

CANCER CAREGIVER BURDEN IN A NURSE-DESIGNED HOME-BASED SYMPTOM
MANAGEMENT INTERVENTION TRIAL

By

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ABSTRACT

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The often overwhelming and unpredictable roles associated with cancer caregiving puts caregivers at risk for physical and psychological health problems. Utilizing secondary analysis, the purpose of this dissertation was to gain insight into cancer caregiver burden, especially when caregivers are engaged in the provision of specific symptom management interventions in addition to basic care. Particular attention was focused on caregivers of patients who did not respond to symptom management interventions in a 12-week trial (1R01 CA193706). This dissertation was conceptually guided by the Organizing Framework for Caregiver Intervention Model. Over the 12 weeks of the parent trial, there were two randomization points depending on the patient's response to the symptom of fatigue. First, all patients and caregivers (dyads) were randomized to four weeks of either reflexology or meditative practices. Patients who did not report decreased fatigue during the first four weeks (Phase I) of the study were referred to as non-responders. Non-responders were then re-randomized to four additional weeks (Phase II) of either the same therapy or the addition of the second therapy.

This dissertation used a three-manuscript format. Manuscript one was a literature review of caregiver burden. Manuscript two was a secondary analysis examining associations between perceived baseline burden and caregiver socio-demographic characteristics, comorbid conditions, anxiety, and depression among caregivers who agreed to provide symptom management intervention for their cancer patients. A total of 349 cancer caregivers completed the baseline interview. The majority of caregivers (58%) were female, 61% were spouses/partners, and 73%

resided with the patient. Being female, Asian, a spouse, employed, and having higher depression and anxiety were all significantly associated with lower self-esteem, higher schedule and higher health burden (12%-24% of explained variance in the multivariable models). Depression and anxiety were significant factors contributing to a greater lack of family support and higher financial burden, with 13%-18% of explained variance.

Manuscript three was a secondary analysis from the same parent study that evaluated the level of perceived burden among caregivers who delivered one or two symptom management interventions to patients who were non-responders during Phase I of the parent trial. This manuscript included a subset of caregivers (n= 89) at the end of the 12-week parent study. Multivariable general linear modeling was used to assess the difference in caregiver burden. Two separate analyses were conducted for caregivers who: 1) began the study providing reflexology; and 2) began the study providing meditative practices. The results demonstrated a significantly lower level of caregiver burden at week 12 in the areas of lack of family support, schedule burden, and health burden among caregivers of non-responders who delivered meditative practice alone over 8 weeks, compared to caregivers who added reflexology during weeks 5-8. Whereas, there were no group differences in caregiver burden at week 12 were found between the two groups of caregivers of non-responders who were initially randomized to reflexology. Caregivers who were initially randomized to reflexology reported greater schedule burden if they were employed versus unemployed at week 12.

The results from these manuscripts advance science by demonstrating the predictive variables for caregiver burden in cancer caregivers before and after providing a nurse-designed symptom management intervention to patients. Caregiver burden assessment may help reduce the caregivers' risk of becoming hidden patients in the healthcare system.

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This dissertation is dedicated to my parents and grandparents,
who make me live in the best way, love, forgive, and offer the best who you were.
“I am as I am because of you all”

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KEY TO ABBREVIATIONS

ACS:	American Cancer Society
ADLs:	Activities of Daily Living
CRAT:	Caregiver Reaction Assessment Tool
CTs:	Complementary Therapy
GLM	General Linear Model
IADLs:	Instrumental Activities of Daily Living
NAC:	National Alliance for Caregiving
PRISMA:	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
RA:	Research Aim
Ref:	Reference
SD:	Standard Deviation
SE:	Standard Error
SMART:	Sequential Multiple Assignment Randomized Trials
U.S.:	United States of America

CHAPTER 1

INTRODUCTION

An estimated 44 million caregivers in the United States (U.S.) provide unpaid care to friends or family members living with a chronic condition or serious medical illness (National Alliance for Caregiving, 2018). There are approximately three million people providing unpaid care for cancer patients at home (National Alliance for Caregiving, 2018). According to the American Cancer Society (ACS), 1.8 million new cancer cases are expected to be reported for 2020, and the total number of people diagnosed with cancer will increase to 20.3 million by 2026 (ACS, 2020). These cancer statistics illustrate the growing number of cancer patients in need of home-based care. Due to technological advances and current healthcare system trends, cancer treatments are increasingly being implemented in home settings, and friend or family members are providing cancer care in addition to assisting with basic activities of daily living (ADLs) (Given, Given, & Kozachik, 2001; Wyatt et al., 2017; Wyatt, Sikorskii, & Victorson, 2012). Home-based caregivers are defined as friends or family members who take responsibility for providing unpaid care for cancer patients (Applebaum & Breitbart, 2013; Northouse, Katapodi, Song, Zhang, & Mood, 2010).

Caring for cancer patients can have both positive and negative effects on caregivers (Bevans & Sternberg, 2012; Esra, Sibel Asi, Zeynep, & Mine, 2017; Frambes, Given, Lehto, Wyatt, & Sikorskii, 2017; Palos et al., 2012). A study by Girgis and colleagues reported that caregivers had high levels of satisfaction in their cancer caregiving role (Girgis, Lambert, Johnson, Waller, & Currow, 2013). In contrast, cancer caregiving has also demonstrated a negative impact on caregivers (Grant et al., 2013; Johansen, Cvancarova, & Ruland, 2018). The impact of challenging experiences associated with caregiving is referred to as “caregiver burden”

and is defined as a negative response to physical, psychological, social, and financial stress resulting from the caregiving experience (Given et al., 1992; Montgomery, Gonyea, & Hooyman, 1985). Several studies showed that cancer caregiving can be taxing, stressful, burdensome, and costly, in part due to lack of autonomy in the role and non-reimbursement for services rendered (Esra et al., 2017; Feinberg, Reinhard, Houser, & Choula, 2011; Grant et al., 2013). For this dissertation, caregiver burden is defined as the encompassing difficulties perceived by caregivers in the following areas: self-esteem, lack of family support, financial burden, schedule burden, and health burden (Given et al., 1992).

The current literature demonstrated that cancer patients often rely on friends or family members to assist with their treatment and needs. Perceived caregiver burden associated with providing home-based care to cancer patients (Given, Given, & Sherwood, 2012; Johansen et al., 2018; National Alliance for Caregiving, 2018). Currently, trends are shifting towards increasing provision of complex care for cancer patients, including ongoing involvement in home-based symptom management interventions (Frambes, Wyatt, Sikorskii, Lehto, & Given, 2017; Wyatt, Lehto, & Sender, 2019). Caregiver burden often goes unrecognized by healthcare professionals due to their focus on the cancer patients. For this reason, friend or family caregivers have been identified as “hidden patients” in the healthcare system (Golics, Basra, Finlay, & Salek, 2013). The high level of sustained burden may not only negatively affect caregivers’ physical and mental health, but also can negatively impact patients’ health outcomes (Kent et al., 2016; Stenberg, Ruland, & Miaskowski, 2010). Dealing with high-level burden may put caregivers at risk for long-term health problems. Greater recognition and management of caregiver burden among friend or family caregivers may help reduce future over-strained caregivers.

In recent years, new cancer treatments such as targeted therapy, oral anticancer medication, and hormonal therapy have evolved and are often administered in out-patient clinics or ambulatory care. Patients would then return home for recovery from side effects of the anticancer drugs, and caregiver reimbursement is limited by health insurance and Medicare (Marshall, Vachon, Given, & Lehto, 2018; Milne, Hyatt, Billett, Gough, & Krishnasamy, 2019). Therefore, the caregiving responsibilities of friends or family caregivers is increasing with the complex and often fragmented healthcare system in the U.S. (Northouse et al., 2010).

Caregiver Burden Among Caregiver-delivered Home-based Symptom Management Intervention

The demands and intensity of cancer caregiving pose a serious challenge to the psychological and physical wellbeing of caregivers. Caring for friend or family members during an episode of cancer treatment may contribute to high caregiver burden. Symptom management interventions delivered by friends or family caregivers at home may reduce patient symptoms and health-related quality of life outcomes (Belgacem et al., 2013; Wyatt et al., 2017). The care activities, which caregivers performed to support cancer patients, such as symptom management interventions, often impact the caregivers' physical and psychological health outcomes (Frambes et al., 2017).

Yet, there is a gap in the research regarding to understanding burden among caregivers who provide nurse-designed symptom management interventions that extend beyond basic care for cancer patients. It is unclear how this new level of caregiver involvement will impact burden when considering caregivers' comorbid conditions, anxiety, and depression (Frambes, et al., 2017; Haley, LaMonde, Han, Burton, & Schonwetter, 2003; Valderas, Starfield, Sibbald, Salisbury, & Roland, 2009). Many factors associated with caregiver burden are well-documented

in the literature. However, burden associated with delivery of nurse-designed symptom management interventions is still emerging. Further, little is known about caregiver burden associated with having patients who do not show symptom improvement following such interventions.

Given changes in the healthcare system including delivery and reimbursement trends, the purpose of this dissertation was to evaluate the current state of the science in the caregiver burden literature. Secondly, the dissertation aimed to examine associations between level of caregiver burden and key variables that could impact cancer care at home prior to initiating a caregiver delivered symptom management intervention. Finally, this dissertation evaluated the level and types of burden among a group of caregivers whose cancer patients did not report an improvement in the symptom of fatigue (“non-responders”) at phase one of a two-phase study (1R01 CA193706, Wyatt and Sikorskii, MPIs, 2015-2019).

This dissertation addressed a gap in caregiver burden research by exploring how burden is impacted by delivery of a nurse-designed symptom management intervention for cancer patients. Findings yield new information in caregiver research in regard to understanding the impact of adding specific symptom management to the caregiving role.

Following were the dissertation aims:

1. State of the science on cancer caregiving burden
2. The association between caregiver burden and caregiver socio-demographic characteristics, comorbid conditions, anxiety, and depression among caregivers of cancer patients at baseline
3. The level of caregiver burden among various groups of caregivers of non-responder cancer patients parent study

A Sequential Multiple Assignment Randomized Control Trial (SMART) was the source of data for this secondary analysis (dissertation aims 2 and 3; Wyatt and Sikorskii, MPIs, 2015-2019). The parent study examined caregiver-delivered reflexology and/or meditative practices symptom management interventions for solid tumor cancer patients.

The Sequential Multiple Assignment Randomized Trial (SMART) Design

The management of adverse symptoms from cancer and its treatment often entails an individualized intervention approach that is adapted and readapted over time in response to the specific needs and symptom status of cancer patients. Some people may prefer or respond better to cognitive therapy over direct physical contact, while others may favor body-based reflexology, and the optimal intervention choice and sequencing may depend on such individual differences (Wyatt & Sikorskii, 2018). The SMART design was developed explicitly for the purpose of building optimal interventions for tailoring the intervention to specific patients and determining which intervention or combined interventions lead to the best patient outcomes. (Almirall, Nahum-Shani, Sherwood, Murphy, 2014). Existing static symptom management interventions deliver a predetermined dose at specific intervals. These interventions are tested in standard RCTs against controls, and this has already been studied from reflexology and meditative practices (Lehto & Wyatt, 2013; Lehto, Wyatt, Sikorskii, Tesnjak, & Kaufman, 2015; Wyatt, Sikorskii, & Victorson, 2012; Wyatt, Sikorskii, & You, 2013). Dynamic tailoring of interventions to patient responses is needed to enhance the science of symptom management.

One of the patient interventions used in the parent study was reflexology, a hands-on body-based therapy using a firm thumb-walking motion (Watson & Voner, 2008). This therapy is based on the premise that the feet contain points (reflexes) that correspond to other reflex points in different areas of the body including, organs, glands, and body systems. The efficacy

of reflexology for symptom management has been demonstrated in multiple cancer studies to reduce adverse symptoms such as fatigue, depression, and anxiety caused by cancer and its treatment (Frambes, Wyatt, Sikorskii, Lehto, & Given, 2017; Watson & Voner, 2008; Wyatt, Sikorskii, & Victorson, 2012; Wyatt, Sikorskii, & You, 2013).

The second patient intervention used was meditative practices, which are a set of mind-body practices that build the capacity to attend to the present moment, including one's thoughts, emotions, bodily sensations, and the environment with nonjudgmental openness and acceptance (Ledesma & Kumano, 2009). The meditative practices intervention included training in breathing exercises, meditation, and gentle yoga movements which carry evidence of symptom relief in previous research (Lehto & Wyatt, 2013; Lehto, Wyatt, Sikorskii, Tesnjak, & Kaufman, 2015).

Parent Study Methods

Patients and their caregivers were recruited as dyads into the parent study. Cancer patients were approached by study recruiters from three comprehensive cancer centers and three community oncology settings. Patient inclusion criteria were: 1) age 21 years or older; 2) solid tumor cancer diagnosis; 3) able to perform basic activities of daily living; 4) undergoing chemotherapy, hormonal therapy, or targeted therapy; 5) reporting severity of ≥ 3 on fatigue using a 0–10 standardized scale at intake; 6) speaking and understanding English; 7) having telephone access; and 8) hearing normal conversation. Exclusion criteria were: 1) diagnosis of major mental illness in medical records and verified by the recruiter; 2) nursing home resident; 3) bedridden; 4) currently involved with reflexology or meditative practices; or 5) presence of deep vein thrombosis or painful foot neuropathy.

Cancer patients identified their own caregivers. All participants (patients and caregivers) signed a consent form. Caregiver inclusion criteria were: 1) age 18 years or older; 2) speaking and understanding English; 3) having telephone access; 4) hearing normal conversation; and 5) willing to be trained in reflexology and meditative practices.

Caregivers were trained by either a reflexology or meditative practices expert practitioner trained in the study protocol, depending on which therapy the dyad was randomized to. Over the first 4 weeks (phase I) of intervention, the patient's response to symptom management was assessed based on weekly symptom data. Dyads in which patient did not improve on the fatigue score during phase I of the study were referred to as non-responders. Non-responders were then re-randomized to four additional weeks (phase 2) of either the same therapy during weeks 5–8 or added the other intervention-reflexology or meditative practices, respectively. The parent study procedure required completion of at least one session per week. Caregivers received weekly calls during the 8-week intervention to determine the number of sessions completed.

Dissertation Study Significance

Cancer caregiving is a highly individualized experience. The increasing complexity of cancer treatments and a shift to home-based management of symptoms add to the demands placed upon friend or family caregivers. While the research on caregiver burden is well-established in the context of a variety of diagnoses and conditions, this dissertation presents the unique features of friend or family caregivers who participated in a nurse-designed symptom management study focused specifically on those home-based caregivers intervening for cancer patients.

Non-responder Cancer Patients. The symptom of fatigue was used to determine non-responding patients. In the parent study, a fatigue scale of 0-10 from MDASI was used, with 0 reflecting no symptom, and 10 reflecting the worst possible severity. Parent study inclusion criteria required a baseline fatigue score of ≥ 3 meaning that at intake patients experience fatigue at a moderate or severe level. The response to fatigue was anchor-based in its interference in areas such as enjoyment of life, relationships with others, general daily activity, and emotions (Sikorskii, Given, You, Jeon, & Given, 2009). The fatigue responses to the symptom management interventions were based on shifts among pre-defined mild, moderate, and severe categories: mild “1,” moderate “2-4,” and severe “5-10” (Given et al., 2008; Jeon, Given, Sikorskii, & Given, 2008). Patients who started with a severe level of fatigue at onset and ended with moderate or mild levels by the end of the 4-week observation, and patients who started at a moderate level and ended at a mild one, are called “responders” to the symptom of fatigue (Sikorskii, Given, You, Jeon, & Given, 2009a). Since responders demonstrated a substantial improvement anchored in fatigue interference with daily life after 4 weeks of the intervention, patient-caregiver dyads continue with the same intervention for another 4 weeks. “Non-responder cancer patients” were defined as patients whose fatigue symptoms did not improve or increased by one category between week one and week four of study Phase I (mild \rightarrow moderate, moderate \rightarrow severe, or mild \rightarrow severe), or those fatigue scores remained the same (no change over time). The non-responder patients and their caregivers were re-randomized to either continue with the same therapy or add the second therapy for week five to week eight (Sikorskii et al., 2017; Wyatt & Sikorskii, 2018).

Background for Dissertation Aim 1: State of Science on Cancer Caregiving Burden

Caregiver burden refers to negative responses that are related to providing care for another individual (Basch et al., 2014; Cleeland & Sloan, 2010). Stemming from additional responsibility, friend or family caregivers may experience significant signs of burden, especially regarding to psychological health such as anxiety and depression, physical health, economic circumstances, and social and personal relationships (Thana, Lehto, Given, Sikorskii, & Wyatt, 2019). Research findings revealed that friends or family caregivers have significantly more anxiety and poorer physical health compared to the general population (Girgis et al., 2013; Kim & Yi, 2015; Stenberg, Cvancarova, Ekstedt, Olsson, & Ruland, 2014).

Cancer caregiving also impact friend or family caregivers' schedule and social aspects of life throughout the patients' cancer trajectory (Hanly, Maguire, Hyland, & Sharp, 2015; Ó Céilleachair et al., 2012; Shieh, Tung, & Liang, 2012). Economic difficulties were reported during cancer treatment, related particularly to appointments and caregivers' reducing or changing employment, including taking leave from work, reducing work time, changing work schedules, quitting studies or works, and changing jobs (Goren, Gilloteau, Lees, & DaCosta Dibonaventura, 2014; van Ryn et al., 2011). In addition, studies indicated that the financial constraints experienced by friend or family caregivers may trigger psychological distress (Girgis et al., 2013; van Ryn et al., 2011).

Furthermore, lack of family support may decrease the likelihood of a closer relationship between caregiver and patient, implied opportunities to change of caregiver's life priorities, and tend to make caregivers appraise their caregiving experiences more negatively (Haley et al., 2003; Park et al., 2013). The burden experienced by friend or family caregivers was a determinant of the degree of psychological distress throughout the cancer trajectory (Dumont et

al., 2006) and was the most important predictor of caregiver depression (Papastavrou, Charalambous, & Tsangari, 2009; Rhee et al., 2008). It is important to understand how friend or family caregivers perceive caregiver burden. In the present study, friend or family caregivers were asked to add a specific symptom management intervention to the basic care they provided.

Findings associated with this additional care responsibility will inform an understanding of caregiver burden when considering a specific intervention to help manage symptoms. The level of caregiver burden changes over time because of patients' conditions and their caregivers' expectations of treatment and care (Bevans & Sternberg, 2012). To help both patients and their caregivers move through the illness in the best way, it is important to first understand how friend or family caregivers initially perceive their problems and caregiver burden after adding a specific symptom management intervention to the basic care they provide.

Manuscript one of this dissertation was needed to update the current state of the science for cancer caregiver burden. Although several factors associated with caregiver burden have been previously identified, recent changes in the healthcare system and new cancer treatments that involve more home-based care suggest the need to evaluate the current state of the science. The purpose of this review was to evaluate current research trends in regard to cancer caregiving and to update the science to reflect previously under-reported factors. Findings from the review carry the potential to identify areas for future research, provide recommendations to improve both caregiver and patient quality of life, and determine targets for interventions.

Background for Dissertation Aim 2: The Association Between Caregiver Burden and Caregiver Socio-demographic Characteristics, Comorbid Conditions, Anxiety, and Depression among Caregivers of Cancer Patients at Baseline.

