individuals without cancer to accept intensive or less intensive chemotherapy or radiation therapy for a potentially small benefit for "chance of a cure" and "response but not a cure."	<ul style="list-style-type: none"> <li>■ Cross-sectional</li> <li>■ 193 patients (73 patients with non-small cell lung cancer who received chemotherapy and a control group of 120 patients without cancer)</li> <li>■ Hypothetical cancer treatments</li> </ul>	<ul style="list-style-type: none"> <li>■ A questionnaire was developed to describe an imaginary scenario. Patients were given 2 treatment options: 1 intensive regimen with high burden for chemotherapy and 1 less intensive, low-burden chemotherapy. Patients were asked to state the minimal benefit that would make hypothetical treatment acceptable.</li> <li>■ Psychometric testing of measure: No</li> <li>■ Rating: 1</li> </ul>
Iskandarsyah et al., 2014 (Indonesia)	Factors for nonadherence or delay in treatment included mistrust in Western treatment. Long duration of treatment led to psychological burden, worry about uncertain outcomes, and fear of death. Lack of information negatively affected adherence. The perception that cancer was incurable negatively affected seeking medical attention or treatment.	<ul style="list-style-type: none"> <li>■ Qualitative</li> <li>■ 50 patients who were diagnosed with breast cancer and were able to speak the Indonesian language; excluded if they had any psychiatric disorders</li> <li>■ Various treatments</li> </ul>	<ul style="list-style-type: none"> <li>■ Qualitative interviews, including questions regarding attitudes toward Western and traditional medicine in relation to cancer, perceived benefits and barriers to treatment</li> <li>■ Psychometric testing of measure: N/A</li> <li>■ Rating: 0</li> </ul>
Jansen et al., 2004 (Netherlands)	Benefits and toxicity of treatment, treatment experience, and having dependents were important determinants of patient preferences for adjuvant therapy. Cognitive or affective determinants may affect these preferences, but more research is needed.	<ul style="list-style-type: none"> <li>■ Literature review</li> <li>■ 23 studies published in English before December 1, 2003</li> <li>■ Various treatments</li> </ul>	<ul style="list-style-type: none"> <li>■ Various</li> <li>■ Psychometric testing of measure: NA</li> <li>■ Rating: N/A</li> </ul>

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**TABLE 1. Review of the Literature About Medication and Treatment Beliefs (Continued)**

Study and Country	Findings	Design, Sample, and Treatment	Medication Belief Measure <sup>a</sup>
Jansen et al., 2005 (Netherlands)	Patients who had been treated with adjuvant chemotherapy had a more positive attitude toward chemotherapy and were more likely to evaluate positive outcomes and provide higher treatment advantages, such as longer life prolongation, than those without treatment experience. Few differences were seen among the two groups regarding negative outcomes.	<ul style="list-style-type: none"> <li>■ Cross-sectional</li> <li>■ 446 patients who underwent breast surgery for early-stage breast cancer and who did not have distant metastasis at the time of enrollment</li> <li>■ Various adjuvant chemotherapies</li> </ul>	<ul style="list-style-type: none"> <li>■ A self-report questionnaire regarding 6 positive and 6 negative outcomes of treatment with adjuvant chemotherapy, with responses measured by a 5-point Likert-type scale ranging from definitely not to definitely</li> <li>■ Psychometric testing of measure: No</li> <li>■ Rating: 1</li> </ul>
Jonnalagadda et al., 2012 (United States)	Fatalistic beliefs potentially affecting treatment were common among minority groups (African American and Hispanic). More non-minority (not African American or Hispanic) patients believed that chemotherapy would have bad side effects, would weaken the body's ability to fight cancer, and would be worse than lung cancer itself.	<ul style="list-style-type: none"> <li>■ Cross-sectional</li> <li>■ 335 patients who were newly diagnosed with lung cancer (within the past year) and were able to speak Spanish or English</li> <li>■ Various treatments</li> </ul>	<ul style="list-style-type: none"> <li>■ A questionnaire adapted from the Illness Perception Questionnaire surveyed beliefs regarding lung cancer care. Questions focused on negative effects of chemotherapy and other treatments.</li> <li>■ Psychometric testing of measure: No</li> <li>■ Rating: 1</li> </ul>
Koedoot et al., 2003 (Netherlands)	Assessment of patients' preference for chemotherapy before consultation with the oncologist was the most strongly predictive factor of actual treatment preference and was strongly explained by striving for length of life (negatively associated with QOL). Patients tend to make decisions about starting or declining chemotherapy before consultation. Younger patients expressed a stronger preference for chemotherapy.	<ul style="list-style-type: none"> <li>■ Prospective</li> <li>■ 140 patients who had metastatic cancer, who were aged 18 years or older, who were able to speak Dutch, and for whom palliative treatment was an option</li> <li>■ Treatment was not yet initiated in this study.</li> </ul>	<ul style="list-style-type: none"> <li>■ Strength of and preference or nonpreference for chemotherapy on a 7-point Likert-type scale, with greater numbers indicating stronger preference for chemotherapy, and the QQ Questionnaire</li> <li>■ Psychometric testing of measure: Yes/<math>\alpha</math> reported only</li> <li>■ Rating: 3</li> </ul>
Lin et al., 2017 (NA)	Positive medication beliefs were associated with adherence to oral anti-cancer medication. Concern beliefs were associated with nonadherence.	<ul style="list-style-type: none"> <li>■ Systematic review</li> <li>■ 21 studies conducted in English that examined oral anticancer medications, assessed medication adherence, and addressed at least one psychosocial aspect of adherence</li> <li>■ Oral anticancer medications</li> </ul>	<ul style="list-style-type: none"> <li>■ Various</li> <li>■ Psychometric testing of measure: N/A</li> <li>■ Rating: N/A</li> </ul>
Llewellyn et al., 2006 (United Kingdom)	Patients with lower physical functioning had higher necessity scores. Medication concern beliefs and depression explained much of the variation (43%) in the global QOL and health scores. Results suggest that fewer medication concerns and lower levels of depression are associated with higher global QOL. Results reflect data that were collected prior to initiation of treatment.	<ul style="list-style-type: none"> <li>■ Cross-sectional study</li> <li>■ 55 patients with newly diagnosed squamous cell carcinoma of the head and neck</li> <li>■ Various treatments</li> </ul>	<ul style="list-style-type: none"> <li>■ BMQ-Specific</li> <li>■ Psychometric testing of measure: No</li> <li>■ Rating: 2</li> </ul>