Manuscript two of this dissertation explored associations between caregiver burden and specific personal characteristics, including comorbid conditions, anxiety, and depression prior to becoming involved in a home-based symptom management intervention. Although friend or family caregivers are often expected to assume the role of providing basic care and assisting with symptom management, they are often not equipped with the necessary skills and confidence to perform the complex care tasks (Frambes et al., 2017). Further, friend or family caregivers often receive less attention from healthcare professionals, who are more likely to be concerned with cancer patients' needs and symptoms (Golics et al., 2013). The lack of attention to caregivers' needs may contribute to increases in psychological problems and contribute to high level of burden, especially when caregivers are feeling overwhelmed secondary to daily workload (Given, Sherwood, & Given, 2011). Furthermore, friend or family caregivers may experience negative changes in their health, especially among those who have comorbid conditions. Such changes in health (e.g., weight gain, increased blood pressure, or increased cholesterol) may be compounded, particularly if the caregivers are physically inactive or have non-healthy lifestyles. Thus, it is important to know which caregivers already experience high burden before asking them to engage in cancer care activities.

To date, the literature has focused on testing interventions and clinical aspects of patients' and caregivers' outcomes. However, those interventions had small to medium effects on reducing burden, and some were not focused specifically on caregiver burden (DuBenske et al., 2013; Frambes, et al., 2017; Hendrix et al., 2016; Northouse, Katapodi, Song, Zhang, & Mood,

2010). The underlying assumption is that friend or family caregivers with low levels of caregiver burden would be able to provide better care for cancer patients at home (Given, 2019). However, the association between caregiver burden and caregivers' socio-demographic characteristics, comorbid conditions, levels of anxiety and depression, and types of activities performed in addition to assisting with daily activities are not consistent across studies, and with respect to symptom management, are not well understood.

Therefore, a better understanding of the relationships regarding how such aspects are associated with the characteristics of caregivers is needed. Thus, a secondary analysis using baseline data from the SMART study explored which caregivers have high burden based on their characteristics, comorbid conditions, depression, and anxiety. In addition to expanding research in this area, findings could be used in clinical settings as markers to determine which caregivers are asked to perform additional tasks, including reflexology or meditative practices.

Caregiver Socio-demographic Characteristics as Linked to Related Variables.

Caregiver socio-demographic characteristics included seven factors: age, sex, race/ethnicity, employment, relationships, living arrangements, and comorbid conditions. Based on past work, each of these characteristics has the potential to impact perceived burden.

Caregiver age. A study by Schulz and Beach (1999) indicated that caregivers of an older age were associated with the highest levels of depressive symptoms and strongest sense of abandonment from others during care of cancer patients. However, age was also associated with positive consequences, including caring, appreciation for others, and personal life meaning (Kang et al., 2013).

Younger age was significantly associated with a high level of psychological distress, as younger caregivers may view a cancer diagnosis as a more traumatic event (Dumont et al., 2006;

Haley et al., 2003; Park et al., 2013). In addition, young caregivers reported more negative experiences with caregiving and an increased need for grief counseling services compared to older caregivers (Burns, LeBlanc, Abernethy, & Currow, 2010). While no age-comparison studies were reviewed, samples consisting of younger caregivers reported signs of being at increased risk for perceived burden and depression (Grant et al., 2013; Hanly et al., 2015; Rha, Park, Song, Lee, & Lee, 2015). This dissertation assessed associations between age and caregiver burden among caregivers providing symptom management for patients being treated for solid tumors.

Caregiver sex. A previous study by Reinhard et al. (2008) reported that females are the predominant friend or family caregivers. Female caregivers experienced the highest burden during care for cancer patients, especially when the patients needed more assistance with activities (Bayen et al., 2017; Esra et al., 2017; Mosher et al., 2016; Stenberg et al., 2010). Female caregivers were more depressed and had a stronger sense of abandonment than male caregivers (Given, Wyatt, Given, Gift, & Sherwood, 2004). However, female caregiver sex was associated with the positive consequences of caring, including appreciation of others and reprioritization of values and attitudes about life (Kang et al., 2013).

Asian male caregivers who were not well-prepared for the role reported high levels of burden while caring for patients with cancer at home (Jeong & An, 2017; Leow & Chan, 2017). Furthermore, male caregivers with less education experienced a high level of burden in caring for patients with cancer due to difficulty obtaining information or support from nurses and healthcare personnel (Beesley, Price, Webb, Group, & Investigators, 2011; Esra et al., 2017). In a western clinical trial, male caregivers who predominantly delivered a home-based reflexology intervention to advanced breast cancer patients reported psychological difficulties (Wyatt et al.,

2017). These data suggested that cancer caregiving may differ by caregiver sex and may contribute to a high level of perceived burden.

Caregiver race/ethnicity. The motivation for informal caregiving is primarily voluntary and related to bonds of attachment between family members, but it can also be affected by cultural norms regarding family obligations or feelings of guilt influencing health beliefs, practices, customs, and culture (Hoffmann & Mitchell, 1998). However, differences in perception of burden have been reported based on different racial and ethnic backgrounds. Dilworth-Anderson, Williams, & Gibson (2002) reported that nine out of 18 studies found that Caucasian caregivers reported higher levels of caregiver burden compared to African American caregivers. An additional study by Wajnberg et al. (2016) reported moderate burden scores when investigating burden among Hispanic caregivers. Furthermore, Leow et al. (2017) and Jeong et al. (2017) investigated caregiver burden in Asian caregivers and found that perceived feelings of burden were associated with anxiety, negative effects on caregivers' health, and the seeking of professional help among caregiving tasks, especially with Asian-male caregivers as mentioned previously. In totality, the evidence indicates that caregiver race/ethnicity may impact perceived level of caregiver burden.

Caregiver employment and economic status. Previous studies indicate that caregiver employment status was frequently a negative factor while providing cancer care at home (van Ryn et al., 2011). Friend or family caregivers who did not work had more time to perform caregiving for cancer patients than those who did work. Caregiver employment status was a predictor of financial burden; family caregivers who worked had less financial burden compared to those who did not work, retired, or stopped working because of providing care (Papastavrou et al., 2009).

Studies by Doorenbos et al. (2007) and Given et al. (2004) showed that caregivers employed during care for cancer patients and those who were unemployed and looking for work reported higher levels of depressive symptoms. Cancer care not only involves medical treatment but also includes travel associated with such treatment, which may reduce work hours during the treatment schedule and indirectly impact cost of care (Hanly et al., 2015; Ó Céilleachair et al., 2012; Shieh et al., 2012). These additional expenses could result in significant financial concerns that impact perceived caregiver burden.

Caregiver relationships. A study by Given et al. (2004) indicated that personal relationships between caregivers and patients were associated with caregiver depression and daily schedule burden. Caregiver burden was a consequence of the relatives' perception of how caregiving affects their social, emotional, and family lives (Hoffmann & Mitchell, 1998). Relationship higher quality between family members and the patient were associated with lower burden during cancer care (Dumont et al., 2006; Francis, Worthington, Kyriotakis, & Rose, 2010). Caregivers with higher quality family's relationships identified fewer problems with family abandonment, fewer health difficulties, less difficulty with scheduling obligations, and lower financial strain (Francis et al., 2010). Sharing caregiving burdens with other family members was associated with positive consequences of caring (Park et al., 2013; Sano et al., 2007).

Previous studies reported that the level of caregiver burden in caring for family members with cancer is impacted by relationship. For example, a study by Given et al. (2004) showed that spouse caregivers of cancer patients might be more depressed than spouses caring for patients with other diseases. Another study by Leow et al. (2017) showed daughters to be the predominant caregivers, whereas sons tended to become caregivers if a female was absent.

Hands-on caregiving needs were most likely to be performed by the daughter. Friend or family caregivers who had less support felt more depressed and anxious (Jeong & An, 2017). Therefore, perceived burden may not be experienced to the same degree by a spouse as opposed to children or other caregivers of other relations. Therefore, this study has further explore the relationships between caregiver perceived burden and their relation to the patient.

Living arrangements. Caregivers in the same residence provided more assistive activity to cancer patients. However, there was no significant effect of relationship (spouse versus adult-child) on health decline among caregivers who were living with cancer patients (Frambes, et al., 2017). In contrast, a study by Akpan-Idiok et al. (2014) found that co-resident caregivers had higher levels of perceived burden and lower levels of social activity since these caregivers gave most of their attention to their patients as opposed to tending to personal needs. Therefore, the association between living arrangement and caregiver burden remains unclear due to inconsistent findings.

Caregiver comorbid conditions. Comorbid conditions refer to a chronic medical condition which the caregiver was diagnosed with, by a physician, and received treatment for, which may limit daily activities (Bayliss, Ellis, & Steiner, 2009). Previous studies indicated that during cancer treatment, the level of burden of friend or family caregivers with worse self-perceived health status was significantly higher than that of those with better self-perceived health status (Dumont et al., 2006; Wang et al., 2011). In addition, a high level of psychological distress in the family caregiver was significantly associated with a poor perception of their health (Dumont et al., 2006; Wang, Chien, & Lee, 2012), and health status was associated with caregiver depressive symptomatology and the level of perceived burden (DuBenske et al., 2013).

Cancer caregivers have an increased risk for developing adverse health illnesses, such as depression, when the amount of time providing care increases (Duggleby et al., 2016). Heuvel et al. (2001) suggested that caregiver burden was increased by the severity of chronic conditions. However, there was little research focused specifically on the association between caregiver comorbid conditions and the burden of caregivers performing a specialized symptom management therapy to individuals with cancer. This dissertation will fill this gap.

Caregiver Anxiety as Linked to Caregiver Burden. Anxiety is among the top five mental health issues in the U.S. (National Institute of Mental Health, 2018). Loss of control, fear of a cancer patient's well-being, uncertainty about the future and worrying about healthcare finances can all become extremely overwhelming for caregivers and can result in heightened anxiety and stress (ACS, 2017). One study has shown that friend or family caregivers who provide care for cancer patients in active treatment (i.e. chemotherapy or radiation therapy) reported a high level of anxiety compared to the other group of caregivers (hormonal therapy or survivorship) (Selamat Din et al., 2017). A study by Lkhoyaali et al. (2015) found that more than 75% of cancer caregivers experienced anxiety. The study also found that cancer caregivers are likely to experience depression, family abandonment, social isolation, and loss of employment (Lkhoyaali et al., 2015). This dissertation has helped to clarify how anxiety impacts the level of caregiver burden among cancer caregivers who participated in delivery of nurse-designed symptom management interventions.

Caregiver Depression as Linked to Caregiver Burden. Depression is one of the most common outcomes of cancer caregiving. Depression occurs as a primary psychological issue, linking caregiver burden with negative mood, sadness, loneliness, giving up, and quitting (Robinson et al., 2008). Depression leads to a negative impact on caregiver health and

contributes to early death (Rivera, 2009). Caregivers reported high levels of depression if cancer patients had a severe symptom because they were aware of the patients suffering and carried the dual responsibility of caring for the patient and for their own emotional needs (Given et al., 2004; Hebert, Arnold, & Schulz, 2007; Rhee et al., 2008; Tang et al., 2013). A study by Given et al. (2004) showed that caregiver depression was a mood disturbance resulting from an imbalanced emotional adjustment while providing cancer care. Friend or family caregivers of cancer patients experience more severe symptoms of depression compared to the normal population of the same age (Nipp et al., 2016). Depressive symptoms appear to have direct and indirect effects on caregiving. In addition, there has been limited research focused on depressed symptoms and caregiver burden among caregivers who were expected to perform symptom management intervention along with daily basis care. Thus, this study will also evaluate caregivers' depressive symptoms.

Background for Dissertation Aim 3: The Level of Caregiver Burden among Various Groups of Caregivers of Non-responder Cancer Patients

In recent years, caregivers of cancer patients have often sought additional ways to support patients (Kent et al., 2016). Increasing numbers of caregivers are involved in complex cancer-related care activities along with basic care (Frambes, et al., 2017; Wyatt et al., 2017). Only a few studies have examined the level of perceived burden among cancer caregivers while performing nurse-designed symptom management interventions at home (Belgacem et al., 2013; DuBenske et al., 2013; Mahendran et al., 2017; Sherwood et al., 2012). The parent study evaluated caregiving that involved not only basic care, but also a specialized symptom management intervention. The secondary analysis within this dissertation examined a subset of caregivers whose patients did not respond to phase I (week 1-4) of a two-phase SMART design

study. Dissertation aim 3 evaluated the impact on caregiver burden when patients' fatigue did not initially improve or the level of fatigue experienced did not decrease or remain at the same level after completing study phase I. The purpose was to evaluate the level of perceived burden among friend or family caregivers who delivered one or two symptom management interventions to non-responding cancer patients. The results for manuscript three (dissertation aim 3) derived new knowledge on perceived caregiver burden associated with non-responders to a symptom management intervention.

Conceptual Framework

The conceptual framework that guided this dissertation was the Organizing Framework for Caregiver Interventions (Van Houtven, Voils, & Weinberger, 2011). This model was selected since it is easily adapted to cancer caregivers and the present study factors. The organized model and its components are described first, and then the adapted version of the model is presented. Third, the operational version of the model for this dissertation is described. For the operational version, only caregivers of non-responder patients were included in the outcomes portion of the model to address dissertation aims 1-3.

Organizing Framework for Caregiver Intervention by Van Houtven, Voils, & Weinberger (2011). The Organizing Framework for Caregiver Intervention (OFCI) was developed by Van Houtven, Voils, & Weinberger (2011) drawing upon a literature review on caregiving research and a review of U.S. caregiver trial literature from 2000-2010. As presented in Figure 1.1, the OFCI framework is laid out in a linear design from left to right and consists of four major components, which are numbered 1-4. Each component is described, followed by an explanation of the connecting arrows.

Caregiver and care recipient baseline characteristics (1). Caregiver and care recipient (patient) baseline characteristics in the organizing framework lead to the design of an intervention. Both caregiver and care recipient influence the commitment to perform and/or respond to an intervention. The caregiver and care recipient baseline characteristics include demographics, health status, economic status, health insurance, relationship type, and cultural norms (Van Houtven et al., 2011). All baseline characteristics affect a caregiver intervention.

Caregiver Intervention. Caregiver intervention is defined as caregivers' actions and the process of caring that aims to improve or assist their patients with both ADLs and IADLs. Caregiver interventions should be designed to be compatible with both their and care recipients' characteristics (Van Houtven et al., 2011).

Caregiver Activities (2). Caregiver activities are distinct from outcomes as they relate to the tasks that caregivers perform on the behalf of care recipients. Caregiver activities are classified into four types:

1) Clinical skills and knowledge: The skills include medication administration, assisting with transfers, wound care and/or changing medical devices, and making decisions or solving problems on behalf of the patient when necessary.

2) Psychological skills and resources: Friend or family caregivers often experience psychological health issues, such as depression and perceived burden, and thus may need supportive resources. Enhancing coping and self-efficacy may improve positive and reduce negative consequences of caregiving.

3) Support-seeking skills interact with how well caregivers receive social support for themselves. The ultimate outcome related to this skill activity would be decreased perceived

burden and/or caregiver depression. Social support is a key role of protecting and maintaining caregivers' physical and psychological health.

4) Quantity of caregiving is identified as an objective burden, often measured by minutes of care or tasks performed.

Caregiver outcomes (3). Caregiver outcomes are defined as the intervention effectiveness that yields both positive (e.g., role satisfaction, improved relationships) and negative (e.g., caregiver depression, anxiety, stress, and burden) outcomes of caregiving. The caregiver outcomes that were included are psychological health, physical health, healthcare utilization of primary and/or specialty care, and economic status.

Care recipient outcomes (4). Care recipient outcomes were grouped into four categories similar to caregiver outcomes, and disease management skills were also included. The four categories include: (1) psychological health, categorized as non-social (e.g., depression) and social (e.g., family functioning) components; (2) physical health and disease management including symptoms and sequelae of disease or illness; (3) care recipient healthcare utilization such as community-based or institutional long-term care, respite care, or primary physician care; and (4) economic status.

Model Links. The model in Figure 1.1 depicts the predictive linkages among factors that are hypothesized to be related between caregivers' baseline characteristics and care recipients' baseline characteristics, caregiver activities, and caregiver and care recipient outcomes. (1) caregivers' and care recipients' baseline characteristics lead to caregiver intervention (single headed arrow). The caregiver intervention is linked to intervention for patients using the single headed arrow. (2) caregiver activities have a two-way interaction with the caregiver outcomes. Further, (3) caregiver outcomes and (4) care recipient outcomes also have a reciprocal

relationship indicated by a double-headed arrow. Finally, caregiver and care recipient outcomes can affect each other as depicted with the double-headed arrow (Van Houtven et al., 2011). This dissertation uses the framework as a foundation and tailors the elements to cancer caregiver involvement in home-based symptom management interventions.

Adapted Conceptual Model. The OFCI suggested relationship between caregiver and caregiving components provided a foundation for examining the aims posed in this dissertation. The adapted OFCI framework (Figure 1.2) represents how the Van Houtven, Voils, and Weinberger (2011) model was adapted for this dissertation's secondary analysis, focusing on caregivers of non-responder cancer patients. The adapted conceptual model concerns only caregiver components and omits all care recipient information from the original conceptual model. Therefore, the care recipient baseline characteristics and care recipient outcome components were shaded in gray and deleted from the adapted model. The adapted conceptual model consists of three components: 1) caregiver baseline socio-demographic characteristics, comorbid conditions, anxiety, and depression; 2) caregiver activities performed by caregivers on behalf of non-responder cancer patients; and 3) caregiver burden as the outcome from the study. Each component will be described in detail.

Caregiver baseline characteristics. In the context of providing symptom management interventions for individuals with cancer, caregiver socio-demographic characteristics provide essential background information for future supportive interventions for caregivers (Van Houtven et al., 2011). Caregiver baseline characteristics have been expanded in this adapted conceptual model to include not only age, sex, race/ethnicity, employment, relationships to cancer patients, living arrangement, and comorbid conditions, but also perceived burden, anxiety

and depression. This dissertation (Chapters 3 & 4) specifically examined caregivers of the patients who were deemed non-responders, as previously defined.

Caregiver anxiety. The level of baseline caregiver anxiety was included in the adapted conceptual model because cancer caregiving is challenging and can adversely impact caregiver emotional wellbeing. Being a cancer caregiver is commonly perceived as a chronic stressor due to unfamiliar treatment situations and an ongoing sense of anxiety that permeates a caregiver's life (Segrin, Badger, Dorros, Meek, & Lopez, 2007).

Caregiver depression. Depression is a baseline variable because it was the one risk factor that could affect caregiver outcomes and the quality of providing care for cancer patients (Segrin & Badger, 2010; Van Houtven et al., 2011).

Caregiver burden. Baseline caregiver burden was included in the adapted conceptual model because a high level of burden affects the quality of care (O'Hara et al., 2010). In this dissertation, caregiver burden consisted of five domains: 1) caregiver self-esteem; 2) lack of family support; 3) financial burden; 4) schedule burden; and 5) health burden. It was measured at baseline and again as the primary outcome in Figure 1.2.

Care activities performed by caregivers on behalf of non-responder cancer patients. In this adapted model, reflexology and meditative practices are nurse-designed symptom management interventions for cancer patients. All trained caregivers performed reflexology and/or meditative practices in an effort to better manage patient symptoms (Frambes et al, 2017; Lehto et al., 2015; Wyatt et al., 2017). The symptom management care activities were intended to reduce patient symptoms.

Adapted Conceptual Model Linkages. This model begins in the left corner. The adapted conceptual model in Figure 1.2 suggested that caregiver socio-demographic characteristics,

comorbid conditions, anxiety, and depression have a reciprocal influence on caregiver burden (double-headed arrow). Second, caregiver socio-demographic characteristics and burden are both considered when performing care activities for the non-responder patients (reflexology or meditative practices). Finally, caregiver delivery of care activities (reflexology and meditative practices) to non-responder patients contributes to understanding post-intervention outcomes (domains of caregiver burden).

Operational Model and Variables. This dissertation was undertaken to determine the extent to which caregiver baseline characteristics associate with caregiver burden and to examine the pattern of caregiver burden before and after the performance of one of the symptom management interventions. An operational version is presented in Figure 1.3. The operation model was designed for the three-manuscript dissertation, including a literature review and two quantitative studies. Each manuscript had a specific dissertation aim (colored text of Aim 1, Aim 2, and Aim 3). The operational model began with a literature review box and presented from the left to the right. The review of the literature box (chapter 2) is separately presented in the blue-colored box. The green box illustrates the Caregiver Burden Model for caregivers of non-responder cancer patients as a foundational model for the dissertation chapters 3 and 4. The three components include: 1) baseline caregiver socio-demographic characteristics, comorbid conditions, anxiety, and depression; 2) care activities for cancer patients (i.e., reflexology and/or meditative practices); and 3) a caregiver burden perception for “non-responders” is retained in the model as the caregiver outcome. Each component is described, followed by an explanation of the connecting arrows.

Variables/Measurement Tools. Caregivers were identified as friend or family members of non-responder cancer patients in the parent SMART study who agreed to provide supportive symptom management interventions (reflexology and/or meditative practices) at home without being paid. Patients and their caregivers may or may not live in the same house. Participants were enrolled as dyads (patient and caregiver).

The operational model also added a key component for the examination of caregiver burden, “non-responders.” The non-responders are referred to as cancer patients who did not respond to the symptom management intervention (either reflexology or meditative practices) for the initial four weeks. A non-responder is determined if their level of fatigue remains the same or has increased from the first week that caregivers started delivering the intervention.

Caregiver socio-demographic characteristics of non-responder patients. The caregiver socio-demographic characteristics of interest in this dissertation are age, sex, race/ethnicity, employment, relationships to cancer patients, living arrangement, and comorbid condition. Refer to Figure 1.3 for the list and each mentioned in the next paragraph.

1. Age: Caregiver age is measured in the number of years.
2. Sex: Sex is a dichotomous variable with male or female.
3. Race/ethnicity background: The ethnic background is grouped as Hispanic or Latino, not Hispanic or Latino. The racial background is Asian, Black, White, or other.
4. Employment status: The employment status is a categorical variable, grouped as employed full-time, employed part-time, not employed, retired, disabled, homemaker, or other.

5. Relationship to patient: The relationship to patient is a categorical variable and identified as spouse or partner, blood-relative, in-law, friend, or other.
6. Living arrangement: Living arrangement is a dichotomous variable, assessed by a “yes/no” question about the caregiver currently living with the cancer patient.
7. Comorbid conditions: Comorbid conditions refer to the health problems reported by caregivers. Comorbidities were measured using Bayliss Comorbidity Checklist (Bayliss et al., 2009) that determines whether caregivers have been diagnosed with and take medication for 21 common chronic conditions using a “yes/no” response. The comorbid conditions variable was measured as a count of the number and types of medical conditions present. This tool has median sensitivity and specificity compared to chart review of >75% and 92%, respectively. Internal consistency reliability is not applicable to the checklist (Bayliss, Ellis, & Steiner, 2005b).

Caregiver anxiety and depression. Anxiety and depression were the proxy of measures in this dissertation. The PROMIS-29 v1 (PROMIS, 2010) instrument was used to measure the level of anxiety and depression based on the past seven days. The PROMIS instrument is a set of standardized and validated questionnaire items used for measuring quality of life (QOL). Developed under the National Institutes of Health’s Roadmap Initiative, the PROMIS-29 is a general instrument intended for persons aged 18 years and older. The instrument asks four questions on each of seven domains (ability to participate in social roles and activities, anxiety, depression, fatigue, pain interference, physical function, sleep disturbance) and one question on a pain intensity scale.

For each question within a domain, the caregivers selected a value from 1 to 4. Thus, the lowest score in any singular domain is 4, and the highest score is 20 from the responses based on a t-score (Cella et al., 2010). For the variables of anxiety and depression (negatively worded), a lower t-score is better than average. The average t-score is based on the U.S. population and is normalized to 50.0 (Cella et al., 2010). In this study, the Cronbach's was 0.85 for anxiety and 0.83 for depression.

Caregiver burden. Caregiver burden was assessed using the Caregiver Reaction Assessment Tool (CRAT) (Given et al., 1992). The CRAT is a multidimensional measurement that is comprised of 23 items related to positive and negative reactions to caregiving. Caregivers are asked to indicate their level of agreement to statements using a 5-point Likert-type scale from 1 to 5: 1= strongly disagree, 2= disagree, 3= neither agree nor disagree, 4=agree, 5=strongly agree. The CRAT evaluates five dimensions of the caregiver situation: 1) caregiver self-esteem (7 items) which relate to the perceived positive aspects of caregiving; 2) lack of family support (5 items), which assesses the caregiver sense of other family members having left him or her to provide all of the patient's care; 3) financial burden (3 items) which identify the issues with economic costs and losses likely caused by caregiving; 4) schedule burden (5 items) which indicates the perceived effort and difficulty of obtaining healthcare needs and making care-related arrangements; and 5) health burden (3 items) refers to the caregiver perception that his or her health has suffered as a result of the obligations of care-giving. The CRAT total scores are generated by summing up the individual items. Four of the CRAT dimensions are constructed in such a way that higher numbers indicate high level of burden, while the self-esteem dimension is constructed in the opposite manner: a low score indicates negative reactions to or a high burden of caring.

Psychometric properties of CRAT. In the original research, the internal consistency coefficients for CRAT's five subscales ranged from 0.79 for the health burden subscale to 0.90 for the caregiver self-esteem subscale (Given et al., 1992; Nijboer, Triemstra, Tempelaar, Sanderman, & van den Bos, 1999; Stommel, Wang, Given, & Given, 1992). Evidence of construct validity of the CRAT was provided by the finding of modest correlations between CRAT scores and measures of the CES-D depression scale and ADL dependencies. The CRAT is stabilized over time by comparing standardized factor loading across data collecting (Stommel et al., 1992). In this study, the Cronbach's was 0.75 for caregiver self-esteem and financial burden, 0.74 for lack of family support and schedule burden, and 0.60 for health burden.

Operational Model Linkages. As depicted in Figure 1.3, the model flows from left to right. On the left-hand side is a box of literature review factors contributing to caregiver burden among cancer caregivers who provide care for solid tumor cancer at home (manuscript 1). The literature review examined the current state of science related to factors that contribute to caregiver burden (Aim 1). The literature review box showed the factors that contributed to high level of burden and less recognized factors affecting high caregiver burden. The literature review of caregiver burden provided a foundation for manuscripts 2 and 3 (presented in the green box). Second, the operational model illustrated that caregiver baseline characteristics have a reciprocal influence with caregiver burden (double headed arrow, Aim 2). Finally, the perception of caregiver burden in five domains is evaluated after delivering care (reflexology and/or meditative practices) for the non-responder cancer patients (Aim 3).

In summary, the three versions of the model demonstrate how the original conceptual model was designed, how it was modified to accommodate the concepts of this study, and how it was operationalized with the variables under investigation.

Dissertation Summary

The findings derived from these three manuscripts provide a better understanding of: 1) the current literature including less recognized factors associated with perceived burden among home-based cancer caregivers; 2) the association of baseline perceived burden and characteristics including comorbid conditions, anxiety, and depression among caregivers who anticipated performing symptom management intervention for cancer patients; and 3) the perceived burden among cancer caregivers who performed a nurse-designed symptom management interventions (reflexology and/or meditative practices) to or with their cancer patients, specifically for non-responder cancer patients.

Dissertation Format

This dissertation used the three-manuscript approach using a secondary data analysis of a parent SMART study (1R01 CA193706, Wyatt and Sikorskii, MPI, 2015-2019). The dissertation was undertaken to determine the extent to which caregiver baseline characteristics were associated with caregiver burden, and examined caregiver burden before and after performing symptom management intervention for patients who did not report symptom improvement at the study midpoint (Figure 1.3). Chapters 2, 3, and 4 represent separate publishable manuscripts formatted for submission.

Manuscript 1 (Chapter 2). Chapter 2 is a scoping review of cancer caregiver burden while delivering care for cancer patients at home. The aims of this scoping review were to reaffirm known factors and determine hidden factors associated with burden. The review was

guided by Arksey and O'Malley's framework (Arksey & O'Malley, 2005). A Preferred Reporting Items for Systematic Reviews and Meta-Analyses diagram was used to illustrate the selection process for publications (Moher, Liberati, Tetzlaff, Altman, & Group, 2009). A variety of electronic databases were used, including PubMed, PsycINFO, Cochrane, CINAHL, and SCOPUS.

Keywords included: lay caregiver, family, caregiver, cancer, neoplasm, patient, solid tumor, spouse, partner, couple, unpaid, lay caregiver, caregiver burden, caregiver strain, caregiver stress, and caregiver distress. Articles were limited to a date range of January 2010 and August 2019. A total of 39 articles were used for final review. This manuscript was formatted for submission to *Journal of Nursing Scholarship*.

Manuscript 2 (Chapter 3). Manuscript 2 was a secondary analysis examining the association between perceived burden and caregiver socio-demographic, comorbid conditions, anxiety, and depression among cancer caregivers at baseline. The report of findings was formatted for submission to *European Journal of Oncology Nursing*.

Manuscript 3 (Chapter 4). Manuscript 3 was a secondary data analysis determining the level of caregiver burden among caregivers of non-responder cancer patients at week-12. The paper was formatted for submission to *Supportive Care in Cancer*.

Chapter 5 Conclusion. This chapter summarized the findings from the three manuscripts and synthesized conclusions in terms of contributions towards advancing the science. Further, chapter 5 also discussed the findings in relation to policy, practice, and future research implications.

CHAPTER 2

INFORMAL CAREGIVER BURDEN FOR SOLID TUMOR CANCER PATIENTS: A REVIEW AND FUTURE DIRECTIONS

Abstract

Introduction: Recent shifts in healthcare delivery and treatment for solid tumor cancer patients have modified the responsibilities of informal caregivers. The aims of this review were to: examine current literature on burden among informal caregivers; explore less recognized factors associated with burden; and determine areas where future research is needed.

Method: Arksey and O'Malley's framework and a modified Preferred Reporting Items for Systematic Reviews and Meta-Analyses were used in conducting this review. Research literature was systematically searched using electronic databases, including PubMed, PsycINFO, Cochrane, CINAHL, and SCOPUS, and reference lists from included studies in order to identify publications since 2010. Inclusion criterion was caregivers providing home-based care to a cancer patient.

Results: The search yielded 39 eligible titles of 2,034 reviewed, including articles from over 16 countries. Caregiver physical and psychological health, financial strain, social isolation, as well as limited family and social support continued to be important factors contributing to high levels of caregiver burden. Less recognized factors affecting higher burden included caregivers' self-esteem, male gender, and the dynamic nature of cancer treatment.

Conclusions: This review updates the state of the science on informal caregiver burden when caring for patients with solid tumor cancers and informs future interventions on how to reduce this burden.

Introduction

A cancer diagnosis is a devastating event for patients and their informal caregivers, typically friends or family members. People diagnosed with cancer are living longer and increasing in numbers worldwide (National Cancer Institute, 2018). With increased public health campaigns targeting cancer risk reduction and prevention, the number of new cancer diagnoses annually will reach 27.5 million cases worldwide by 2040 (International Agency for Research on Cancer, 2018).

Informal caregivers may experience substantial burden associated with cancer and treatment-related symptoms that need to be managed in a home setting (Given, Given, Sikorskii, Vachon, & Banik, 2017; Wyatt et al., 2017). Care in the home setting, as opposed to a professional healthcare setting, is becoming the norm (National Alliance for Caregiving, 2018). Informal caregivers often take on the responsibility of assisting cancer patients with tasks of daily living, organizing with healthcare providers, and complex symptom management (Badger, Sikorskii, & Segrin, 2019; Frambes, et al., 2017).

As the shifting trends of cancer treatment and therapies have steadily improved survivorship, the need for informal caregivers to provide a longer duration of care in the home setting has also increased (Page, Newcomer, Sprandio, & McAneny, 2015). Cancer patients are now prescribed oral antineoplastic medications, targeted therapy, and immunotherapies that are taken and managed at home (Marshall et al., 2018; Milne et al., 2019). Informal caregivers play an important role in the home-based management of these newer therapies and the accompanying symptoms.

Providing care for cancer patients is documented as being both rewarding and stressful. While there are reports of high satisfaction in caregiving roles (Milbury, Badr, Fossella, Pisters,

& Carmack, 2013), cancer caregiving also brings considerable burden to informal caregivers. This happened particularly in caregivers who were feeling overwhelmed (Applebaum & Breitbart, 2013), or who were not well prepared or confident in performing supportive care (Frambes, Given, et al., 2017). Further, caregivers who face personal health issues, such as chronic conditions, unmet psychological needs, or low self-confidence may perceive inadequate resources, and in turn experience high levels of burden (Kim & Yi, 2015; Kim & Carver, 2019).

Caregiver burden is identified as the extent to which caregivers perceive that their physical health, psychological health, schedule, social life, and financial status have suffered due to providing care for their cancer patients (Given, Given, & P. Sherwood, 2012). Caregiver burden can be problematic for both informal caregivers and patients with cancer, which can pose challenges to their relationship. Perceived burden may lead to increased anxiety and depressive symptoms as well as changes in social relationships, which may impact the capacity of caregivers to provide optimal care (Badger et al., 2019; Girgis et al., 2013; Litzelman & Yabroff, 2015; Wyatt et al., 2019).

Although several factors associated with caregiver burden are recognized, recent changes in the healthcare system and progress in cancer treatments must be considered, such as oral anticancer medication, targeted therapy, and immunotherapies. Given these changes, there is a need to update the current state of the science on caregiver burden. Therefore, the purpose of this review was to apprise current literature regarding caregiver burden to include less studied factors including healthcare trends in therapeutic treatment and modes of delivery, such as home-based drugs management or out-patient/ambulatory care, and look to the future for potential caregiver-based interventions to ease burden. Such updated findings carry the potential for a better

understanding of cancer caregiver burden and may assist healthcare professionals in supporting caregivers with targeted services and interventions.

Methods

This review was guided by the Arksey & O'Malley (2005) literature review method. The selected methodology included five steps that: 1) identified the research aims; 2) identified relevant studies; 3) study selection; 4) data charting; and 5) summarized and reported the results (Arksey & O'Malley, 2005).

Identified the Research Aims (RA). This review was organized by three aims: 1) examination of current factors on burden among cancer caregivers of patients in treatment with solid tumors in the home setting; 2) exploration of new factors associated with cancer-caregiver burden given new trends in antineoplastic treatment and healthcare delivery; and 3) exploration of areas where future research is needed.

Identified Relevant Studies and Study Selection. For the purposes of this review, the following electronic databases were searched: PubMed, PsycINFO, Cochrane, CINAHL, and SCOPUS. Keywords and MeSH terms were used to search for titles and abstracts. Keywords included: informal, family, unpaid caregiver, cancer, neoplasm, solid tumor, patient, spouse, partner, couple, caregiver burden, caregiver strain, caregiver stress, and caregiver distress. The search terms were customized to each database. Hand searches were conducted based on references from the initial articles. Any publications after 2010 were considered for evaluation.

Publications were included if they met the following criteria: 1) published in English (regardless of country of origin); 2) focused on informal caregivers over 18 years old caring for adult patients with solid tumor cancer undergoing active treatment at home; 3) were research-based, including quantitative, qualitative, and mixed method approaches; and 4) investigated

factors associated with caregiver burden. Publications were excluded if: 1) the patients were terminally ill, at the end-of-life phase, or no longer undergoing any cancer treatment; 2) they focused on caregivers of pediatric patients; 3) they focused on paid or professional caregivers; 4) burden was not the primary outcome of the studies or review literature; or 5) they were abstracts or conference proceedings.

The initial search yielded 2,034 publications. After screening titles and abstracts, 45 publications remained. The full-text of the publications were reviewed to determine whether the inclusion criteria were met. The authors reviewed the publications and conducted independent assessments. After close review, six publications were rejected. The final review included 39 publications. A modified PRISMA flow diagram depicted this review and elimination process (Moher, Liberati, Tetzlaff, Altman, & Group., 2009) (Figure 2.1).

Data Charting, Summarizing, and Reporting the Results. Information from the selected studies was collected and sorted using an investigator-developed data extraction form. The charting information presented in Table 2.1 included study characteristics, the profile of family caregiver socio-demographic characteristics, patients' diagnosis, and factors associated with caregiver burden. Two authors reviewed this table and developed descriptive reports from the evidence sources. The summative findings as they pertained to each research question are reported in the results section.

Results

Study Characteristics. The 39 publications selected for the review were conducted in 16 countries worldwide (See Table 2.1). A combined total of 10,774 eligible informal caregivers. Caregivers were predominantly female (n=7,695, 71.48%). More than half of caregivers were spouses (average, n=5,897, 54.78%). The mean age of caregivers was 51.34 years. Six studies

focused on patients with lung cancer, three on breast cancer, four on colorectal cancer, two each on lung and colorectal cancers, and one each on gynecological (breast and ovarian cancer), melanoma, and gastrointestinal cancer. The remaining 22 publications included patients with mixed solid tumor cancers.

Research Aim 1: Examination of Current Caregiver Burden Factors. New trends in cancer therapeutic treatments, such as immunotherapies and targeted therapy, are primarily administered in ambulatory settings while oral agents are often self-administered at home. The responsibility for treatment-related side effects, monitoring, reporting, and symptom management fall to patients and their caregivers. Given the movement toward intensified home-based caregiving, factors associated with burden remain serious issues for informal caregivers. Of the 39 studies, two qualitative studies were focused predominantly on immunotherapies and oral anticancer agents (Marshall et al., 2018; Milne et al., 2019). However, all 39 studies reported that cancer caregivers experience significant burden stemming from their roles, particularly in their physical and psychological health, including anxiety, depression, economic circumstances, and social and personal relationships. Four factors that continued to stand out in this updated review on caregiver burden were caregiver physical and psychological factors, financial status, social isolation, and family or social support.