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**TABLE 1. Review of the Literature About Medication and Treatment Beliefs (Continued)**

Study and Country	Findings	Design, Sample, and Treatment	Medication Belief Measure <sup>a</sup>
Llewellyn et al., 2007a (United Kingdom)	Pretreatment medication concerns were related to more maladaptive coping strategies compared to necessity beliefs. Higher levels of satisfaction with the type and timing of information were associated with stronger necessity of treatment ( $r = 0.28, p = 0.015$ ).	<ul style="list-style-type: none"> <li>■ Longitudinal, questionnaire-based</li> <li>■ 50 patients newly diagnosed with a first and histologically confirmed primary tumor of the head and neck</li> <li>■ Various treatments</li> </ul>	<ul style="list-style-type: none"> <li>■ BMQ-Specific</li> <li>■ Psychometric testing of measure: Yes/<math>\alpha</math> reported only</li> <li>■ Rating: 3</li> </ul>
Llewellyn et al., 2007b (United Kingdom)	Beliefs about treatment necessity were positively associated with active coping and use of emotional support; strong concerns were related to more positive reframing. More maladaptive coping styles were positively associated with more negative illness and treatment perceptions.	<ul style="list-style-type: none"> <li>■ Cross-sectional</li> <li>■ 82 patients with confirmed squamous cell carcinoma of the head and neck, newly diagnosed head and neck cancer primary tumor</li> <li>■ Various treatments</li> </ul>	<ul style="list-style-type: none"> <li>■ BMQ-Specific</li> <li>■ Psychometric Testing of Measure: Yes/<math>\alpha</math> reported only</li> <li>■ Rating: 3</li> </ul>
Moon et al., 2017 (N/A)	Patients with a greater number of prescriptions had greater necessity beliefs. A few included studies suggested that medication beliefs are associated with adherence; more research is needed to confirm this relationship.	<ul style="list-style-type: none"> <li>■ Systematic review</li> <li>■ 61 studies conducted in clinical practice involving women who were aged 18 years or older and had primary breast cancer</li> <li>■ Adjuvant hormone therapy</li> </ul>	<ul style="list-style-type: none"> <li>■ Various</li> <li>■ Psychometric testing of measure: N/A</li> <li>■ Rating: N/A</li> </ul>
Neugut et al., 2012 (United States)	Patients who reported difficulty making a chemotherapy decision, had strong negative beliefs about treatment or believed chemotherapy was not effective, or had weak positive beliefs about chemotherapy had strong expectations about adverse effects. Patients who had low quality of communication with physicians were less likely to initiate chemotherapy. Chemotherapy initiation was strongly associated with strong negative beliefs and weak positive beliefs about treatment efficacy.	<ul style="list-style-type: none"> <li>■ Prospective cohort study</li> <li>■ 1,020 women aged 20 years or older who were newly diagnosed with primary breast cancer (stage I-III)</li> <li>■ Various adjuvant chemotherapies</li> </ul>	<ul style="list-style-type: none"> <li>■ A questionnaire was developed to ask participants about negative or positive beliefs about chemotherapy and beliefs of family and friends about chemotherapy.</li> <li>■ Psychometric testing of measure: No</li> <li>■ Rating: 1</li> </ul>
Partridge et al., 2015 (United States)	Participants received standard chemotherapy in addition to placebo or an experimental treatment drug. Participants receiving placebo did not have greater perception of chance or fear of recurrence, feelings of being less informed, or lower confidence in their participation compared to those who received bevacizumab. Patients receiving bevacizumab perceived a significantly higher risk of having serious problems associated with the treatment ( $p = 0.01$ ).	<ul style="list-style-type: none"> <li>■ Prospective substudy of a double-blind clinical trial</li> <li>■ 492 patients with early breast cancer receiving placebo and bevacizumab</li> <li>■ Bevacizumab</li> </ul>	<ul style="list-style-type: none"> <li>■ Perceptions ranged on a 7-point Likert-type scale from almost 0 chance of a serious problem to almost certain of a serious problem from bevacizumab; assessed views on how informed patients felt about treatment and confidence in joining the trial on an 11-point scale ranging from “not informed/confident at all” to “extremely well informed/confident”</li> <li>■ Psychometric testing of measure: No</li> <li>■ Rating: 1</li> </ul>

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**TABLE 1. Review of the Literature About Medication and Treatment Beliefs (Continued)**

Study and Country	Findings	Design, Sample, and Treatment	Medication Belief Measure <sup>a</sup>
Pellegrini et al., 2010 (France)	Women struggled with their understanding and experience of tamoxifen. Reluctance to take tamoxifen was expressed because of increased risk of uterine cancer and fear of cancer related to hormonal treatments. Patients could not differentiate among treatment side effects, chemotherapy, premenopause, or HRT withdrawal as the cause of their symptoms.	<ul style="list-style-type: none"> <li>■ Qualitative</li> <li>■ 34 patients with breast cancer</li> <li>■ Adjuvant tamoxifen therapy</li> </ul>	<ul style="list-style-type: none"> <li>■ Qualitative interviews covered questions regarding onset and history of disease, women's experience of previous treatments, tamoxifen side effects, relationships with clinic staff, and understanding and expectations of tamoxifen treatment.</li> <li>■ Psychometric testing of measure: N/A</li> <li>■ Rating: 0</li> </ul>
Salgado et al., 2017 (United States)	Women aged 70 years or older tended to have lower BMQ necessity and concern beliefs. Concerns were higher among women with depression. Women experiencing side effects had greater concerns than those without symptoms. Women who previously stopped their aromatase inhibitor had greater concerns than those who had never had their medication interrupted. Those with greater cancer worry had high medication necessity and concern beliefs.	<ul style="list-style-type: none"> <li>■ Cross-sectional</li> <li>■ 224 women who were aged 50 years or older; diagnosed with HR+ stage I-III breast cancer; prescribed an aromatase inhibitor for 6-48 months; completed prior surgery, radiation therapy, or chemotherapy for breast cancer; and had no breast cancer recurrence</li> <li>■ Aromatase inhibitor</li> </ul>	<ul style="list-style-type: none"> <li>■ BMQ-Specific</li> <li>■ Psychometric testing of measure: No</li> <li>■ Rating: 2</li> </ul>
Saratsiotou et al., 2011 (Greece)	The most important factor associated with unintended nonadherence was belief regarding treatment effectiveness. Most participants liked oral chemotherapy because it gave them freedom, they felt less sick, and they avoided frequent doctor visits. The few who reported not liking oral chemotherapy reported side effects.	<ul style="list-style-type: none"> <li>■ Prospective, observational study</li> <li>■ 99 patients with cancer</li> <li>■ Various oral chemotherapies</li> </ul>	<ul style="list-style-type: none"> <li>■ Questionnaire assessing patient beliefs about the effectiveness of oral chemotherapy (will improve health, cure, prolong life, improve symptoms)</li> <li>■ Psychometric testing of measure: No</li> <li>■ Rating: 1</li> </ul>
Stiggelbout et al., 1996 (Netherlands)	A scale determined preferences and attitudes by weighing benefits and side effects of treatment and the trade-off of QOL and length of life. Younger patients and those with children placed more importance on longer survival while accepting decreased QOL.	<ul style="list-style-type: none"> <li>■ Cross-sectional</li> <li>■ 211 patients with testicular, colorectal, or breast cancer and those receiving radiation therapy for a variety of malignancies</li> <li>■ Various treatments</li> </ul>	<ul style="list-style-type: none"> <li>■ QQ Questionnaire</li> <li>■ Psychometric testing of measure: Yes/<math>\alpha</math> and PCA reported</li> <li>■ Rating: 4</li> </ul>
Tariman et al., 2012 (N/A)	Beliefs about treatment outcomes influence decisions. Older adults based decisions on burden, outcomes, and likelihood of adverse effects. QOL is seen as more important than length of life. Previous experience and familiarity with treatment options also influenced choice. The impact of treatment on caregivers ranked as an important influence.	<ul style="list-style-type: none"> <li>■ Literature review</li> <li>■ 80 articles published in English in PubMed, PsycINFO, and CINAHL<sup>®</sup> that included patients aged 65 years or older</li> <li>■ Various treatments</li> </ul>	<ul style="list-style-type: none"> <li>■ Various, not all measures specified</li> <li>■ Psychometric testing of measure: N/A</li> <li>■ Rating: N/A</li> </ul>

*Continued on the next page*

**TABLE 1. Review of the Literature About Medication and Treatment Beliefs (Continued)**

Study and Country	Findings	Design, Sample, and Treatment	Medication Belief Measure <sup>a</sup>
Thuné-Boyle et al., 2006 (United Kingdom)	Patients tend to make more causal attributions of their symptoms to treatment rather than to illness, and, on average, chemotherapy was seen as effective in curing illness. Relative attributions to illness or treatment were positively correlated with the number of symptom attributions to illness ( $r = 0.748$ , $p < 0.01$ ) and negatively correlated with the number of symptom attributions to treatment ( $r = -0.55$ , $p < 0.01$ ).	<ul style="list-style-type: none"> <li>■ Cross-sectional</li> <li>■ 72 patients aged 18 years or older who had at least 3 treatments to get a better feeling of beliefs about treatment and who were beyond shock of diagnosis with no brain metastasis or IV chemotherapies</li> <li>■ Various treatments</li> </ul>	<ul style="list-style-type: none"> <li>■ Adapted an illness perception questionnaire to focus on effectiveness and consequences of treatment; items were scored on a 5-point Likert-type scale ranging from strongly agree to strongly disagree. Symptoms were assessed as being caused by cancer, treatment, or both.</li> <li>■ Psychometric testing of measure: Yes/<math>\alpha</math> reported only</li> <li>■ Rating: 1</li> </ul>
Voogt et al., 2005 (Netherlands)	Patients' attitudes toward treatment were divided into three categories: striving for QOL, striving for length of life, and no clear preference. Younger patients preferred prolonging life, whereas older patients, more tired patients, and patients who had less positive feelings were more inclined to strive for QOL. No differences in attitudes toward treatment were found between sex, having children, education, religious beliefs, and type of cancer.	<ul style="list-style-type: none"> <li>■ Longitudinal, questionnaire-based</li> <li>■ 122 patients diagnosed with incurable cancer within the past 2 months; cancers included breast, ovarian, colorectal, lung, or prostate.</li> <li>■ Various treatments</li> </ul>	<ul style="list-style-type: none"> <li>■ QQ Questionnaire; patients' initiatives to anticipate medical decision making at end of life were addressed, balancing quantity of life versus QOL.</li> <li>■ Psychometric testing of measure: Yes/PCA reported</li> <li>■ Rating: 4</li> </ul>