Caregiver physical and psychological factors. Cancer caregiving contributes to adverse effects on the caregiver's physical health. In particular, caregivers with comorbid conditions report exacerbated health issues and higher burden than those without chronic diseases (Esra et al., 2017). Findings indicated that the most prevalent physical problems reported included sleep disturbance, fatigue, pain, and weight gain (Hanly et al., 2015; Lee et al., 2018; Nemati, Rassouli, Ilkhani, & Baghestani, 2018). In a European study, over one third of caregivers in a

larger sample (n = 825) reported that caregiving directly affected caregivers' comorbid conditions, such as gastrointestinal problems, irritable bowel syndrome, and dyspepsia, hypertension, and other cardiovascular diseases (Goren et al., 2014). Moreover, caregivers with more than one comorbid condition tended to report higher levels of depression and anxiety compared to caregivers with none/fewer chronic health issues (Goren et al., 2014).

Informal caregivers with childcare responsibilities reported an increased negative impact on their physical health (Kavanaugh, Kramer, Walsh, & Trentham-Dietz, 2015). Further, caregivers may neglect activities that benefit physical health. A study by Beesley et al. (2011) found that caregivers of ovarian cancer patients in Australia reported skipping self-care activities, like exercise, because they did not have time. Approximately 35% of these caregivers (n=36) experienced weight gain that exceeded the healthy body mass index range, and 12% of the sample (n=12) increased alcohol intake (Beesley et al., 2011).

Cancer caregiving has been found to affect caregivers psychologically through anxiety, depression, fatigue, exhaustion, and hopelessness (Goren et al., 2014; Milbury et al., 2013; Shaw et al., 2013). Caregivers with poor psychological health, high depressive symptoms, poor self-sufficiency for symptom management, and high anxiety experienced a greater burden (Johansen et al., 2018; Lee et al., 2018; Petruzzi, Finocchiaro, Lamperti, & Salmaggi, 2013; Rha et al., 2015). Informal caregivers reported high levels of anxiety and worry regarding observation and reporting of patients' symptoms or treatment-related side effects (Milne et al., 2019; Reblin, Small, Jim, Weimer, & Sherwood, 2018).

Financial status. Informal caregivers of cancer patients reported significant financial concerns secondary to direct treatment costs, non-treatment associated expenses, and loss of income incurred by the impact of the disease (Jeong et al., 2016; Van Houtven, Ramsey,

Hornbrook, Atienza, & van Ryn, 2010; van Ryn et al., 2011). Managing costs for cancer treatment, along with other medical care costs, was often dependent on the presence of adequate health insurance coverage (Milne et al., 2019; van Ryn et al., 2011). Qualitative studies by Marshall et al. (2018) and Milne et al. (2019) reported that the high cost of oral anti-cancer medication and immunotherapy was the greatest financial challenge to informal caregivers. Health insurance benefits often did not cover all costs of immunotherapy agents. Further, there was frequent travel and accommodation related to treatment, causing a high level of financial strain (Milne et al., 2019).

Financial strains were exacerbated by decreased household income due to work absences, transportation for cancer treatment, and changes in work hours during the patients' treatment (Hanly et al., 2015; Ó Céilleachair et al., 2012; Shieh et al., 2012). Loss of occupational productivity contributed to immediate financial strain and had a long-term negative impact on the capacity to accrue retirement savings (Goren et al., 2014). Caregivers with only a high school education reported significantly higher levels of financial burden due to providing home care and loss of paid hours (Esra et al., 2017; Rha et al., 2015). Finally, several studies showed that a younger caregiver age, combined with greater patient symptom severity, resulted in a greater financial burdens (Kavanaugh et al., 2015; Li et al., 2013; Courtney Harold Van Houtven et al., 2010).

Social isolation. A study by Nemati et al. (2018) reported that informal caregivers experienced life changes that caused interference with their routine while being caregivers. Several studies showed that involvement in caregiving tasks required adjustments in the caregiver's daily routine and disrupted social activities (Bayen et al., 2017; Esra et al., 2017; Li et al., 2013). Informal caregivers reported spending more than 21 hours per week caring for their

cancer patients and providing a range of daily domestic care tasks, such as dressing, symptom management, and medicine administration over an average of 2.5 years from cancer diagnosis to remission (Grant et al., 2013; Maguire, Hanly, Hyland, & Sharp, 2018; Marshall et al., 2018). Other caregiving activities requiring significant time and commitment included a wide range of tasks, such as stoma care and health appointment commutes (Mollica, Litzelman, Rowland, & Kent, 2017; Mosher et al., 2016). Concerns over the number of hours per week spent caregiving increased burden due to the impact of scheduling demands (Bayen et al., 2017; Esra et al., 2017; Mosher et al., 2016), which limited time for social activities.

Heightened burden was also associated with reduced time for personal privacy, recreation, tension management, vacations and trips, personal chores, and socializing with friends or relatives (Grant et al., 2013; Hanly et al., 2015; Rha et al., 2015). Informal caregivers reported they often made efforts to participate in social and entertainment activities, but declined as a result of concerns about the patient during their absence (Jeong et al., 2016; Kavanaugh et al., 2015). Studies by Jeong et al. (2016) and Kavanaugh et al. (2015) revealed that younger caregivers perceived that the caring role impinged on their personal life and challenged their capacity to express their needs. Social isolation issues emphasize the importance of providing more caregiver support and assistance (Li et al., 2013; Vahidi M. et al., 2016).

Family or Social support. Informal caregivers with inadequate availability of supportive resources felt this contributed to higher burden (Petruzzi et al., 2013; van Ryn et al., 2011). Several studies showed that some informal caregivers were not using existing resources due to lack of family support, inability to obtain resources, and burden associated with caregiving (Bayen et al., 2017; Oven Ustaalioglu, Acar, & Caliskan, 2018; Shieh et al., 2012). Conversely,

caregivers with high levels of perceived social support reported a lower level of burden (Reblin et al., 2018; Shieh et al., 2012).

Family size was one factor contributing to burden level. Extended families reported lower levels of burden compared to nuclear families, given the increased numbers of members available to provide care (Akpan-Idiok & Anarado, 2014). A study by Nemati et al. (2018) showed that caregivers with a relatively heavy patient care load and poor family functioning experienced a greater burden. The type of relationship, such as spouse, sibling, or child-in-law was correlated with greater emotional attachment and higher burden (Li et al., 2013; Milbury et al., 2013). Informal caregivers who cared for a spouse or in-law with cancer reported a higher level of burden compared to those who provided care for their children or friends (Cassidy, 2013).

The four key areas of known caregiver burden continue to be an issue with an added focus due to changes in therapies and care delivery. Financial burden is compounded now by costs associated with newer therapies. The other three areas (physical and psychological, social isolation, and support) are also impacted by additional time constraints and uncertainty as to how to manage their own health and well-being, along with patient caregiving.

Research Aim 2: Less Reported Caregiver Burden Factors. Throughout the cancer treatment trajectory, informal caregivers face many challenges as they adapt to new demands brought on by caregiving responsibilities. Of 39 studies, there were three previously less reported factors associated with cancer caregiver burden: caregiver self-esteem, male gender, and the changing dynamics of cancer treatment.

Caregiver self-esteem. Caring for a friend or family member with cancer has been reported as having a positive effect on caregiver self-esteem (Cassidy, 2013; Johansen et al.,

2018). Such as when caring for an intimate partner or relative, perceived as rewarding and enhanced confidence and self-esteem among informal caregivers (Ávila, Brandão, Coimbra, Lopez, & Matos, 2016; Bayen et al., 2017). Further, caregivers with clinical skills had a higher level of self-esteem than those who were less prepared for cancer caregiving (Bahrami & Farzi, 2014; Mollica et al., 2017). For example, Mosher et al. (2016) reported on caregivers who felt helpless and did not know what to do when cancer patients faced physical symptoms, such as pain, fatigue, diarrhea, weight loss, and functional decline. Moreover, some caregivers were fearful of doing harm or the wrong thing for their patients (Nemati et al., 2018).

Male caregivers. While females are most often identified as caregivers in the literature, males are increasingly found to be the primary home-based caregivers, especially in studies of women with breast and ovarian cancer (Ávila et al., 2016; Beesley et al., 2011; Oven Ustaalioglu et al., 2018). Male caregivers reported a lower level of confidence compared to female caregivers (Esra et al., 2017; Shieh et al., 2012). Two Asian studies found that male caregivers were reluctant to provide home-based care, as they did not feel adequately prepared by the health team for the role (Jeong et al., 2016; Leow & Chan, 2017; Turkoglu & Kilic, 2012). Male caregivers with less education reported higher burden due to challenges in deriving important information and/or other support from nurses and healthcare personnel (Beesley et al., 2011; Esra et al., 2017).

Dynamic nature of cancer treatment. The reoccurrence of cancer in treated patients, and the often inevitable drift to disease metastases, highlight the dynamic nature of cancer care. Solid tumor cancers are complex diseases, which continue to require challenging therapeutic strategies, including immunotherapies, targeted therapy, and oral oncologic agents. For example, patients who were prescribed oral anti-cancer agents often received variable treatment schedules and

needed close monitoring to ensure treatment adherence (Marshall et al., 2018). Further, many cancer patients have advanced diseases and have exhausted more traditional treatment options (Marshall et al., 2018; Milne et al., 2019).

Another dynamic trend is the change from short-term in-hospital stays to ambulatory settings and an increase in home-based care as a key strategy to reduce the costs of healthcare worldwide (Lee YH et al., 2018; McLean, Walton, Rodin, Esplen, & Jones, 2013; Milne et al., 2019; Mollica et al., 2017; Nemati et al., 2018). The length of hospital stays was the key performance indicator for reimbursement of cancer care cost; therefore, the intensity and responsibility of care provision placed on informal caregivers has significantly increased (Shaw et al., 2013; Turkoglu & Kilic, 2012; Vahidi M. et al., 2016).

Cancer caregiving during active treatment strongly contributes to more challenges and thus increases caregiver burden (Leow & Chan, 2017; Milbury et al., 2013; Mosher et al., 2016). Assisting patients to manage the cancer treatment and its effects requires complex skilled-care activities. Informal caregivers often lack training, skills, and supportive resources (Bayen et al., 2017; Halpern, Fiero, & Bell, 2017; Lee et al., 2018; van Ryn et al., 2011). Caregivers may consider practical aspects of patient care as extremely challenging, includes specific training before transition to home-based care (Mollica et al., 2017; Mosher et al., 2016; Shaw et al., 2013). For example, caregivers of lung and gastrointestinal cancer must be trained on caregiving tasks including administering medications, changing dressings, and dietary and food preparation at home (Mosher et al., 2016; Shieh et al., 2012; van Ryn et al., 2011).

Longer treatment trajectories also increase burden for caregivers who have to regularly escort and/or transport patients to appointments over time (Mollica et al., 2017; Shieh et al., 2012). While duration of treatment was found to increase caregiver burden in cross-sectional

studies (Ávila et al., 2016; Johansen et al., 2018; Petruzzi et al., 2013; Rha et al., 2015), caregiver burden was recognized to fluctuate over the course of cancer treatment (Beesley et al., 2011; Milbury et al., 2013; Shaw et al., 2013). More research that evaluates the impact on caregiver burden secondary to the dynamic nature of cancer treatment is needed (Marshall et al., 2018; Vahidi et al., 2016).

In summary, caregiver burden is taking on new dimensions as care delivery and treatments advance. Providers must be aware of these changes in order to adequately support cancer caregivers in the home. The self-esteem and gender of caregivers are new fronts to consider, and the changing dynamics of cancer treatment will continue to challenge health providers as therapies evolve.

Research Aim 3: Future Trend on Caregiver Burden Research. Of the 31 quantitative studies, most were cross-sectional and descriptive in nature. There remains a lack of studies examining caregiver burden over the full duration of cancer treatment, including remissions, reoccurrences, and metastases. Longitudinal research is critical in this area, given shifts in burden over time (Beesley et al., 2011; Grant et al., 2013; Lee et al., 2018; Milbury et al., 2013) and changes in how cancer treatment is delivered.

More preparation for caregiving was pointed out in both the established areas of caregiver burden and newer, less examined areas. Although cancer caregivers confront a range of challenges, they often perceive inadequate preparation (Milne et al., 2019; Mollica et al., 2017; Reblin et al., 2018; Shaw et al., 2013) or lack information on available resources. Successful supportive care interventions for caregivers are still needed to relieve caregiver burden. Six publications examined the potential of supportive interventions to reduce caregiver burden (Bahrami & Farzi, 2014; DuBenske et al., 2013; Heckel et al., 2018; Hendrix et al., 2016;

Mahendran et al., 2017; McLean et al., 2013); however, only four demonstrated a reduction in the level of caregiver burden during the study period (Bahrami & Farzi, 2014; DuBenske et al., 2013; Hendrix et al., 2016; Mahendran et al., 2017).

Two studies reported the implementation of the Caregivers of Cancer Outpatients' Psycho-Education Support Group (COPE) intervention that reduced caregiver burden compared to standard conventional care (Bahrami & Farzi, 2014; Mahendran et al., 2017). Other studies demonstrated that cancer caregivers who received specialized training to implement home-based symptom management, including managing and prioritizing caregiving responsibilities, meal preparation, and assisting in daily activities, had lower burden compared to the control group who received standard care (DuBenske et al., 2013; Hendrix et al., 2016). DuBenske and team (2013) developed the eHealth system, which includes information services, communication services, and training services. The study found that caregivers in the intervention group had a lower level of burden and negative mood than caregivers who only had accessed to the internet. A study by Hendrix et al (2016) found that caregivers in the intervention group reported a higher level of self-efficacy after receiving the training, but there was non-significant change in level of burden. Further, two studies reported that emotionally-focused therapy interventions delivered via telephone and support services did not reduce burden in cancer caregivers (Heckel et al., 2018; McLean et al., 2013).

In summary, some caregivers were satisfied with their caregiving role, while others felt overwhelmed and uncertain regarding caregiving responsibilities. Pointing to the fact that some well-established, contributing factors to burden remain both physically and psychologically, along with a need for more social and financial support. Many of these factors have been compounded by the advances in medical treatment and continue to evolve. Areas that can be

explored further include self-esteem, male caregivers, and the dynamic nature of care. The need continues to investigate caregiver burden over the full duration of the cancer trajectory, preparation of caregivers, access to available resources and interventions designed specifically to relieve caregiver burden.

Discussion

This review evaluated current factors associated with caregiver burden of cancer patients, with findings emphasizing previously identified and newly emerging factors, and a need for interventions that relieve caregiver burden in home settings worldwide. The findings demonstrate that previously identified problems affecting caregivers continue to persist and are often exacerbated with newer treatments.

The known factors contributing to caregiver burden are physical and psychological factors, financial status, social isolation, and family or social support. Caregivers' psychological concerns, including anxiety and depression, can be compounded by financial stressors so that there is less opportunity for respite (Balfe et al., 2018; Mosher et al., 2016; Vahidi et al., 2016). This fact draws attention to the need for health professionals to provide information on available resources, especially in relation to the newer therapeutics. Social support has been associated with significantly less caregiver burden (Kemp et al., 2018; Oven Ustaalioglu et al., 2018; Reblin et al., 2018). Caregiver support groups or on-line chat rooms may be useful to some caregivers who feel isolated (DuBenske et al., 2013; Given, 2019). For caregivers with comorbid conditions, resources need to put the emphasis on a healthy lifestyle, self-care, and time management to efficiently accomplish tasks for themselves as well as their patient. In this review, major differences were acknowledged across various countries. Further, changes such as those seen in the U.S. regarding cancer treatment and delivery may be indicative of trends in

other countries as well. Each country will need to address its health resources for caregivers and implement a culturally-appropriate plan.

The top issues for the less reported factors associated with caregiver burden were caregiver self-esteem, male gender, and dynamics of cancer treatment. Informal caregivers felt low self-esteem during moments when they saw their patients suffer from adverse symptoms or treatment-related side effects, and they perceived themselves as having not provided adequate care for the patient. This suggested the importance of educating caregivers on the patients' illness trajectory so that they know how to support and manage the symptoms as part of the disease and treatment process. While not measuring caregiver burden, Mazanec et al. (2019) tested a simulation-based intervention with caregivers for specific skills needed in home-based care. Less than half of the enrolled caregivers completed the study; therefore, the investigators recommended more feasibility testing. Those who did complete the study showed trends towards improved psychological health and self-efficacy (Mazanec et al., 2019).

Male caregivers may experience additional barriers compared to female caregivers, since often the perception is that caregiving is a predominantly female role. While not assessing the level of burden among male caregivers, a clinical trial study by Wyatt et al. (2017) reported that male caregivers in the U.S. were highly likely to deliver home-based symptom management for spouses with advanced breast cancer. As reported above, the number of male caregivers is growing and the support and education directed toward male caregivers needs to reflect such an increase changes. Internationally, research can explore culturally-sensitive caregiving issues, such as helping male caregivers adapt to the role within a given culture.

Regarding dynamic factors of treatment, immunotherapy has extended survival in metastatic cancer patients and taking in-home medication like palbociclib or enzalutamide

(Antonarakis, 2018; Milne et al., 2019). Such dynamic factors in the evolving responsibilities of home-based caregiving must be addressed. Health professionals must be prepared to alleviate the burden posed by these newer therapies as they continue to present new challenges over time. Creative interventions for caregivers and new or different support structures can be considered. There are clearly unexplored areas for caregiver burden research, including those found in this review: duration of cancer treatment, preparation for caregiving, available resources, and interventions designed to relieve caregiver burden. Knowing more about caregiver socio-demographic characteristics will help health providers determine which caregivers will need more support over time. Caregivers may require specialized training to cope with oral anti-cancer drugs, targeted therapy, or immunotherapy agents. Previous studies showed that psycho-educational, skill training, and therapeutic counseling have been the predominant methods used in caregiver burden interventions. However, those interventions were found to have small to medium effects on reducing burden (DuBenske et al., 2013; Frambes, et al., 2017; Hendrix et al., 2016; Northouse et al., 2010).

Valuable intervention testing is moving forward, even though it does not focus specifically on caregiver burden. Organizations such as the Oncology Nursing Society are developing critical guidelines on topics, including safe handling of oral anti-cancer agents at home (Neuss et al., 2016; Oncology Nursing Society, 2016). Specific home-based interventions are being tested to facilitate symptom reporting and management (Beck, Eaton, Echeverria, & Mooney, 2017; Berry, 2019; Mooney, Whisenant, & Beck, 2019; Mooney et al., 2017). These home-based interventions can be considered in the future for their impact on caregiver burden. In summary, there remains limited evidence of support available to help caregivers in undertaking cancer caring tasks, particularly in the face of newer therapies. Despite growing research on

informal caregiving, there is a crucial need to develop effective interventions to reduce or alleviate caregiver burden. Such intervention may need to be tailored based on caregivers' individual characteristics and current skill set.

Limitations of Review

First, articles were limited to those published in English, which might overlook relevant work published in other languages. Second, while search strategies were developed by agreement of the authors, there remains challenges in searching through all studies on caregiver burden. Therefore, it is plausible that potential eligible studies may have been overlooked for inclusion. Finally, the search was limited to studies indexed in five databases.

Conclusions

The delivery of cancer care by informal caregivers is a global public health issue. Policies and programs that strengthen community capacities to promote caregivers' health are imperative. Public policies currently address cancer patients' needs to access to high-quality care and the availability of resources, but remain lacking in attending to needs for informal caregivers. Informal caregivers need information and their own support services to preserve their critical role as caregivers, but frequently do not know where to turn for help.