<sup>a</sup> Articles were given a rating of 0–4 to indicate rigor of medication beliefs measurements. Higher numbers indicate stronger methodologic measurement. Literature and systematic reviews were not rated because they synthesized other studies and did not use their own medication beliefs measure.

BMQ—Beliefs About Medicines Questionnaire; HR+—hormone-receptor-positive; HRT—hormone replacement therapy; N/A—not applicable; PCA—principal component analysis; QOL—quality of life; QQ Questionnaire—Quality Quantity Questionnaire

**Note.** Some studies were not specific to one cancer medication or treatment or included combined therapies.

Three literature reviews, two systematic reviews, and eight longitudinal studies also were included.

All study participants were aged 18 years or older. Several types of cancer were represented (chronic myeloid leukemia and breast, ovarian, testicular, colorectal, prostate, lung, and head and neck cancer). Some studies concentrated on specific cancer types, and others examined medication and treatment beliefs among patients with various cancer types. Breast cancer represented the most frequent type of cancer. Cancer medications consisted mostly of oral adjuvant chemotherapies and endocrine therapies. Other cancer medications included various IV chemotherapies and oral targeted agents (see Table 1).

### Settings

Study participants were mainly recruited from outpatient and hospital-based oncology clinics. Studies

spanned across several countries (the United States, the United Kingdom, Taiwan, Japan, New Zealand, Indonesia, France, Australia, the Netherlands, Israel, and Greece). Most studies were conducted in the United States (10 studies) and the United Kingdom (7 studies).

### Medication Beliefs Measures

Only two measures of medication and treatment beliefs were consistent: the BMQ and the Quality Quantity Questionnaire (QQ Questionnaire).

The BMQ—Specific focuses on beliefs about medication that are prescribed for a specific illness, as opposed to medication in general, and is comprised of two subscales. The necessity subscale evaluates whether patients perceive that their medication is needed to treat their illness, and the concern subscale evaluates possible distrust in medications (Horne et al., 1999).

The QQ Questionnaire is specific to people with cancer and measures perceptions regarding the benefit of treatment against the risks or side effects of cancer treatment (Stiggelbout, De Haes, Kiebert, Kievit, & Leer, 1996). Specifically, the QQ Questionnaire measures how perceptions of cancer medication guide a balance between an individual's quality of life (QOL) versus length (quantity) of life (Stiggelbout et al., 1996).

Additional questionnaires have been developed to evaluate perceptions of cancer treatments (Balmer, Thomas, & Osborne, 2001; Bickell, Weidmann, Fei, Lin, & Leventhal, 2009; Partridge et al., 2015; Thuné-Boyle, Myers, & Newman, 2006). For example, Thuné-Boyle et al. (2006) developed a questionnaire evaluating beliefs involving the effectiveness of cancer treatment and whether patients perceived symptoms to be a result of their cancer, the cancer treatment, or both.

Some research studies used qualitative interviews to elicit cancer medication and treatment beliefs that represented perceived benefits, barriers, or risks associated with cancer treatment (Iskandarsyah et al., 2014). Qualitative research used broad questions regarding positive and negative aspects of cancer treatment (Bond, Hirota, Fortin, & Col, 2002).

### Factors Associated With Medication Beliefs

**Benefit versus risk:** Medication-taking behavior can be influenced by a benefit–risk analysis in which patients weigh the benefits of medication against the risks associated with medication, such as adverse symptoms (Banning, 2012; Bickell et al., 2009). For example, individuals with breast cancer participating in a focus group revealed that they weighed the risk of breast cancer recurrence with concerns, such as osteoporosis and loss of youthfulness, when making decisions about initiating hormone replacement therapy (Bond et al., 2002). In another study, continued adherence was reported among individuals with breast cancer who felt that benefits of tamoxifen therapy (selective estrogen receptor modulator hormonal therapy) outweighed risks, underscoring the link between a patient's medication beliefs and oral adherence (Fink, Gurwitz, Rakowski, Guadagnoli, & Silliman, 2004).

Patients with life-threatening illnesses, such as advanced cancer, may weigh benefits and risks differently than those with lower-stage cancers. Several studies reported that patients were willing to accept treatment that had high risk for symptoms and side effects with very little gain of life expectancy or improvement of prognosis (Balmer et al., 2001;

Hirose et al., 2009; Stiggelbout et al., 1996); perhaps this was because they had no other options for maintaining current health. Balmer et al. (2001) found that patients choosing second-line chemotherapy were accepting of treatment involving toxicities and social disruption, even if it meant only gaining one to two months of survival time. Although it can only be speculated, patients who have experienced failed cancer treatment in the past may have lower expectations that cancer treatment will be effective and already understand the symptoms and side effects of treatments; therefore, they are willing to accept higher risk and lower benefit (Balmer et al., 2001). Alternately, once patients have failed to respond to one cancer treatment, they may believe a treatment that produces more symptoms and side effects is more effective to treat cancer and may be willing to suffer the negative consequences of treatment even if the benefit is unknown or low (Balmer et al., 2001).