In the era of changing cancer treatment and therapies, nurse scientists must continue to develop and test new supportive interventions targeted to informal caregivers or patient-caregiver dyads. Based on this review, there is an urgent need to design and test multipronged caregiving interventions capable of addressing a combination of complex factors, such as ethnic and racial demographics, comorbid conditions, and social and geographic diversity for reducing caregiver burden. As informal caregivers represent a critical extension in cancer caregiving, there is a need to provide innovative solutions that account for these new challenges and address

caregiving needs throughout the cancer trajectory. It would be beneficial to identify tailored interventions with standardized measurement scales and research methods to assist healthcare professionals in preventing and alleviating caregiver burden.

CHAPTER 3

BURDEN AND PSYCHOLOGICAL SYMPTOMS AMONG CAREGIVERS WHO COMMITTED TO PERFORM HOME-BASED COMPLEMENTARY THERAPIES AS SYMPTOM MANAGEMENT FOR CANCER PATIENTS

Abstract

Purpose: To explore associations between caregiver burden and caregiver socio-demographic characteristics, comorbid conditions, anxiety, and depression among those who agreed to provide nurse-designed complementary therapy (CT) home-based symptom management interventions to cancer patients undergoing treatment.

Methods: This secondary analysis was guided by the Organizing Framework for Caregiver Interventions, using baseline data from a randomized controlled trial of two CTs. A total of 349 caregivers completed the Caregiver Reaction Assessment Tool (CRAT) for burden, Bayliss Comorbidity Tool, and PROMIS-29 v1.0-Anxiety and Depression Short Forms. Multivariable linear models were used to examine the associations of five dimensions of caregiver burden: caregiver self-esteem, family support, financial, schedule, and health burden with caregiver socio-demographic characteristics, comorbid conditions, anxiety, and depression.

Results: The majority of caregivers (58%) were female, 61% were spouses/partners, and 73% resided with the patient. Being a female, Asian, a spouse, employed, and having a high level of depression and anxiety were significantly associated with CRAT dimensions of caregiver self-esteem, schedule burden and health burden (12%-24% of explained variance). Caregiver depression and anxiety were significant factors influencing lack of family support and higher financial burden, accounting for 13%-18% of explained variance.

Conclusions: When assessing caregivers who may be willing to participate in a nurse-designed CT intervention for patients, evaluating socio-demographics, anxiety, and depression may be

useful to identify caregivers with the greatest pre-existing burden related to self-esteem, health, and schedule.

Introduction

It is estimated that 3 million Americans are serving as friend or family caregivers for cancer patients at home (National Alliance for Caregiving, 2018). Caregiving for cancer patients undergoing treatment often comes at a price referred to as caregiver burden. The friend or family caregivers often take on unpaid roles for providing cancer care, including symptom management. As new nursing interventions are developed for symptom management, friends or family caregivers are asked to provide these additional care tasks to support cancer patients at home. Due to this change, increasing numbers of caregivers are involved in new cancer care activities, such as complementary therapies along with basic care (Frambes, et al., 2017; Wyatt, et al., 2017), which may or may not contribute to higher caregiver burden (Frambes at al., 2017; Leow & Chan, 2017; Wyatt, Lehto, & Sender, 2019). The consequences of the increasing shift to home-based care has not been adequately investigated for caregivers.

Caregiver burden is defined as multidimensional responses to the overwhelming and unpredictable roles associated with complex care demands during caregiving experiences (Bevan & Stenberg, 2012; Given, Given, & Sherwood 2012). Caregiver burden includes perceived physical, psychological, social, and financial problems resulting from providing complicated care for people with cancer (Given et al., 1992; Montgomery, Gonyea, & Hooyman, 1985). High level of caregiver burden could be significant for years, affecting the overall well-being of caregivers. When burden increases physical and psychological health problems, the caregiver's ability to provide adequate care is reduced (Stenberg et al., 2014; Girgis, Lambert, Johnson, Waller, & Currow, 2013).

Describing the factors that affect caregiver burden is essential, especially so when agreeing to implement nurse-designed home-based symptom management interventions (Given

et al., 2005). To date, few researchers have looked at the associated factors of caregiver burden among caregivers who commit to providing a home-based symptom management intervention (Frambes; Wyatt, Sikorskii, & Victorson, 2012; Wyatt & Sikorskii, 2018). A better understanding of these associations may help healthcare professionals support friend or family caregivers.

Study Aim

The aim of this study was to examine the association between dimensions of caregiver burden and caregiver socio-demographic characteristics, comorbid conditions, anxiety, and depression among those who agree to provide one or more nurse-designed complementary therapy symptom management interventions (i.e., reflexology and meditative practices) to their care recipients who undergo cancer treatment.

Literature Background

While nurse researchers are addressing caregiver needs (Badger, Sikorskii, & Segrin, 2019; Wyatt et al., 2017), the focus has primarily been on patients. To advance research on caregiver health, this study aimed to explore factors that could potentially be associated with caregiver burden. This work was guided by the adapted Organizing Framework for Caregiver Interventions (OFCI; Van Houtven, Voils, & Weinberger, 2011). The literature on each potential predictor of caregiver burden is reviewed below.

Caregiver socio-demographic characteristics. Cancer caregiver socio-demographic characteristics that have been identified in the literature as affecting caregiver burden include being female, different racial and ethnic backgrounds, having a lower level of education, being unemployed, living in the same house with the cancer patient, and having no choice but to be a caregiver (Akpan-Idiok & Anarado, 2014; Grant et al, 2013; Hanly, Maguire, Hyland, & Sharp,

2015; Rha, Park, Song, Lee, & Lee, 2015). However, employed caregivers and male caregivers in Asian studies reported a higher level of burden while caring for patients undergoing cancer treatment (Jeong & An, 2017; Leow & Chan, 2017). In summary, caregiver socio-demographic characteristics have varied by study and only minimally reported in relation to caregiver burden, and not at all for those who commit to participate in symptom management interventions.

Caregiver comorbid conditions. Esra, Sibel, Asi, Zeynep, & Mine (2017) reported that a higher number of comorbid conditions correlated with a higher level of caregiver burden. Friend or family caregivers often believe that caring for their patients with cancer is their first priority, leaving little time for maintaining their own healthy lifestyles (Girgis et al., 2013; Palos et al., 2011). As a result, levels of burden may increase the number of caregiver health issues, such as gastrointestinal disease, hypertension, and heart disease, especially in those who previously had comorbid conditions (Girgis et al., 2013; Goren et al, 2014). Further research is still needed to assess how caregiver comorbid conditions may affect the level of caregiver burden when agreeing to participate in a specific symptom management intervention.

Caregiver anxiety and depression. Anxiety and depression are common negative psychological responses to the cancer caregiving experience (Sherwood et al., 2004). Friend or family caregivers have reported higher levels of anxiety and depression compared to the general population (Finocchiaro et al., 2012). Previous studies reported that the prevalence of anxiety and depression among cancer caregivers was 24% and 50%, respectively (Girgis et al., 2013; Goren et al., 2014; Rivera, 2009). Further, a significant proportion of caregivers experienced the co-occurrence of anxiety and depression disorder was 50% (Moscati, Flint, & Kendle, 2016). An assessment of caregivers experiencing anxiety and depression is needed in order to provide better

support prior to beginning home-based symptom management, especially when planning to include a specific complementary therapy alongside basic care.

Methods

Research Design and Sample. This study was a secondary analysis of baseline data from 349 caregivers enrolled in a randomized controlled trial called, Using Sequential Multiple Assignment Randomized Trial (SMART) Design to Improve Symptom Management Strategies among Cancer Patients (R01 CA193706). In the parent study, patients and caregivers were recruited as dyads from eight comprehensive cancer centers and community oncology clinics across the U.S.

Cancer patients inclusion criteria were: 1) age 21 or older; 2) having solid tumor cancer diagnosis; 3) being able to perform basic activities of daily living; 4) undergoing chemotherapy, hormonal therapy or targeted therapy; 5) reporting severity of >3 on fatigue using a 0–10 standardized scale at intake; 6) being able to speak and understand English; 7) having access to a telephone; and 8) being able to hear normal conversation. Patients exclusion criteria were: 1) having diagnosis of major mental illness in medical record and verified by the recruiter; 2) nursing home residents; 3) bedridden; 4) involving with regular reflexology or meditative practices; or 5) having presence of deep vein thrombosis or painful foot neuropathy.

Once patients consented to participate, they were asked to identify the person who they considered their friend or family caregiver to participate with them in the study. Caregivers inclusion criteria were: 1) 18 years old or older; 2) being able to speak and understand English; 3) having access to a telephone 4) being able to hear normal conversation; 5) cognitively oriented to time, place, and person; and 6) willing to be trained in reflexology and/ or meditative

practices and participate in phone data collection. Caregivers exclusion criteria were: 1) being unwilling or unable to perform reflexology or meditative practices in the patient's home.

Data Collection. Trained interviewers collected baseline data from caregivers via telephone and included questions about caregiver burden, socio-demographic characteristics, comorbid conditions, anxiety, and depression. In this secondary analysis, the baseline interview was conducted prior to randomization and only baseline data were used for the analysis.

Ethical Considerations. Institutional Review Board approval was obtained for the parent study and for this secondary analysis. All data were stored on a secure study server at the investigators' university; access to data was restricted by password protection and managed per institutional review board-approved procedures. All data for this secondary analysis were de-identified.

Measures.

Caregiver burden. Caregiver burden was measured using the Caregiver Reaction Assessment Tool (CRAT) (Given et al., 1992). The CRAT is comprised of 23 items that reflect both positive and negative reactions to caregiving. The CRAT is a multidimensional instrument on a 5-point scale: 1=strongly agree to 5=strongly disagree. Items are grouped in five areas, including caregiver self-esteem, lack of family support, financial burden, schedule burden, and health burden. Average scores were computed across items within each subscale, so that subscale scores ranged from 1 to 5.

Four of the CRAT dimensions were constructed in such a way that higher numbers indicated higher levels of burden, while the caregiver self-esteem subscale was constructed in the opposite manner: a lower number indicated a higher burden. Cronbach's alphas for the subscales

ranged from .60 for health burden; .74 for lack of family support and schedule burden; and .75 for caregiver self-esteem and financial burden subscale.

Caregiver socio-demographic characteristics. A caregiver socio-demographic characteristics questionnaire was used to collect information about age, sex, race/ethnicity, employment (full-time, part-time, not employed, or retired), education (high school or less, some college or 2-year degree, 4-year college graduate, or more than 4-year degree), caregiver relationship (spouse/partner, adult children/step children, parent, friend or other), and living arrangement (living with the cancer patient or not with patient).

Caregiver comorbid conditions. The Bayliss Comorbidity Checklist (Bayliss, Ellis, & Steiner, 2009) was used to identify the presence of 21 common chronic conditions. This tool has a median sensitivity and specificity compared to chart review of >75% and 92%, respectively. Internal consistency reliability was not applicable due to this tool being a checklist (Bayliss, Ellis, & Steiner, 2005).

Caregiver anxiety and depression. The extent to which caregivers felt overwhelmed and experienced interpersonal symptoms associated with anxiety and depression was measured using PROMIS-29 V.1 (PROMIS, 2010). PROMIS- 29 is a set of tools designed to measure self-reported physical, mental and social health and wellbeing. The depression and anxiety PROMIS domains were used in this study. The PROMIS questions are rated on a 5-point scale, ranging from 1=never to 5=always. T-scores were calculated for each domain on the PROMIS measures, so that a score of 50 represented the mean of the reference population, with the standard deviation 10. High scores represented more of the domains being measured. Cronbach's alphas were 0.85 for anxiety and 0.83 for depression.

Data Analysis

The data were analyzed using Statistical Analysis System version 9.4 (SAS Institute, Cary, NC). All data were checked for completeness and quality in the parent study. Descriptive statistics were used to summarize the sample characteristics. Categorical variables were summarized using frequencies and percentages. Means and standard deviations were used to describe continuous variables. A general linear model (GLM) was used to determine the association between caregiver burden and caregiver socio-demographic characteristics, comorbidity, anxiety, and depression. To account for co-linearity between depression and anxiety (Moscatti, Flint, & Kendle, 2016), the models were also fit including socio-demographic characteristics, comorbidity, and either depression or anxiety. All statistical tests were two-sided and conducted at a .05 level of significance.

Results

Baseline Socio-demographic Characteristics, Comorbid Conditions, Anxiety, and Depression. A total of 349 caregivers of cancer patients completed baseline data collection and were included in this secondary analysis. The average age of the caregivers in the sample was 55.37 years old (SD = 14.61 years). Approximately 58% (n=192) of caregivers were female and 73% (n=252) were living with their patients (Table 3.1). Most caregivers (61%, n=211) were patients' spouses, and 12% were friends (n=41) and parents (n=40). The sample was predominantly white (84%, n=284) and non-Hispanic/Latino (90%, n=314). Most caregivers were employed at least part-time (57%, n=198) and had some college education (30%, n=105). In this sample, caregivers had a mean of 3.15 (SD 2.61) comorbid conditions.

Mean Scores and Standard Deviations on Caregiver Burden Subscales, Anxiety, and Depression. When examining the burden subscales (Table 3.2), caregivers had a high level of caregiver self-esteem (\bar{x} =4.51, SD=0.42, range 2.29-5.0), corresponding to lower burden. Regarding the other four subscales, lower means were seen, which also corresponded with lower burden due to the scoring method: lack of family support (\bar{x} =1.72, SD=0.73, range 1.0-4.6), financial burden (\bar{x} =1.89, SD=0.87, range 1.0-4.67), schedule burden (\bar{x} =2.46, SD=0.89, range 1.0-5.0), and health burden (\bar{x} =1.46, SD=0.67, range 1.0-4.0). Therefore, all burden subscales reflected relatively low caregiving burden. Further, caregivers had a mean T-score on PROMIS-anxiety = 47.48 (SD=8.32, range 40.3-81.6) and PROMIS-depression = 46.47 (SD=7.27, range 41.0-79.4), with both being below the general United States population mean of 50.

Correlation Coefficients of Caregiver Burden Five Subscales. Table 3.3 presents the correlation coefficients of five-subscales of caregiver burden with socio-demographic characteristics, comorbid conditions, anxiety, and depression.

Self-esteem subscale score was negatively related to caregiver age ($r = -.11$, $p < .05$) and anxiety ($r = -.10$, $p < .05$). This indicated that caregivers whose score was higher on self-esteem (i.e., lower burden) were younger and less anxious.

Lack of family support subscale score was positively correlated with comorbid conditions ($r = .12$, $p < .05$), anxiety ($r = .20$, $p < .01$), depression ($r = .24$, $p < .01$), and negatively correlated with caregiver self-esteem ($r = -.23$, $p < .01$). This finding indicated that a greater perceived lack of family support was reported by caregivers with more comorbid conditions and higher anxiety, depression, and lower caregiver self-esteem mean scores.

Financial burden subscale score was negatively related to caregiver age ($r = -.17$, $p < .01$), indicating that a greater financial burden was reported by younger caregivers. Further,

financial burden was positively associated with comorbid conditions ($r = .19, p < .01$), anxiety ($r = .22, p < .01$), depression ($r = .24, p < .01$), and lack of family support ($r = .38, p < .01$), which means that a higher financial burden was reported by those with more comorbid conditions and higher anxiety, depression, and lack of family support mean scores.

Schedule burden subscale score was negatively correlated with caregiver age ($r = -.17, p < .01$), pointing to a higher schedule burden being reported by younger caregivers. On the other hand, schedule burden was positively related to anxiety ($r = .35, p < .01$), depression ($r = .37, p < .01$), lack of family support ($r = .34, p < .01$), and financial burden ($r = .23, p < .01$). That is, when schedule burden was high, anxiety, depression, lack of family support, and financial burden were also high.

Health burden subscale score was negatively associated with caregiver self-esteem ($r = -.25, p < .01$), representing that caregivers who reported higher burden experienced lower self-esteem. However, the health burden subscale was positively associated with the number of comorbid conditions ($r = .19, p < .01$), anxiety ($r = .29, p < .01$), depression ($r = .29, p < .01$), lack of family support ($r = .25, p < .01$), financial burden ($r = .27, p < .01$), and schedule burden ($r = .40, p < .01$). These associations indicated that the health burden was higher for those with more comorbid conditions and higher anxiety, depression, lack of family support, and financial burden mean scores.

Anxiety and depression subscales were strongly and positively correlated ($r = .74, p < .01$). This supported the decision to explore inclusion of only one or both of these variables in the statistical models for caregiver burden.

Three GLMs for Caregiver Burden and Predictor Variables.

Five GLMs for Burden Subscales in Relation to all Predictor Variables. Table 3.4

illustrates the results of five GLMs for caregiver burden subscales (i.e., self-esteem, lack of family support, financial burden, schedule burden, and health burden) in relation to all predictor variables, including both depression and anxiety in the same model.

Self-esteem subscale score was lower for female caregivers ($b = -.11$ (.06), $p < .05$) compared to males and those with high anxiety ($b = -.01$ (.004), $p < .05$). Twelve percent of the variance in caregiver self-esteem was explained by all predictor variables.

Lack of family support subscale score was higher for caregivers with higher depression ($b = .02$ (.01), $p < .05$). On the other hand, lack of family support was lower for those who were employed full-time ($b = -.23$ (.12), $p < .05$) compared to retired, and graduates with a 4-year college degree ($b = -.24$ (.11), $p < .05$) compared to only some college. Thirteen percent of the variance in lack of family support was explained by all predictor variables.

Financial burden subscale score was higher for caregivers with comorbid conditions ($b = .06$ (.02), $p < .01$). Whereas, financial burden was lower among those whose level of education exceeded a 4-year college degree ($b = -.30$ (.13), $p < .05$) compared to a 4-year degree. Eighteen percent of the variance in financial burden was explained by all predictor variables.

Schedule burden subscale score was higher for caregivers with higher depression ($b = .03$ (.01), $p < .01$). However, schedule burden was lower for those who were friends ($b = -.67$ (.19), $p < .01$) or in the “other” relationship category ($b = -.49$ (.21), $p < .05$) compared to spouses. Twenty-four percent of the variance in the schedule burden was explained by all predictor variables.

Health burden subscale score was higher among females ($b = .20 (.08)$, $p < .05$) compared to males, Asian caregivers ($b = .39 (.18)$, $p < .05$) compared to White, those with higher depression ($b = .02 (.01)$, $p < .05$), and those with more comorbid conditions ($b = .05 (.01)$, $p < .01$). Health burden was lower for those who were friends ($b = -.62 (.15)$, $p < .01$), adult children or stepchildren ($b = -.44 (.15)$, $p < .01$), or in the “other” type of relationship ($b = -.45 (.15)$, $p < .01$) compared to spouses. Twenty-three percent of the variance in health burden was explained by all predictor variables.

Five GLMs for Burden Subscales in Relation to All Predictor Variables, Except Depression. Table 3.5 describes the results of five GLMs, one for each burden subscale, in relation to socio-demographic characteristics, comorbid conditions and anxiety, but not depression. When depression was not included, caregiver anxiety was significantly related to all burden subscales. The effects of socio-demographic characteristics and comorbid conditions did not change when compared to the first model.