In contrast, although some treatments, such as adjuvant endocrine therapy and tamoxifen, have shown the benefit of increased cancer-free survival in individuals with breast cancer, many do not adhere to their medication for the time prescribed, perhaps because of symptoms (Arriola et al., 2014; Pellegrini et al., 2010). Patients who weigh risks of treatment more heavily than benefits may decide not to initiate or adhere to treatment (Horne et al., 1999). Other studies have reported that individuals with cancer are more likely to discontinue treatment or report lower adherence intention if they had a negative decisional balance (higher risk than benefit) than those with positive decisional balance (higher benefit than risk) on the BMQ (Fink et al., 2004; Gatti, Jacobson, Gazmararian, Schmotzer, & Kripalani, 2009; Heisig et al., 2016; Moon, Moss-Morris, Hunter, Carlisle, & Hughes, 2017).

Misunderstanding the benefits and risks of treatment is critical because this analysis can negatively affect medication beliefs, initiation, or adherence to the cancer medication (Bickell et al., 2009; Bond et al., 2002). Beliefs about cancer medication and treatment outcomes can affect the treatment decisions of individuals with cancer (Tariman, Berry, Cochrane, Doorenbos, & Schepp, 2012). Providing patients with information they can understand assists them in the benefit–risk analysis of cancer treatment.

**Adherence:** Saratsiotou et al. (2011) reported that patients' OCM beliefs were the most important factor associated with medication adherence, demonstrating that those with lower beliefs that the medication could treat the illness reported lower adherence, and those with greater beliefs in medication effectiveness

reported higher adherence. Arriola et al. (2014) reported that higher BMQ necessity and lower concern beliefs were associated with medication adherence among individuals with breast cancer receiving adjuvant endocrine therapy. Individuals with breast cancer who felt that the benefits of tamoxifen therapy outweighed the risks had continued tamoxifen adherence, and those with either neutral or negative medication beliefs were more likely to stop tamoxifen (Fink et al., 2004; Grunfeld, Hunter, Sikka, & Mittal, 2005). Overall, patients with more positive medication perceptions are more likely to initiate and continue their cancer treatment compared to those with less positive medication perceptions (Banning, 2012; Neugut et al., 2012).

**Symptoms and side effects:** The number and type of symptoms and side effects from cancer or cancer treatment can vary across cancer and medication types (Thuné-Boyle et al., 2006). Symptoms are important to explore because they can lead to non-adherence or discontinuation of cancer treatment and decreased QOL (Corter, Findlay, Broom, Porter, & Petrie, 2013; Thuné-Boyle et al., 2006). A symptom is an experience of subjective disturbance, whereas a side effect is an undesirable result of a medication or treatment that also could present in the form of a symptom. Symptoms and side effects may be used to weigh whether patients adhere to cancer treatment because they may believe their symptoms outweigh the benefit of taking medication (Bender et al., 2014; Bhattacharya, Easthall, Willoughby, Small, & Watson, 2012; Gatti et al., 2009; Iskandarsyah et al., 2014). Patients experiencing side effects with cancer medication report higher concerns compared to those with no side effects (Salgado et al., 2017).

Cancer medication treatments are unique in that they often result in more symptoms than the illness itself (Thuné-Boyle et al., 2006), leaving individuals with cancer susceptible to negative cancer medication beliefs. Patients with chronic myeloid leukemia (CML) receiving imatinib noted side effects as the main concern of cancer treatment (Chen, Chen, Huang, & Chang, 2014). Patients may begin to weigh the risk of severe symptoms and side effects with the benefit of cancer treatment to slow disease progression or prolong survival (Jansen et al., 2005). Individuals with cancer may find it difficult to take a medication that makes them feel worse than before they began taking medication (Horne, 2003). Partridge et al. (2015) reported that individuals with breast cancer who were told they were randomized to receive bevacizumab versus a placebo (in addition to standard treatment) perceived a significantly higher

risk of having a serious problem caused by the cancer treatment, indicating negative medication expectancies based on potential misconceptions surrounding the medication.

Research indicates that symptom experience may vary among individuals taking the same cancer medication, implying that nonpharmacologic factors influence symptoms (Thuné-Boyle et al., 2006). In addition, medication beliefs may affect the way patients experience symptoms (Corter et al., 2013) by biasing internal (somatic sensation) or external (physician counseling) information. This phenomenon has not been well explored for patients receiving cancer medications. For example, patients who have endured symptoms as a result of prior cancer treatments or other chronic conditions may develop negative medication beliefs or anticipate symptoms as a result of past medication experiences (Barsky, Saintfort, Rogers, & Borus, 2002; Heller, Chapman, & Horne, 2015). Patients with these negative medication experiences may be biased to focus attention on bodily sensations that they assume are from the medication or may bias information they receive regarding their cancer medication, while consciously or unconsciously blocking out positive aspects of medication.

In contrast, patients who have compromised physical functioning from symptoms of their cancer may perceive a greater need for their cancer medication (Llewellyn, McGurk, & Weinman, 2006). In addition, patients with symptoms of the cancer itself may have relief once starting treatment. One study revealed that patients with CML were satisfied with the way imatinib relieved disease-related fatigue and allowed them to resume normal activities of daily living (Chen et al., 2014). However, patients also may perceive symptoms as further disease progression, which can negatively affect perceived medication efficacy (Chen et al., 2014). Symptoms and side effects can play a dynamic role in the way illness representations are formed and medications are perceived.