Five GLMs for Burden Subscales in Relation to All Predictor Variables, Except Anxiety. Table 3.6 describes the results of five GLMs, one for each burden subscale, in relation to socio-demographic characteristics, comorbid conditions and depression, but not anxiety. When anxiety was not included, caregiver depression was significantly related to all burden subscales. The effects of socio-demographic characteristics and comorbid conditions on the caregiver burden subscales (i.e., self-esteem, lack of family support, financial burden, and schedule burden) did not change compared to the first model. However, in the third model, the health burden subscale was higher among younger caregivers ($b = -.01 (.001)$, $p = .05$), females ($b = .21 (.08)$, $p < .05$) compared to males, Asian caregivers ($b = .37 (.18)$, $p < .05$) compared to White, those with higher depression ($b = .03 (.01)$, $p < .01$), and those with more comorbid

conditions ($b = .05$ (.01), $p < .01$). Health burden was lower for those who were friends ($b = -.62$ (.14), $p < .01$), adult children or stepchildren ($b = -.46$ (.15), $p < .01$), or in the “other” type of relationship ($b = -.43$ (.16), $p < .01$) compared to spouses. Twenty-two percent of the variance in health burden was explained by all predictor variables.

In sum, the predictor variables showing the statistically significant association with the caregiver burden five subscale were caregiver sex, race, comorbid condition, relationship to cancer patients, employment status, level of education, depression, and anxiety.

The predictor variable of being a female caregiver was associated with higher self-esteem and higher health burden. Compared to spousal caregivers, caregivers who identified themselves as friends, adult/step-children, or as other type of relationships to cancer patients had lower schedule burden and health burden than spouses. Further, caregivers who had a higher number of comorbid conditions were more likely to report higher financial burden and higher health burden. The level of education was a predictor variable for burden related to lack of family support and financial burden. Self-reported depression was independently associated with lack of family support, financial burden, schedule burden, and health burden. Whereas, higher anxiety was a predictive factor of lower caregiver self-esteem. Finally, caregiver age was the only variable that showed a significant difference in health burden among caregiver socio-demographic characteristics in three GLM models. Younger caregivers and those who had more comorbid conditions had a significant association with higher health burden in the third GLM.

Discussion

The result of this secondary analysis provided insight into the burden of caregivers prior to being trained to deliver a nurse-designed CT home-based symptom management intervention. As supported by prior literature, caring for cancer patients at home can potentially carry negative

consequences for caregivers such as reduction or interruption of personal and social activities, financial issues, and physical and psychological health problems (Given et al., 2012; Grant et al., 2013;). In contrast, this study found that caregiver burden was lower than that reported in previous caregiving studies (Esra et al., 2017; Grant et al., 2013; Hu, Peng, Su, & Huang, 2018).

Caregiver burden subscale findings are similar to those reported by Girgis et al. (2013) and Li & Loke (2013), who found that caregivers had high personal satisfaction, feelings of reward, and received respect and appreciation from patients related to their cancer caregiving roles. For example, due to the high self-esteem reported, caregivers in this study might have felt confident to perform a nurse-designed CT as a home-based symptom management intervention for cancer patients. Another contributing factor could have been the fact that caregivers knew they would be trained by reflexology and meditative practices experts in their home (Sikorskii et al., 2017). Such preparation and guidance may have kept caregivers from reporting higher burden. Regarding anxiety and depression, caregivers were very similar to average Americans and may not have felt overwhelmed by taking on a new project, such as nurse-designed CT interventions, especially if it might help eliminate or reduce symptoms for their patient (Stenberg et al, 2014; Wyatt et al. 2017).

For the other four types of burden, the findings of this study showed that caregivers reported lower burden on lack of family support, schedule burden, financial burden, and health burden subscales. These findings contradict previous studies where higher financial and health burden were reported (Esra et al., 2017; Hu et al, 2018). Moreover, the study by Girgis et al. (2013) found that cancer caregiving had an impact on caregivers' personal schedules and lifestyles that resulted in higher burden reported for scheduling. On the other hand, a study by Maguire et al. (2016) supported the findings from this study, where Irish caregivers found

acceptable support while caring for cancer patients. Thus, the comparative results are mixed with what the present study found.

There were significant correlations between all five subscales and one or more predictor variables. Health burden had the highest number ($n=6$) of positive correlations with predictor variables, followed by financial burden and schedule burden with four positive correlations. The predictor variables that cut across all three of these highly associated burden subscales were anxiety, depression and lack of family support. These findings are supported by previous studies (Maguire, Hanly, Hyland, & Sharp; 2016 and Yeh & Chang; 2011), where perceived lack of family support was positively associated with higher health burden, schedule burden, and financial burden.

When all predictor variables were included, the highest percentage of variance was explained by schedule burden and health burden at 24% and 23%, respectively. Higher schedule burden and health burden were significantly associated with the relationship to cancer patients and/or depression. Based on the current findings, spousal caregivers and those who had higher depression were more likely to report higher schedule burden and health burden compared to caregivers who were adult children/step-children, friends, or other type of relationships. Similar to the study by Hu et al. (2018), spousal caregivers reported a higher caregiver burden than other types of relationships to the patient. Spouses may be associated with family commitments and relationship attachment that could further exacerbate the perceived burden of cancer caregiving (Maguire et al., 2016). It could also be that caregivers other than spouses felt conflicted due to other roles, such as childcare and their own daily schedules. The conflict between caregivers' schedule and providing care has been documented (Cinar et al., 2016; Hu et al., 2018).

While the mean age of caregivers in this study was 55.37 years old, yet they had at least three comorbid conditions. Similar to the findings by Maguire et al. (2016), caregiver comorbid conditions were significantly predictive of health burden and financial burden (11%–13% of explained variance), and younger age increased the risk of health and financial burden. From a cross-cultural perspective, caregivers in the present study who were Asian had more comorbid conditions and higher depression correlated with a higher health burden. Several caregiving studies reported that younger Asian caregivers had higher burden with obligations of care compared to those caregivers from other countries (Hu et al., 2018; Leow & Chan, 2017; Yeh & Chang, 2011).

Additionally, the findings of the present study indicated that level of education had a significant association with lack of family support and financial burden. Caregivers with less education (some college or associate degree) experienced lower family support and higher financial burden than caregivers with more education (four years of college or higher). Findings by Sheih, Tung & Liang (2012) and Stenberg et al. (2014) also reported on caregivers whose level of education was below a bachelor's degree, but who expressed burden as inadequate preparedness and/or a limited ability to find or utilize resources for caregiving. Employment status was a factor associated with lack of family support, with retired caregivers more likely to report this burden compared to caregivers who were employed full-time. Similar results were found by Stenberg et al. (2014), where full-time employed caregivers had lower burden. It is possible that employment served as a buffer or diversion from caregiving; it may also be a factor of age or family perception, since retired caregivers may be perceived as having time for caregiving and therefore needing less support.

Finally, the present study found an association between caregiver self-esteem and caregiver sex and anxiety. This finding is similar to Stenberg et al. (2014), who found that female caregivers had lower self-esteem compared to males. Female caregivers were found to be more emotional and more likely to report negative effects of cancer caregiving. In other words, cancer caregiving may create more emotional strain for females and present as anxiety, which could threaten caregiver performance and self-esteem.

In model two, there was no change in predictor variables of caregiver burden subscales compared to the first model. However, in model three, the high level of health burden was associated with younger caregivers, females, spouses, Asian caregivers, and those with more comorbid conditions. This finding is consistent with Girgis et al. (2013), who reported that caregivers were more likely to focus on the cancer patient and decrease their own time for exercise and healthy activities. The exacerbation of health issues often emerged during or after the caring trajectory (Esra et al., 2017). Also, the GLMs analyses demonstrated the co-occurrence of anxiety and depression. Thus, healthcare professionals must pay more attention and provide additional supportive resources for caregivers to prevent the worsening of physical and psychological health burdens for caregivers.

In summary, caregiver socio-demographic characteristics (age, sex, race, relationship to patient), number of comorbid conditions, anxiety, and depression were significantly associated with one or more caregiver burden subscales. Caregivers reported an average of three comorbid conditions, and older caregivers reported a higher number of comorbid conditions. Perceived lack of family support increased burden in health, schedules, and finances. Taken together, findings of this study suggest that caregivers who agreed to participate in nurse-design CTs home-based symptom management intervention may be identified as at-risk for experiencing

burden in these specific areas. Identifying risk factors for each individual caregiver could help anticipate need and reduce factors that increase caregiver burden earlier in the caregiving trajectory.

Limitations

This study had several limitations that were important considerations related to findings and implications for future research. First, this study may have a generalizability limitation due to self-selection bias of caregivers who agreed to participate in nurse-designed symptom management interventions with complementary therapies. Secondly, response-bias might be possible since the study used self-reported measurements, and answers could not be verified objectively. Finally, the study had a cross-sectional design and only associations could be explored, rather than causal relationships between caregiver burden and predictor variables. Moreover, potential risk factors for caregiver burden, such as number of caregiving hours, dwelling distance from the patient, and caregivers' pre-existing tendency for anxiety and depression were not measured in this study and should be considered for future studies.

Research Implications

The results of the study apply to nursing practice by indicating the need to assess specific groups of caregivers at risk for excessive burden. Practitioners need to be aware of socio-demographic characteristics, anxiety, depression, and comorbid conditions of caregivers who wish to participate in a specific symptom intervention for their patient. Nurses need to consider the cancer caregiver as well as the patient when determining home care needs.

Conclusions

In conclusion, the findings of this study provided a comprehensive description of the association between caregiver burden and related characteristics. When assessing caregivers who

may be willing to participate in symptom management interventions, caregiver socio-demographics, anxiety, and depression may be assessed to identify caregivers with the greatest pre-existing burden related to caregiver self-esteem, family support, finances, schedule, and health of the caregivers.

CHAPTER 4

BURDEN AMONG CAREGIVERS WHOSE CANCER PATIENTS WERE NON-RESPONSIVE TO A HOME-BASED SYMPTOM MANAGEMENT INTERVENTION

Abstract

Purpose: There is a growing trend of home-based informal caregiver involvement in cancer patient care. This study examined perceived caregiver burden among caregivers that delivered one or two symptom management interventions to cancer patients in a two-phase dyadic (patient & caregiver) 8-week symptom management study.

Methods: This secondary analysis was conducted on data from a national Sequential Multiple Assignment Randomized Trial (SMART). The parent study enrolled 471 dyads. In phase 1, dyads were randomized to one of two symptom management interventions: reflexology or meditative practices, or a control condition. After the first 4 weeks, non-responders to each intervention (N=89 total) were randomized to either continue the same intervention or add another one for weeks 5-8 (phase 2). The 23-item Caregiver Reaction Assessment Tool (CRAT) was administered at baseline and post-intervention at week 12 to evaluate change in perceived caregiver burden. Multivariable general linear modeling was used to assess differences between groups, created by the second randomization, in perceived caregiver burden at week 12 after adjusting for baseline burden.

Results: The findings demonstrated a significantly lower level of caregiver burden at week 12 in the areas of lack of family support, schedule burden, and health burden among caregivers of non-responders who delivered meditative practice alone over 8 weeks, compared to caregivers who added reflexology during weeks 5-8. No group differences in caregiver burden at week 12 were found between the two groups of caregivers of non-responders who were initially randomized to

reflexology. Caregivers who were initially randomized to reflexology reported greater schedule burden if they were employed versus unemployed at week 12.

Conclusions: Caregivers of non-responders who began with meditation and added the second therapy, reflexology, expressed more burden in three areas at week 12, compared to those who provided 8 weeks of meditation. Therefore, caregivers involved in a mind-body intervention such as meditation and then add a body-based intervention like reflexology may need more support in the areas of enlisting family support, managing their schedule and their own health. Finally, caregivers providing reflexology to their patient should consider their schedule, if they are employed, to be sure they have the time for this symptom management intervention.

Introduction

A cancer diagnosis not only impacts patients but can also contribute to psychological and physical health consequences for caregivers (Grant et al., 2013). According to the Affordable Care Act, the responsibilities of care are being transferred from healthcare institutions to caregivers in the home setting to reduce healthcare costs (Bielaszka-Duvernay, 2011). Friend and family members who serve as unpaid caregivers in the home environment throughout the cancer treatment trajectory provide the bulk of basic care (Given, Given, & Sherwood, 2012). Friend or family caregivers of cancer patients perceived higher self-esteem and feelings of closeness to patients through caregiving (Milbury, Badr, Fossella, Pisters, & Carmack, 2013). At the same time, caring for cancer patients may lead to higher caregiver burden, which is defined as the extent to which caregivers perceive their physical health, psychological health, time-schedule, social life, and financial status as having suffered due to providing care (Bevans & Sternberg, 2012; Given et al., 1992; Zarit, Reever, & Back-Peterson, 1980).

Although the uncertainty of the role of caregiving has been investigated, most of these studies were conducted with friend or family caregivers who provided basic care (Akpan-Idiok & Anarado, 2014; Esra, Sibel Asi, Zeynep, & Mine, 2017; Johansen, Cvancarova, & Ruland, 2018). There has been little examination of potential variables such as patient-caregiver relationships, living arrangements or perceived burden when the friend or family caregivers are asked to deliver a symptom management intervention in addition to basic care. As new caregiver-delivered interventions are tested for patient symptom management, it is essential to examine the impact of adding yet another task to cancer caregiving. A few studies have examined caregiver burden among caregivers who were involved in a cancer symptom management training program (DuBenske et al., 2013; Hendrix et al., 2016; McLean, Walton,

Rodin, Esplen, & Jones, 2013; Wyatt et al., 2017). However, there were no studies that evaluated the level of burden for caregivers who delivered interventions to the patients who did not report symptom relief, referred to as non-responders.

This study focused specifically on caregivers of patients who were deemed non-responders to a nurse-designed symptom management intervention for cancer patients. The parent study “Using SMART Design to Improve Symptom Management Among Cancer Patients” was a 12-week, two-phase sequential multiple assignment randomized trials (SMART), (1R01 CA193706; Wyatt & Sikorskii, 2018). The study examined caregiver-delivered reflexology and/or meditative practices as a symptom management intervention for individual with cancer, and was the source of data for this secondary analysis study.

Analyses for this paper used data from the parent study at weeks 1 and 12 reported by caregiver on the caregiver burden subscale. During the 8 week intervention of the SMART study, there were two points for randomization, depending on the patient response to the symptom of fatigue. First, all patients and caregivers (dyads) were randomized to four weeks of reflexology, meditative practices, or the control group. Patients who did not report decreased fatigue during the first four weeks (Phase I) of the study, were deemed non-responders (Sikorskii, Niyogi, Victorson, Tamkus, & Wyatt, 2020), and re-randomized to four additional weeks (Phase II) of either the same therapy or the addition of the second therapy.

Conceptual Framework

An adapted version of the Organizing Framework for Caregiver Intervention (OFCI) developed by Van Houtven, Voils, & Weinberger (2011) serves as the conceptual model for this secondary analysis. The adapted OFCI (presented in figure 4.1) proposed a unidirectional relationship between caregiver baseline characteristics including comorbid conditions, care

activities performed by caregivers on behalf of non-responder cancer patients, and caregiver outcome (perceived burden). The burden included five specific domains that could be impacted by caring for patients who did not respond to the intervention during Phase I (weeks 1-4).

Purpose

The purpose of this secondary analysis was to examine the effects on caregiver burden among those who delivered home-based symptom management interventions to patients who were non-responders during Phase 1 (weeks 1-4) of an 8-week intervention, with data collected over 12 weeks. Specific research questions included the following:

1. Among caregivers of non-responding patients in the initial 4 weeks of *meditative practices* (Phase I), will adding reflexology during weeks 5-8 result in greater caregiver burden (five-specific burden domains) at week-12, compared to caregivers of non-responders who continue with meditative practices alone during weeks 5-8?

2. Among caregivers of non-responding patients in the initial 4 weeks of *reflexology* (Phase I), will adding meditative practices during weeks 5-8 result in greater caregiver burden (five-specific burden domains) at week-12, compared to caregivers of non-responders who continue with reflexology alone during weeks 5-8?

Methods

Design. A secondary analysis was used to examine caregiver burden in a sub-sample of 89 caregivers whose patients were deemed non-responders to Phase I of the two-phase parent study intervention. The parent study, Using SMART design to improve symptom management among cancer patients (1R01 CA193706), enrolled 471 cancer patient-caregiver dyads between 2015 and 2019. Cancer patients who had agreed to participate in the study identified their own friend or family caregivers. Once the caregivers were chosen and agreed to participate, they were

trained by study practitioners of reflexology or meditative practices, respectively, depending on their randomization. Caregivers and patients in both groups received weekly symptom assessments. Caregivers provided data regarding their demographics and caregiver burden at baseline. The number of sessions of reflexology or meditative practices that the patient underwent were assessed weekly during the 8-week intervention. Follow-up interviews were conducted after completion of the study at week-12 to determine sustained effects (Wyatt & Sikorskii, 2018).

Study Participants. Caregivers and patients were recruited as dyads from eight cancer clinics and community oncology settings across the United States. Protocol-trained recruiters at the study sites approached patients with a solid tumor diagnosis who had a friend or family member willing to participate; where both caregiver and patient met respective eligibility criteria.

Patient inclusion criteria were: 1) age 21 years or older; 2) solid tumor cancer diagnosis; 3) able to perform basic activities of daily living; 4) undergoing chemotherapy, hormonal therapy, or targeted therapy; 5) reporting severity of >3 on fatigue using a 0–10 standardized scale at intake; 6) able to speak and understand English; 7) have telephone access; and 8) able to hear normal conversation. Patient exclusion criteria were: 1) diagnosis of major mental illness in medical record and verified by the recruiter; 2) nursing home resident; 3) bedridden; 4) currently involved with regular reflexology or meditative practices; or 5) presence of deep vein thrombosis or painful foot neuropathy.

Caregiver inclusion criteria were: 1) being 18 years or older; 2) able to speak and understand English; 3) have access to a telephone; 4) able to hear normal conversation; 5) cognitively oriented to time, place, and person; and 6) willing to be trained in reflexology and/ or

meditative practices and participate in phone data collection. The caregiver exclusion criteria included being unwilling or unable to perform a return demonstration of reflexology and/or meditative practices protocol with 90% accuracy according to the standardized procedure.

Non-responder Cancer Patients. This secondary analysis focused on caregivers of cancer patients who were determined to be non-responders. Non-responders were identified by how they reported the symptom of fatigue based on weekly assessment using the MD Anderson Symptom Inventory (MDASI) questionnaire during weeks 1-4 of the intervention (phase 1). The MDASI scoring of 0 reflected no symptom severity, and 10 reflected the worst possible severity. The fatigue responses to the symptom management interventions were based on shifts among the pre-defined mild, moderate, and severe categories: mild “1,” moderate “2-4,” and severe “5-10” (Given et al., 2008; Jeon, Given, Sikorskii, & Given, 2008). In the parent study, cancer patients were enrolled if the baseline fatigue score was ≥ 3 (moderate) since the cut-off score of 3 has been found to be optimal in past work for balancing sensitivity and specificity in predicting needs for symptom management (Jeon, Given, Sikorskii, & Given, 2008). The symptom response was anchor-based on the interference of symptoms including fatigue in areas of enjoyment of life, relationships with others, general daily activity, and emotions (Given et al., 2008; Jeon et al., 2008; Sikorskii, Given, You, Jeon, & Given, 2009). As severity of a given symptom increases along the 1 to 10 rating scale, interference may not increase linearly, so the cut-points were placed where there was greatest increase in interference as severity increased between successive integers (Sikorskii et al., 2009).

In this study, “non-responder cancer patients” were defined as patients whose fatigue symptom remained at the moderate levels (≥ 2), or the symptom increased from moderate to severe between week one and week four of study Phase I. The non-responder patients and their

caregivers (presented in figure 4.2) were re-randomized to either continue with the same therapy, or add the second therapy for weeks 5-8 (Sikorskii et al., 2017; Wyatt & Sikorskii, 2018).

Study Interventions. In the parent study, the research protocol specifies that caregivers must deliver a minimum of one session of reflexology or meditative practices per week to or with their patients.

Reflexology protocol. Reflexology is a hands-on body-based therapy that offers a specialized foot therapy using a firm thumb-walking motion (Watson & Voner, 2008; Wilkinson, Lockhart, Gambles, & Storey, 2008). The reflexology protocol includes nine reflexes on the foot using a firm thumb-walking motion over each reflex. The duration of reflexology session was 15 minutes each foot, totaling a 30-minute session.

Meditative practices protocol. Meditative practices are a set of mind-body practices that build the capacity to attend to the present moment, including one's thoughts, emotions, bodily sensations, and the environment with nonjudgmental openness and acceptance (Bower et al., 2014; Hölzel et al., 2011). The protocol consisted of meditation training with gentle yoga, breathing exercises, and body scan. The meditative practice was guided by audio recording that provided a 30-minute session.

Data Collection. Protocol-trained staff collected caregiver data via telephone at baseline and at week 12 using self-report measures. Interviewers obtained the Health Insurance Portability and Accountability Act (HIPAA)/Institutional Review Board (IRB) certification and were trained in data collection protocol, including the delivery of questions with a neutral tone and attitude. Each contact took about 15 minutes to complete and consisted of questions pertaining to caregiver burden and socio-demographic characteristics. Data were collected from patients on the same schedule and through weekly symptom assessment calls during the 8-week

intervention portion of the study. Caregivers who provided reflexology and/or meditative practices to patients were also called weekly during the 8-week intervention period of the 12-week study to obtain data regarding the number of sessions provided to the patient. Each weekly call took about 10 minutes to complete. See Figure 4.2.

Ethical Considerations. IRB approval for ethical treatment and protection of human participants was received from the investigators' university and all recruitment sites. Signed informed consent was obtained from all participants. Data were stored on a secure study server at the investigators' university; access to data was restricted by password protection and managed per IRB-approved procedures. De-identified data use for this analysis was also IRB approved.

Measures.

Caregiver burden was assessed by using the Caregiver Reaction Assessment Tool (CRAT) (Given et al., 1992). The CRAT is a multidimensional instrument that queries both positive and negative reactions to caregiving. The CRAT is comprised with 23-items with a 5-point rating scale, 1 (strongly agree) to 5 (strongly disagree) that are grouped in five areas: 1) self-esteem; 2) lack of family support; 3) impact on finances; 4) impact on schedule; and 5) impact on health. Higher scores indicate higher burden, whereas the higher score on self-esteem indicates lower burden. In this study, the Cronbach's was 0.75 for impact on finance subscale, 0.74 for caregiver's esteem, lack of family support, and impact on schedule subscale, and 0.61 for impact on health subscale.

Caregiver Characteristics. Demographic information collected from caregivers at baseline included age, sex, race/ethnicity, employment status, caregiver relationship, and living arrangement.

Caregiver comorbid conditions was measured using the Bayliss Comorbidity Scale (Bayliss, Ellis, & Steiner, 2009), which identifies the presence of 21 common chronic conditions and associated ratings of limitations on daily activities. This scale has median sensitivity and specificity compared to a chart review of >75% and 92% respectively. Internal consistency reliability is not applicable due to this tool being a checklist (Bayliss, Ellis, & Steiner, 2005).

Data Analysis

The data were analyzed using Statistical Analysis System version 9.4 (SAS Institute, Cary, NC). All data were checked for completeness and quality in the parent study. Descriptive statistics were used to describe sample characteristics. Categorical variables were summarized using frequency, percentage, and range. Means and standard deviations were used to describe continuous variables. Caregiver employment status, relationship to patient, and living arrangement were included as covariates. Multivariable general linear modeling was used to assess the difference of caregiver burden according to the addition of a new intervention or continuing previous intervention among caregivers of non-responders after the first 4 weeks while adjusting for baseline burden. Two separate analyses were conducted for caregivers who 1) began the study providing reflexology, and 2) caregivers who began the study providing meditative practices. Least square means were estimated from the model to determine if there was a significant difference in mean for perceived caregiver burden scores at 12 weeks between the randomized groups. All statistical tests were two-sided and conducted at a 0.05 level of significance.

Results

Caregiver Socio-demographic Characteristics at Baseline. At the end of the 12-week parent study, 89 participants were classified as caregivers of non-responders. Table 4.1 provides the socio-demographic characteristics of all participants. The characteristics of each group by research question is described next.

There were 41 caregivers who began the study with meditative practices, with a mean age of 55.46 years (SD = 15.03), and 3.16 comorbid conditions (SD = 2.74). Most caregivers were spouses, white, non-Hispanic/Latino, living with cancer patient, had at least 4-year college education, and were employed at least part-time.

There were 48 caregiver who began the study with reflexology, with a mean age of 56.55 years (SD = 15.73), and 3.46 comorbid conditions (SD = 2.41). Most caregivers were spouses, White, non-Hispanic/Latino, living with patient, had at least 4-year college education, and were employed at least part-time.

Results for Research Question 1. Among caregivers of non-responding patients to the initial 4-week meditative practices (Phase I), will adding reflexology during weeks 5-8 result in greater caregiver burden (specific burden subscales) at week-12 compared to caregivers of non-responders who continue with meditative practices alone during weeks 5-8?

Table 4.2 presents the LS means and standard error for each caregiver burden subscale at week 12 between: 1) caregivers who began the study with meditative practices and continued for all 8 weeks; and caregivers who added reflexology during weeks 5-8. In this table, lower LS mean values represent less of the burden construct. In Table 4.2, it can be seen that for the group of caregivers who provided only meditative practices for the full 8 weeks, their burden was significantly lower at week 12 in three areas: lack of family support ($p < .03$), schedule burden

($p < .02$), and health burden ($p < .01$). Whereas at week 12, there were no between group differences for self-esteem and financial burden.

The results presented in Table 4.4 indicate that the baseline score of each caregiver burden subscale was positively associated with each caregiver burden subscale at week 12 among caregivers of non-responders who were initially randomized to meditative practices. Further, among the possible covariates, caregiver employment status, relationship to cancer patient, and living arrangement there were no significant associations with caregiver burden subscales.

Results for research question 2. Among caregivers of non-responding patients to the initial 4 weeks of reflexology (Phase I), will adding meditative practices during weeks 5-8 result in greater caregiver burden (specific burden subscales) at week-12 compared to caregivers of non- responders who continue with reflexology alone during weeks 5-8?

Table 4.3 provides the LS means values and standard error for each caregiver burden subscale at week 12 between: 1) caregivers who began the study with reflexology and continue for all 8 weeks; and 2) caregivers who added meditative practices during weeks 5-8. In Table 4.3, it can be seen that there was no significant between group differences in caregiver burden subscales at week 12.

Table 4.5 represents the effect of other covariates on the GLM model for the burden subscales at week 12 among caregivers who began with reflexology. The baseline caregiver burden subscale was positively associated with each caregiver burden subscale at week 12 among caregivers of non-responders who were initially randomized to reflexology. Among caregivers who began with reflexology, the results from GLM model indicated that a higher schedule burden subscale score at week 12 was positively associated with caregivers who were

employed at least part-time ($p < .03$) compared to those who were unemployed. However, among the possible covariates, including caregiver employment status, relationship to cancer patient, and living arrangement there were no significant associations with other caregiver burden subscales at week 12.

Discussion

Caregivers were identified as important resources in supporting cancer patients undergoing treatment. The role these individuals play is also growing, as trend data indicates that cancer patients chose to receive care at home (Marshall et al., 2018; Wyatt et al., 2017). It is imperative that nurse researchers and healthcare providers understand the relationship between caregiver burden and the provision of home-based symptom management for cancer patients. Such evaluation can potentially promote the sustainability of caregiving activities and lead to a better understanding of caregiver burden issues. Using a national sample, this secondary study examined caregivers who performed specialized home-based symptom management interventions for non-responder cancer patients. The findings of this study introduced a new evidence-based avenue for home-based symptom management specifically in caregivers of non-responder patients.

Caregivers who began with meditative practices. The findings demonstrated the reduction of caregiver burden in the subscale of lack of family support, schedule burden, and health burden among caregivers of non-responders who delivered meditative practice alone for the full 8 weeks compared to those who added reflexology in weeks 5-8. This finding may have several implications. Perhaps adding a second intervention created more burden compared to simply continuing the initial intervention. Another reason could be that patients and caregivers could practice meditation independently, as it did not require finding a common time for both to

perform the reflexology. It could also be that meditation is a passive listening therapy; whereas, reflexology is an actively engaged therapy that the caregiver must provide according to a prescribed protocol. Nonetheless, the study by Tkatch et al (2017) found that an online mindfulness meditation intervention reduced caregiver burden among family caregivers of older adults. Another study by Wood et al. (2015) reported that mindfulness-based cognitive therapy decreased caregiver burden among caregivers of cancer survivors. These two empirical studies support the finding of this study that caregivers who delivered meditative practices alone for 8 weeks had lower caregiver burden when compared to caregivers who added a second therapy during weeks 5-8.

Caregivers who began with reflexology. The current study added further information regarding the caregiver-delivered reflexology intervention. The findings demonstrated no significant differences on any burden subscales at week 12 between caregivers of non-responders who began with reflexology and added meditative practice during weeks 5-8, and caregivers who only delivered reflexology for 8 weeks. These findings show that adding a second therapy had no additional impact on caregiver burden. This may be due to meditative practices being a passive mind-body therapy requiring less effort. This finding may have been different if caregivers were asked to add another active body-based therapy. This points to the need to consider what type of therapy is being added when a study aims to tailor more than one interventions to meet patient and caregiver needs for symptom management (Sikorskii et al., 2017).

In relation to associated factors that may have influenced caregiver burden, this study found that among those who provided reflexology, employed caregivers were more likely to have higher schedule burden compared to unemployed caregivers. The finding was similar to studies by Hsu et al. (2014) and Hu et al. (2018) who found that employed caregivers who

provided care for cancer patients who needed more assistance with instrumental activities of daily living were more likely to report higher caregiver burden. This finding regarding schedule may be due to reflexology taking time away from other tasks, so the caregiver can sit with the patient and provide the intervention. When suggesting a body-based therapy such as reflexology, nurses should discuss the time requirements with the caregiver to be sure they foresee adequate time to fit sessions into their schedule.

Finally, for all groups of caregivers of non-responder patients the baseline score of each caregiver burden subscale was positively associated with caregiver burden subscales at week 12. When using baseline caregiver burden as a covariate, the findings implied that caregiver burden at week 12 was not significantly different, even though caregivers were providing a nurse-designed symptom management intervention(s) for their patients

Limitations

First, it is acknowledged that this study was limited, as any secondary analysis is, by the available variables that can be considered. Second, the study was conducted with only caregivers of non-responders. Very little work has been published on this group of caregivers, so little comparison across studies is possible. Third, data were self-reported, which can potentially influence caregivers' responses, especially caregivers who felt reluctant to report their burden. Fourth, analysis was limited to a 12-week period and did not capture potential changes in caregiver burden that may occur over a longer period of time.

Conclusions

In conclusion, home-based caregivers provide important support to cancer patients undergoing treatment. Considering caregiver burden in relation to delivering home-based symptom management intervention, nurses should be aware by assessing for caregiver burden at

the beginning of care and at periodic points during the care trajectory. This is especially true for caregivers of patients who do respond to efforts to manage symptoms. This study demonstrated that caregivers who delivered a passive mind-body therapy such as meditative practices may experience lower caregiver burden on subscale of lack of family support, schedule burden, and health burden, since it may require less effort. Whereas, Friend or family caregivers of cancer patients who deliver reflexology may need to consider their schedule closely when agreeing to deliver a body-based therapy that requires time and effort to deliver. Home-based caregivers remain essential to the overall care plan for a cancer patient in treatment. Health professionals must consider special issues when a patient is not responding to their symptom management plan so that the caregiver remains well supported.

CHAPTER 5

CONCLUSION

Friend or family caregivers are important supportive resources for cancer patients throughout the treatment trajectory and disease-related symptom management. Unlike healthcare professionals, friend or family caregivers who are involved in complex cancer caregiving may experience caregiver burden and emotional distress (Longacre et al., 2018). With the trend toward caregiver involvement, the increasing numbers of cancer patients rely on home-based symptom management interventions (Frambes et al., 2017; Wyatt et al., 2019). Little is known about the impact on caregivers of delivering a nurse-designed intervention for symptom management to cancer patients.

This dissertation was designed to extend knowledge about the perception of burden among friend or family caregivers before and after the delivery of reflexology and/or meditative practices. Although researchers have documented many factors associated with caregiver burden, the literature continues to have gaps with regard to understanding burden in relation to areas such as comorbid conditions, anxiety, and depression among caregivers who provide nurse-designed symptom management interventions that extend beyond basic care for cancer patients.

Dissertation Aim 1: State of Science on Cancer Caregiving Burden

The shifting trends in treatment and healthcare delivery for solid tumor cancer patients have modified the responsibilities of caregivers that need to be managed in a home setting (Given, Given, Sikorskii, Vachon, & Banik, 2017; Wyatt et al., 2017). The Caregiver Burden Model for the literature review was adapted from the Organizing Framework for Caregiver Interventions (OFCI) by Van Houtven et al. (2011), and served as a foundation for the dissertation. The review of literature from 2010 forward identified 2,034 articles; 39 articles met

review inclusion criteria of adult caregivers (age 18 or older), providing care for patients with solid tumor cancer undergoing treatment at home, and investigated factors associated with caregiver burden.

Literature published during the past decade demonstrated that caregiver physical and psychological health, financial status, social isolation, and limited family and social support continued to be frequently reported factors contributing to caregiver burden. Previously less reported factors affecting perceived burden include caregiver self-esteem, male gender, and the dynamic nature of cancer treatment. As the research among friend or family caregivers grows, there is a crucial need to develop effective interventions to reduce or alleviate caregiver burden. Such interventions may need to be tailored to caregivers' individual characteristics and current skill set. Based on the review findings, the determination of associated factors to support caregivers undertaking cancer caring tasks particularly in the face of newer medical therapies and modes of delivery is needed. The underlying OFCI Caregiver Burden Model was the basis for this literature review, providing an update on the state of science. This literature review led to the next two chapters of this dissertation. Chapter three examined baseline characteristics and burden level (i.e., adapted OFCI model components of characteristics and outcomes) of caregivers who agree to provide specific symptom management interventions to their patients. Chapter four examined the burden experience of caregivers of those patients who did not respond to phase one of the intervention, addressing the model components of caregiver activities/intervention and outcomes.

Dissertation Aim 2: The Association Between Caregiver Burden and Caregiver Socio-demographic Characteristics, Comorbid Conditions, Anxiety, and Depression among Caregivers of Cancer Patients at Baseline

The Caregiver Burden Model continued to be used to guide manuscript two, which addressed baseline characteristics and burden. Baseline characteristics included comorbid conditions, anxiety, depression, and personal characteristics. The model outcome component was represented by burden, and examined caregivers who agreed to join the study. Examining characteristics associated with caregiver burden at baseline provided information on who may be best suited to engage in such interventions. Therefore, manuscript two (chapter 3) focused on baseline characteristics associated with caregiver burden.

The findings revealed that the majority of caregivers were females, spouses/partners, and resided with their cancer patients. At baseline, caregivers who anticipated delivering a home-based nurse-designed intervention reported higher caregiver self-esteem and family support, and lower perceived caregiver burden in several areas: financial burden, schedule burden, and health burden. However, caregivers who identified as female, Asian, or as a spouse/partner of the patient, were employed, or had high levels of depression and anxiety were significantly associated with burden dimensions of lower self-esteem, higher schedule burden, and higher health burden. Furthermore, caregiver depression and anxiety were significantly associated with higher caregiver burden in the areas of lack of family support and financial burden.

These findings have important implications for nursing practice, related to caregiver burden and psychological symptoms experienced by caregivers. Specifically, these findings suggested the need for nurses to be aware of the increased risk for developing a high level of burden, particularly among working female caregivers and spousal caregivers. In addition, it is

important to practicing nurses to recognize how multiple factors, such as socio-demographics, comorbid conditions, and psychological issues, influence caregivers who agreed to participate in symptom management interventions.

Dissertation Aim 3: The Level of Caregiver Burden among Various Groups of Caregivers of Non-responder Cancer Patients

Following a better understanding of baseline caregiver the burden and associations with specific caregiver characteristics, the Caregiver Burden Model was once again used to guide manuscript three. The third manuscript addressed the model component of outcomes (burden) at the end of the study (week 12) among caregivers of non-responder patients who were trained in the intervention(s) (caregiver activities/intervention component of the model).

Began with meditative practices. The findings demonstrated a significantly lower level of caregiver burden at week 12 in the areas of lack of family support, schedule burden, and health burden among caregivers of non-responders who delivered meditative practice alone over 8 weeks, compared to caregivers who added reflexology during weeks 5-8.

Began with reflexology. The findings demonstrated no significant differences in any aspects of burden at week 12 between caregivers of non-responders who began with reflexology and added meditative practice during weeks 5-8, and caregivers who only delivered reflexology for 8 weeks.

These findings suggest that providing meditative practices for the entire 8 week intervention resulted in lower caregiver burden than when reflexology was added. Many reason could account for this including the fact that patients and caregivers could practice meditation independently, as it did not require finding a common time for both to perform the reflexology. It

could also be that meditation is a passive listening therapy; whereas, reflexology is an actively engaged therapy the caregiver must provide according to a prescribed protocol.

Baseline associations with outcomes. Caregivers of non-responder patients who began with reflexology, and reported a higher schedule burden at week 12 were associated with a higher baseline schedule burden and caregivers who were employed at least part-time. This findings suggest working caregivers must closely consider their schedule burden when agreeing to provide specific types of care.

In summary, this dissertation guided by components of the Caregiver Burden Model, updated the state of the science literature, addressed caregiver characteristics and burden before caregivers began providing home-based intervention, and examined types of caregiver burden for various groups who delivered home-based intervention(s) for non-responsive patients.

Limitations

First, it is acknowledged that the use of secondary data poses its own limitations due to a predetermined set of variables. Second, the majority of caregivers were White and non-Hispanic, which limits generalizability of findings to caregivers with those characteristics. Third, the associated burden factors in the findings of this study were based on group perceptions being analyzed within each subgroup; whereas, each individual caregiver in the study may experience different patterns of burden. Future studies using qualitative methods could help provide rich insight into the burden experience, especially for caregivers of patients who are considered non-responders. Fourth, response-bias is possible due to self-reported data. In future work, the association of physiological measures with caregiver reported outcomes on burden could be considered. Last, the data were limited to 12 weeks; a longer timeframe might have revealed additional new knowledge involving caregiver burden.

Research Implications

This dissertation has implications for research, education, nursing practice, policy, and society, as well as making new contributions to science.