**Patient-provider relationship:** The patient-provider relationship can influence medication perceptions. Arriola et al. (2014) found that more frequent physician communication was associated with greater cancer medication necessity beliefs among individuals with breast cancer. However, Iskandarsyah et al. (2014) reported that patients may feel inferior to physicians and do not question the cancer treatment plan out of respect or to avoid conflict. Others place trust in and rely on physicians who are trained in cancer care to make treatment decisions (Carrion, Nedjat-Haiem, & Marquez, 2013). A study of individuals with breast

cancer noted that the healthcare provider's recommendation about hormone replacement therapy was important and even swayed their treatment decisions, despite previously held beliefs about medication (Bond et al., 2002), which indicates that medication beliefs can be influenced by providers.

**Previous experiences:** Medication beliefs can be influenced by prior experiences with health, illness, and medications (Iskandarsyah et al., 2014). One study of individuals with breast cancer described women developing fatalistic beliefs of cancer based on the experiences of their family or friends (Iskandarsyah et al., 2014). Some studies have shown that prior exposure to chemotherapy influences a patient's perceptions of treatment (Jansen et al., 2005; Jansen, Otten, & Stiggelbout, 2004). For example, patients who have gone through infusion chemotherapy tend to be more favorable toward treatment than those who have never had chemotherapy (Jansen et al., 2005). Bickell et al. (2009) found that women with breast cancer who were untreated were less likely to know the benefits of adjuvant treatment and had more negative treatment beliefs compared to patients who had been treated previously. Having experience with cancer also may give patients a more realistic, positive perception of cancer or its treatment (Del Castillo, Godoy-Izquierdo, Vásquez, & Godoy, 2011). Cognitive reappraisals of cancer and cancer treatment may lead to more positive cancer medication beliefs (Jansen et al., 2005) after symptoms of cancer are relieved or disease progression is slowed as a result of cancer medication.

In contrast, those with negative experiences of cancer, such as seeing a loved one suffer or experiencing a medication interruption themselves, may have more negative cancer medication perceptions (Del Castillo et al., 2011). Patients taking aromatase inhibitors (AIs) who had to stop treatment with another AI reported higher medication concern beliefs compared to those who had never experienced a stoppage (Salgado et al., 2017). Previous experiences with health, illness, and medication are individualized and should be reviewed with patients prior to initiation of treatment to clarify misconceptions about cancer medication and to promote positive medication beliefs.

**Cancer treatment context:** When examining medication beliefs, the context or intended goal of cancer treatment is important to consider. Patients with various cancer stages and prognoses may view cancer medications differently. One treatment may be curative, and the other may be palliative; this

can shape different expectations and perceptions of cancer treatment. For example, Heisig et al. (2016) reported that a lower stage of cancer was associated with greater medication concern compared to medication necessity beliefs. Chen et al. (2013) found that 64% of 384 patients diagnosed with incurable lung cancer had an unrealistic belief that radiation therapy would treat their cancer or extend life expectancy, and they revealed that 92% of these patients were significantly more likely to hold the same inaccurate beliefs about chemotherapy. These results indicate a gap in patients' understanding of their prognosis and various treatment options (Chen et al., 2013). Medication beliefs are intertwined with an individual's illness representations. Patients must understand their cancer diagnosis and prognosis; otherwise, medication beliefs can develop based on misconceptions.

For patients with metastatic cancer, treatment choices can be supported by a patient's medication beliefs (Koedoot et al., 2003). By examining beliefs about continuing treatment despite challenges of side effects, poor QOL, and the possibility that cancer treatment would be ineffective in treating the cancer, one study reported that life-prolonging treatment was more frequently sought over comfort if survival was predicted to be more than six months (Stiggelbout et al., 1996). Another study revealed that individuals newly diagnosed with cancer were more likely to prefer life-prolonging treatment than those who had experienced cancer longer, which may indicate a change in treatment beliefs across the cancer treatment trajectory (Balmer et al., 2001; Voogt et al., 2005). However, Voogt et al. (2005) reported that patients diagnosed with fatal cancer (less than six-month life expectancy) expressed a decline in striving for length of life with prolonged treatment, and QOL tended to be more important as imminent death was near. Findings suggest that a patient's medication beliefs can change over time, underscoring the importance of assessing medication beliefs more than once (Voogt et al., 2005). However, research examining how medication beliefs change over time and factors influencing these changes is limited.

**Fear of recurrence:** Fear of cancer recurrence can affect how patients perceive their treatment. Bond et al. (2002) noted that cancer treatment beliefs are not a straightforward cognitive process but rather are influenced by emotions, such as fear (Bond et al., 2002). Two studies reported that greater fear of recurrence was associated with higher medication concern beliefs and higher medication necessity beliefs (Corter et al., 2013; Salgado et al., 2017). Corter et al. (2013)



indicated that individuals with breast cancer taking adjuvant endocrine therapy may weigh the belief that they need the medication to protect them from cancer recurrence with the concern that the medication may not treat their cancer. The preceding statement is difficult to understand, given that the BMQ was used to elicit medication beliefs and that the concerns subscale measures distrust in medications, not treatment efficacy. Barak, Ostrowsky, and Kreitler (2012) described patients placing preventing cancer recurrence in the future as a main goal of adjuvant therapy, perhaps indicating that the fear of recurrence may motivate them to adhere to the treatment and increase medication necessity beliefs. Fear of recurrence appears to have positive and negative effects on patients' cancer medication beliefs, possibly because fear of recurrence can motivate patients to take their medication based on necessity or symptoms associated with cancer, or because symptoms or side effects caused by the medication can be interpreted as recurring disease.

**Information and education:** Information regarding medication or treatment options can activate medication beliefs by way of cognitive processing. Information is essential to facilitating patient understanding of the disease process and treatment because it allows patients to weigh the benefits and risks of treatment options or no treatment (Barak et al., 2012; Bickell et al., 2009). Without proper knowledge regarding disease and treatment options, patients may develop beliefs based on misconceptions, which can negatively affect patient outcomes (Chen et al., 2013).

Some patients may have unrealistic or inaccurate beliefs about their cancer prognosis with treatment (Chen et al., 2013). Those with misconceptions about the disease progression itself may not trust that cancer medication can result in remission (Chen et al., 2014). Satisfaction with the type and timing of information was associated with stronger medication necessity beliefs among individuals with head and neck cancer (Llewellyn, McGurk, & Weinman, 2007a). In contrast, Bhattacharya et al. (2012) found no association between patients' medication necessity beliefs and satisfaction with the information about medication.

Bhattacharya et al. (2012) noted that patients taking capecitabine expressed gaps in knowledge regarding when the medication would take effect and how they could know whether the treatment was working. Patients may rely on diagnostic testing, such as computerized tomography scans or laboratory testing, for confirmation of the medication's efficacy.

For patients with CML, a rapid drop in white blood cell counts below the normal range post-treatment resulted in the belief that imatinib was efficacious to control cancer (Chen et al., 2014).

Some patients may think their cancer is incurable (Iskandarsyah et al., 2014) or that long-term OCM use could cause resistance to the medication (Chen et al., 2014); these thoughts also can affect medication beliefs. Cancer medication often does not show immediate improvement in health, unlike medications for other chronic illnesses. Education is essential at treatment initiation to explain medication expectations and the plan for testing throughout the cancer trajectory. Oncology professionals must clarify medication misconceptions to form and support favorable medication beliefs.

**Coping and depression:** Coping among individuals with cancer is associated with medication beliefs. In a study of individuals with head and neck cancer, baseline BMQ concerns were significantly positively associated with positive and negative coping strategies, such as self-distraction, venting, planning, denial, substance use, use of instrumental support, and behavioral disengagement one month after treatment for head and neck cancer (Llewellyn et al., 2007a). Baseline BMQ necessity was significantly positively associated with active coping, positive reframing, substance use, and planning (Llewellyn et al., 2007a); however, these associations declined during a six- to eight-month period after treatment (Llewellyn et al., 2007a). Similar results have been reported (Llewellyn, McGurk & Weinman, 2007b). Findings imply that more positive medication beliefs are associated with more adaptive coping, and medication concerns are linked to more maladaptive coping strategies. Only one study linked depression to cancer medication beliefs, associating self-reported depression with higher medication concern beliefs compared to those with no depression (Salgado et al., 2017).

**Demographic factors:** Reporting of sociocultural factors that can influence cancer medication beliefs is inconsistent (Bickell et al., 2009; Chen et al., 2013; Jonnalagadda et al., 2012; Nedjat-Haiem, Lorenz, Ell, Hamilton, & Palinkas, 2012). Voogt et al. (2005) reported that cancer treatment beliefs did not differ among sex, education, or cancer type. In addition, Bickell et al. (2009) observed that older age and presence of comorbidities accounted for lower use of adjuvant therapies, indicating that patients who have prior experience with illness and who are older may develop more medication concerns. Bond et al. (2002) found that younger women expressed more



concern about their survival and QOL, whereas older women worried more about comorbid conditions other than cancer. Salgado et al. (2017) reported that women aged older than 70 years had lower medication necessity and concern beliefs compared to those aged younger than 70 years. The relationship between medication beliefs and patient sociodemographic factors remains inconclusive.

## Discussion

Medication beliefs among individuals with cancer are multifaceted and are encompassed within a larger context of cancer illness representation. Understanding medication beliefs among individuals with cancer is in its infancy stage, and more rigorous measures are needed in research studies to elicit such beliefs. The BMQ provides a way to quantify medication beliefs among individuals with cancer, but studies fail to perform factor analysis to determine if the original underlying constructs hold in this population. The BMQ allows for statistically associating factors with medication beliefs and is a viable option for eliciting medication beliefs among individuals with cancer.

Another measure that most commonly quantified medication beliefs among individuals with cancer was the QQ Questionnaire. Use of this questionnaire in cancer research permits the awareness of possible differences in cancer treatment preferences among younger and older patients, with younger patients striving for quantity of life and older patients striving for QOL. More research using the BMQ and QQ Questionnaire is needed, particularly regarding examining medication beliefs among patients receiving OCM and in longitudinal studies across the cancer treatment trajectory. Research involving established instruments can inform interventions that can improve positive medication beliefs and decrease medication concerns to maintain adherence among patients who manage their cancer medication in the home environment.

Information is essential for patients to fully understand their illness and medication and treatment options (Barak et al., 2012; Pellegrini et al., 2010). The interplay between medication beliefs and symptoms needs further investigation, because negative medication expectancies can affect the way in which symptoms are experienced (Faasse & Petrie, 2013; Thuné-Boyle et al., 2006). Symptoms also play a large role in the benefit–risk analysis when making decisions about initiating or continuing cancer medication or treatment (Bickell et al., 2009). Cancer symptoms can increase patients' perceptions that

medication is needed to treat their illness, whereas symptoms experienced after initiation of cancer medication can negatively affect medication perceptions. Demographic variables associated with medication beliefs are inconclusive. Understanding medication beliefs among individuals with cancer may lead to important key factors affecting symptom management and adherence to cancer medication. As more OCMs are being offered and patients are required to self-manage complex regimens and symptoms in the home environment, medication beliefs may be a crucial factor associated with patient outcomes.

Overall, studies have presented a variety of factors associated with medication beliefs among patients receiving cancer treatment, including benefit–risk analysis; adherence; symptoms and side effects; patient–provider relationships; prior exposure to health, illness, and medications; cancer treatment characteristics; fear of recurrence; information regarding the diagnosis or cancer treatment; coping; and demographics. Despite the increased use of oral oncolytic agents, these medications were not well represented in the review. However, cancer medication, regardless of type or drug classification, appears to be associated with similar factors. More systematic reviews are focusing on medication beliefs specific to oral adherence (Lin, Clark, Tu, Bosworth, & Zullig, 2017; Moon et al., 2017). Research is slowly beginning to evaluate more factors that could be associated with medication beliefs beyond adherence. For example, research surrounding medication beliefs involves studies that explore negative medication expectancies and their role in the development of medication beliefs (Faasse & Petrie, 2013; Heller et al., 2015), the examination of medication beliefs and their link to the cancer-related symptom experience (Corter et al., 2013), depression (Salgado et al., 2017), and the importance of patient education in the formulation of cancer medication beliefs (Chen et al., 2013; Llewellyn et al., 2007a).

## Limitations

The current integrative review has limitations. Some studies assessed medication perceptions among individuals with cancer before initiating treatment, and others had been exposed to treatment, making comparing results difficult. Perceptions about cancer treatment were measured by various means, often using newly developed questionnaires, making comparing studies challenging. Factor analysis was lacking for articles using the BMQ to measure medication beliefs in the cancer population, which was not represented during

the original psychometric testing of the scale (Horne et al., 1999); the original psychometric evaluation of the BMQ revealed that only 3 of 524 patients had a cancer diagnosis. Some studies used newly developed questionnaires that failed to report reliability and validity testing. Other studies combined the use of chemotherapy with other cancer treatment, such as radiation therapy or surgery, making differentiating results problematic. In addition, some studies were based on hypothetical scenarios in which individuals with cancer were questioned about treatment choices based on imaginary situations involving chemotherapy rather than actual experiences (Hirose et al., 2009). Targeted oral oncolytic agents were not well represented, perhaps because of the rise in use of these medications or the assumption by oncology professionals that patients receiving OCMs are mostly adherent.

### Implications for Nursing Practice

Nurses are positioned to elicit cancer medication beliefs. Reliable and valid measurements, such as the BMQ, can be used to help elicit such beliefs in the clinical setting (Horne et al., 1999). The OCM trend is increasing (Moseley & Nystrom, 2009), and nurses must be aware of factors influencing medication beliefs and clarify misconceptions to promote facilitative medication beliefs. Medication beliefs can change over time and should be addressed regularly, particularly when changes in a patient's prognosis, treatment plan, or assessment of symptoms are noted. Nurses should be aware that medication beliefs can influence medication-taking behavior and are closely linked with adherence (Arriola et al., 2014; Lin et al., 2017; Moon et al., 2017; Saratsiotou et al., 2011). Depression also should be carefully evaluated because it can negatively affect medication beliefs and heighten concern for taking cancer medication (Salgado et al., 2017). Nurses are at the forefront of patient education and can provide trusted oncology resources regarding a patient's cancer treatment. Patient education is critical in the development of medication beliefs and can help patients weigh the benefits and risks of cancer treatment (Barak et al., 2012; Bickell et al., 2009).

### Conclusion

Additional research is needed to better understand how medication beliefs may lead to an exacerbated symptom experience, via negative medication expectancies, and to test interventions that can improve medication beliefs, specifically targeting patients starting a new treatment regimen. Research using

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### KNOWLEDGE TRANSLATION

- Patients' medication beliefs are multifaceted and influenced by many factors, including the symptom experience; patient-provider relationships; previous experiences with health, illness, and medications; the context of cancer treatment; fear of recurrence; emotional well-being; and patient information and education.
  - Medication beliefs can influence decisions to initiate or continue cancer medication; they can change over time and should be assessed regularly to ensure that educational needs are met and misconceptions regarding medication are clarified.
  - Oncology nurses can intervene to address patient concerns surrounding cancer medication and enhance facilitative medication beliefs.
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reliable and valid measurement tools to elicit medication beliefs among individuals with cancer is needed. Factor analysis on reliable and valid tools, such as the BMQ, is needed to determine if latent factors underlying medication beliefs among individuals with cancer differ from other chronic illnesses. More research specific to OCM beliefs is needed as well.

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## QUESTION GUIDE FOR A JOURNAL CLUB

Journal clubs can help to increase and translate findings to clinical practice, education, administration, and research. Use the following questions to start discussion at your next journal club meeting. Then, take time to recap the discussion and make plans to proceed with suggested strategies.

1. The Quality Quantity Questionnaire discussed in this article measures patient beliefs about necessity for and concern about medication. How can these concepts be used in the clinical setting?
2. This review did not include any findings related to the effects of culture on adherence to oral medication. What do you know about this, and how do you think that culture affects adherence?
3. No mention was made of costs associated with these medications. Given the recent emphasis on the financial toxicities of treatment, how might cost affect adherence?
4. How do you encompass patient beliefs about medication in your teaching?

Visit <http://bit.ly/1vUqbVj> for details on creating and participating in a journal club. Contact [pubONF@ons.org](mailto:pubONF@ons.org) for assistance or feedback. Photocopying of the article for discussion purposes is permitted.

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