Implication for Research. Understanding caregiver characteristics in relation to their burden can help identify caregivers at risk when considering which caregivers to involve in a future study where they are asked to take on an additional task such as a nurse-designed intervention for their cancer patient. Further, study data suggested that baseline burden of caregivers for non-responder patients can help identify who may be best equipped to participate in a symptom management interventions. For example, this study demonstrated that employed caregivers may need more help with managing their schedule and perhaps only agree to participate in a mind-body passive intervention like meditation. These could be factors to consider in future caregiver studies. Future work could also incorporate the Caregiver Burden Model, which was able to demonstrated the value of theory-driven research in this dissertation.

Implication for Education. This study highlights the need to include caregiver burden content in the nursing curriculum, including assessment of caregiver burden, psychological well-being and personal characteristics. Further, content is needed specifically on the positive and negative consequences of cancer caregiving, evidence-based practices for caregivers who perform supportive interventions for cancer patients at home, and management strategies for patients who are non-responders to symptom interventions.

With the complex nature of cancer care and caregiving interventions, nurses will require additional training and inter-disciplinary team effort (Jadalla et al., 2020). Ensuring nurses are adequately prepared to support not only the patient, but also the home-based caregiver. Training content may include specific information on the cancer caregiving role such as interventions for

caregivers to reduce burden, caregiver problem-solving, community resources, and symptom management skills.

Implication for Nursing Practice. Nurses are the healthcare professionals who most often encounter cancer caregivers. There are several pathways for nurses to support cancer caregivers to reduce their burden. A key approach is educating caregivers while patients are at the clinic for treatment. Oncology nurses need to conduct an early assessment of caregiver supportive needs and target symptom management skills needed in order to identify caregivers who are at risk for caregiver burden. Practicing nurses can provide information about community-based caregiver resources, knowledge about how to utilize these resources, and help caregivers to overcome personal obstacles that may hinder use of supportive resource.

Since nursing will not be able to identify caregivers of non-responders to symptom management as they begin care, it will be important to conduct ongoing assessment throughout the caregiving trajectory. Specifically, this study pointed to the need for more support for those caregivers who were employed outside the home when providing a body-based therapy. They may have more demands on their time and need help with fitting caregiving into their schedule. Further, it may prove frustrating to provide care for a patient who does not have symptoms relieved. Caregivers of non-responders may also need resources for respite time.

Further, psychological needs of caregivers cannot be overlooked. Anxiety and depression were found to be likely among cancer caregivers. Once identified, nurses can help with referrals to mental health resources and with problem solving in the areas of greatest burden. Assessment is key since each individual caregiver brings different needs and strengths to their role as a cancer caregiver. Ideally, these deficits and assets would be identified at the beginning of the cancer caregiving so they can be addressed throughout the cancer trajectory.

Implication for Policy and Society. Cancer care remains a significant global issue that requires providing policies and programs that strengthen healthcare and community capacities to promote caregivers' physical and psychological health. Further, understanding how families function can contribute to further development of health care services for promoting the well-being of friend and family caregivers. A multi-disciplinary team may be best prepared to assist cancer caregivers with their complex role.

Perhaps there is a role for government sources such as Medicare or third-party payers to provide resources for friend or family cancer caregivers. Such help could come in the form of increased insurance coverage for caregivers, or providing well-targeted resources for cancer patients and their caregivers as dyads. Established non-profit organizations such as the American Association of Retired Persons (AARP) or the National Alliance for Caregiving (NAC) could provide targeted support to cancer caregivers through communication such as tips for caregivers as they prepare for cancer caregiving.

The unpaid support by friends or family members increased from \$257 billion in 2000 to \$470 billion in 2013 (AARP, 2019). Friend or family caregivers have assumed the responsibility of caregiving in the home, and this number will only increase as more cancer care transitions to the home setting (Frambes, et al., 2017; Wyatt et al., 2017). Future policy must address the intensity of home-based cancer care, the cost of home-based care, and better ways for navigating the complexity of the healthcare system. As long as home-based caregivers are expected to provide care, help is needed to support them in ways that reduce caregiver burden.

Contributions to Science

First, this work updated the state of the science on caregiver burden among caregivers who provide care for cancer patients at home through a literature review. Second, this study

demonstrated the advantage of studying caregiver burden prior to agreeing to provide a nurse-designed symptom management intervention. This study has clarified the caregiver characteristics and the aspects of burden that need to be the target of future research.

Third, this dissertation explored a new area of caregiver science - that of assessing outcomes for caregiver whose patients do not show improvement in their symptoms at midpoint in the intervention, i.e., non-responders. Specifically, this work identified that a more passive mind-body therapy may be most manageable for cancer caregivers. It also demonstrated that baseline burden and caregiver characteristics can assist in knowing the issues caregivers of non-responders may report at the end of a dyadic study.

Conclusions

Caregiver burden often goes unrecognized by healthcare professionals due to their focus on the patient. This circumstance often leads to increasing caregiver risk for becoming the hidden patients in the healthcare system (Golics et al., 2013). The focus of this dissertation shifted from the traditional approach of studying the cancer patient to the needs and burden of the caregiver. The Caregiver Burden Model provided a framework that synthesized the common them of this three manuscripts dissertation, caregiver burden.

First, an update of literature was conducted on caregiver burden. Next, secondary data from an NCI study addressed questions regarding baseline characteristics and burden of caregivers prior to providing a nurse-designed symptom management intervention for their patient. Third, caregiver burden endpoints were explored for those whose patients were considered non-responders to the nurse-designed intervention at the study mid-point. Each of the three manuscripts in this dissertation contributed to the science by adding to the caregiver burden literature and caregiver burden outcomes, especially for caregivers of non-responders. This

dissertation has also inspired questions related to caregiver burden that can be addressed with further research adding knowledge and translation to education, practice, and policy regarding cancer caregiving.

APPENDICES

APPENDIX A

Tables

Table 2.1 Notes and Specifics of Caregiver Burden Literature Used for Literature Review

Study (by author name) and Country	Cancer type	Design, caregiver sample, characteristic, and relationship	Caregiver burden	
			Frequently reported burden factors	Previously less reported burden factors
Akpan-I diok et al., 2014 (Nigeria)	* Solid tumor cancer	* Cross-sectional design * n = 210 * Mean age: 42.6 years * 62.9% Female * 62.9% Parent	1) Caregiving tasks 2) Impact on social and personal relationships	Supportive strategies/ interventions for caregivers
Ávila et al., 2016 (Portugal)	* Breast cancer	* Cross-sectional design * n = 124 * Age: above 50 years * 100% Male * 100% Spouse/ partner	1) Impact on caregiver health 2) Couple attachment-based interventions	Caregiver self-esteem
Bahrami et al., 2014 (Iran)	* Breast cancer	* RCT [†] * n = 64 * Mean age: 36.94 years * 56.2% Female * 53.1% Son/ daughter	1) Psycho- Education intervention 2) Caregiver education	Caregiver self-esteem
Bayen et al., 2017 (France)	* Solid tumor cancer	* Cross-sectional design * n = 84 * Mean age: 55 years * 87% Female * 64% Spouse	1) Lack of familial and/or social support and inadequate availability of supportive resources 2) Impact on social and personal relationships 3) Caregiving responsibility 4) Impact on financial status	1) Caregiver self-esteem 2) Dynamic nature of cancer treatment

Table 2.1 (cont'd)

Study (by author name and Country)	Cancer type	Design, caregiver sample, characteristic, and relationship	Caregiver burden	
			Frequently reported burden factors	Previously less reported burden factors
Beesley et al., 2011 (Australia)	* Ovarian cancer	* Longitudinal design * n = 101 * Mean age: 58 years * 75% Male * 71% Spouse/ children	1) Impact on social and personal relationships 2) Impact on caregiver's health	1) Male caregivers 2) Dynamic nature of cancer treatment
Cassidy, 2013 (England)	* Solid tumor cancer	* Cross sectional study * n = 842 * Mean age: 51.30 years * 87.6% Female * 39.42% Children * 30.87% Spouse	1) Lack of familial and/or social support and inadequate availability of supportive resources 2) Impact on caregiver's health 3) Impact on caregiver's health	1) Dynamic nature of cancer treatment
DuBenske et al., 2014 (U.S.)	* Lung cancer	* RCT * n = 285 * 66% Female * 78% Spouse	1) Lack of familial and/or social support and inadequate availability of supportive resources 2) Impact on caregiver's health	Dynamic nature of cancer treatment
Esra et al., 2017 (Turkey)	* Solid tumor cancer	* Cross-sectional design * n = 101 * Mean age: 37.6 years * 70.3% Female * 51.5 % Children	1) Impact on social and personal relationships 2) Lack of familial and/or social support and inadequate availability of supportive resources	1) Caregiver self-esteem 2) Male caregivers

Table 2.1 (cont'd)

Study (by author name) and Country	Cancer type	Design, caregiver sample, characteristic, and relationship	Caregiver burden	
			Frequently reported burden factors	Previously less reported burden factors
Goren et al., 2014 (European country)	* Solid tumor cancer	* Cross-sectional design * n = 1713 * Mean age: 46.43 years. * 58.7% Female * 68.5% Partner	1) Impact on caregiver's health 2) Impact on social and personal relationships 3) Lack of familial and/or social support and inadequate availability of supportive resources	1) Caregiver self-esteem 2) Dynamic nature of cancer treatment
Grant et al., 2013 (U.S.)	* Lung cancer	* Longitudinal design * n = 163 * Mean age: 57.23 years * 64.4% Female * 68.1% Spouse/Cohabitant	1) Impact on social and personal relationships 2) Lack of familial and/or social support and inadequate availability of supportive resources	1) Dynamic nature of cancer treatment 2) Caregiver self-esteem
Halpern et al., 2017 (U.S.)	* Solid tumor cancer	* Secondary data analysis * n = 373 * Mean age: 60 years * 62% Female * 29% Spouse/ partner	1) Lack of familial and/or social support and inadequate availability of supportive resources 2) Impact on financial status	1) Dynamic nature of cancer treatment 2) Caregiver self-esteem
Hanly et al., 2015 (Ireland)	* Colorectal cancer	* Secondary data analysis * n = 228 * Mean age: 50.3 years * 81.2 Female	1) Impact on caregiver's health 2) Impact on social and personal relationships 3) Impact on financial status	1) Caregiver self-esteem 2) Dynamic nature of cancer treatment

Table 2.1 (cont'd)

Study (by author name and Country)	Cancer type	Design, caregiver sample, characteristic, and relationship	Caregiver burden	
			Frequently reported burden factors	Previously less reported burden factors
		* 73% Spouse/ Cohabiting	4) Lack of familial and/or social support and inadequate availability of supportive resources	
Heckel et al., 2018 (Australia)	* Malignant brain tumor	* RCT * n = 216 * 53.7% Female * Mean age: 57.2 years * 79.6% Spouse/ partner	1) Lack of familial and/or social support and inadequate availability of supportive resources	Caregiver self-esteem
Hendrix et al., 2016 (U.S.)	* Solid tumor cancer	* RCT * n = 138 * Mean age: 56.2 years * 82.4% Female * 67.4% Spouse	1) Impact on social and personal relationships	1) Male caregivers 2) Social support or availability of supportive resources 3) Male caregivers
Jeong et al., 2016 (Korea)	* Solid tumor cancer	* Secondary analysis * n = 990 * Mean age: 50 years * 62.1% Female * 54.9% Spouse	1) Lack of familial and/or social support and inadequate availability of supportive resources 2) Impact on social and personal relationships 3) Lack of familial and/or social support and inadequate availability of supportive resources	1) Male caregivers 2) Caregiver self-esteem

Table 2.1 (cont'd)

Study (by author name) and Country	Cancer type	Design, caregiver sample, characteristic, and relationship	Caregiver burden	
			Frequently reported burden factors	Previously less reported burden factors
Johansen et al., 2017 (Norway)	* Solid tumor cancer	* Cross-sectional design * n = 281 * Age: above 50 years * 53.02% Female * 80.78% Spouse/ partner	1) Impact on caregiver's health 2) Lack of familial and/or social support and inadequate availability of supportive resources 3) Impact on social and personal relationships	1) Dynamic nature of cancer treatment 2) Caregiver self-esteem.
Kavanaugh et al., 2015 (U.S.)	* Lung cancer	* Cross-sectional design * n = 138 * Mean age: 65 years * 81% Female * 100% spouse	1) Impact on financial status 2) Lack of familial and/or social support and inadequate availability of supportive resources	1) Caregiver self-esteem 2) Male caregivers 3) Dynamic nature of cancer treatment
Lee et al., 2018 (Taiwan)	* Lung cancer	* Longitudinal design * n = 150 * Mean age: 48 years * 70% Female * 50% Spouse	1) Impact on social and personal relationships 2) Impact on financial status 3) Impact on caregiver's health	Male caregivers
Leow et al., 2017 (Singapore)	* Solid tumor cancer	* Descriptive qualitative design * n = 19 * 73.68% Female * 78.95% Son/daughter	1) Lack of familial and/or social support and inadequate availability of supportive resources 2) Impact on social and personal relationships	1) Male caregivers 2) Caregiver self-esteem

Table 2.1 (cont'd)

Study (by author name) and Country	Cancer type	Design, caregiver sample, characteristic, and relationship	Caregiver burden	
			Frequently reported burden factors	Previously less reported burden factors
Li et al., 2013 (U.S.)	* Solid tumor cancer	* Retrospective design * n= 88 * Mean age: 68.2 years * 100% Female * 100% Spouse	1) Impact on financial status 2) Impact on caregiver's health	1) Caregiver self-esteem 2) Male caregivers
Mahendran et al., 2017 (Singapore)	* Solid tumor cancer	* Quasi-experimental * n = 120 * Age: above 21 years * 64.95% Female * 83.2% Spouse/ other	1) Impact on social and personal relationships 2) Lack of familial and/or social support and inadequate availability of supportive resources	Caregiver self-esteem
Marshall et al., 2018 (U.S.)	* Solid tumor cancer * Oral oncolytic agents	*Qualitative design * n = 7 * Mean age: 61.43 years * 100% Female 85.71% Spouse	1) Impact on financial status	
McLean et al., 2013 (Canada)	* Solid tumor cancer	* RCT * n = 42 * Mean age: 48.82 years * 54.55% Male * 100% Spouse	Impact on social and personal relationships	1) Caregiver self-esteem 2) Dynamic nature of cancer treatment
Milbury et al., 2013 (U.S.)	* Lung cancer	* Longitudinal design * n = 158 * Mean age: 60.5 years * 67.1% Female	1) Lack of familial and/or social support and inadequate availability of supportive resources	1) Caregiver self-esteem 2) Dynamic nature of cancer treatment

Table 2.1 (cont'd)

Study (by author name and Country)	Cancer type	Design, caregiver sample, characteristic, and relationship	Caregiver burden	
			Frequently reported burden factors	Previously less reported burden factors
		* 84% Spouse	2) Impact on social and personal relationships 3) Impact on financial status 4) Impact on caregiver's health	
Mollica et al., 2017 (U.S.)	* Lung & Colorectal cancer	* Secondary data analysis * n = 641 * Mean age: 58 years * 80.5% Female * 62.56% Spouse	1) Lack of familial and/or social support and inadequate availability of supportive resources 2) Impact on social and personal relationships	Dynamic nature of cancer treatment
Mosher et. al., 2016 (U.S.)	* Colorectal cancer	* Qualitative design * n = 23 * Mean age: 56 years * 87% Female * 78% Spouse/ partner	1) Lack of familial and/or social support and inadequate availability of supportive resources 2) Impact on social and personal relationships	1) Dynamic nature of cancer treatment 2) Caregiver self-esteem
Nemati et al., 2018 (Iran)	* Solid tumor cancer	* Descriptive qualitative design * n = 21 * Age: above 20 years * 57.3% Female * 47.6% Son/ daughter	1) Lack of familial and/or social support and inadequate availability of supportive resources 2) Impact on caregiver's health 3) Impact on social and personal relationships	Dynamic nature of cancer treatment

Table 2.1 (cont'd)

Study (by author name and Country)	Cancer type	Design, caregiver sample, characteristic, and relationship	Caregiver burden	
			Frequently reported burden factors	Previously less reported burden factors
Oven Ustaalioglu et al., 2017 (Turkey)	* Solid tumor cancer	* Prospective cohort study * n = 302 * 51.3% Male * 44.9% Children * 43.2% Spouse	1) Lack of familial and/or social support and inadequate availability of supportive resources 2) Impact on caregiver's health	Caregiver self-esteem
Ó Céilleachair et al., 2011 (Ireland)	* Colorectal cancer	* Descriptive qualitative design * n = 6 * Age: above 48 years * 66.67% Female * 66.67% Spouse	1) Impact on financial status 2) Impact on social and personal relationships 3) Lack of familial and/or social support and inadequate availability of supportive resources	Dynamic nature of cancer treatment
Petruzzi et al., 2013 (Italy)	* Brain tumor	* Cross-sectional design * n= 72 * Mean age: 51 years * 73.6% Female * 65.3% Spouse	1) Lack of familial and/or social support and inadequate availability of supportive resources 2) Impact on social and personal relationships 3) Impact on caregiver's health	1) Caregiver self-esteem 2) Dynamic nature of cancer treatment

Table 2.1 (cont'd)

Study (by author name) and Country	Cancer type	Design, caregiver sample, characteristic, and relationship	Caregiver burden	
			Frequently reported burden factors	Previously less reported burden factors
Reblin et al., 2017 (U.S.)	* Brain tumor	* Secondary data analysis of a longitudinal study * n = 147 * Mean age: 51.82 years * 70.7% Female * 74.8% Spouse	1) Lack of familial and/or social support and inadequate availability of supportive resources 2) Impact on caregiver's health	Dynamic nature of cancer treatment
Rha et al., 2015 (Korea)	* Solid tumor cancer	* Secondary data analysis * n = 227 * Mean age: 46.2 years * 79.2% Female * 48.6% Spouse	Lack of familial and/or social support and inadequate availability of supportive resources	Dynamic nature of cancer treatment
Shaw et al., 2012 (Australia)	* Gastrointestinal cancer	* Longitudinal qualitative design * n = 15 * Mean age: 50.6 years * 80% Female * 53% Spouse	1) Lack of familial and/or social support and inadequate availability of supportive resources 2) Impact on caregiver's health	Caregiver self-esteem
Shieh et al., 2012 (Taiwan)	* Colorectal cancer	* Cross-sectional design * n = 100 * Mean age: 52.20 years * 76% Female * 46% Spouse * 28% Parent	1) Lack of familial and/or social support and inadequate availability of supportive resources 2) Impact on social and personal relationships 3) Impact on financial status	1) Caregiver self-esteem 2) Male caregivers

Table 2.1 (cont'd)

Study (by author name and Country)	Cancer type	Design, caregiver sample, characteristic, and relationship	Caregiver burden	
			Frequently reported burden factors	Previously less reported burden factors
Turkoglu et al., 2012 (Turkey)	* Solid tumor cancer	* Cross-sectional design * n = 190 * Age: above 35 years * 58.9% Female * 38.4% Son/ daughter * 31.1% Spouse	1) Lack of familial and/or social support and inadequate availability of supportive resources 2) Impact on financial status	1) Male caregivers 2) Caregiver self-esteem
Vahidi, et al, 2016 (Iran)	* Breast cancer	* Cross-sectional design * n = 150 * Mean age: 39.6 years * 51.3% Male * 34.7% Spouse * 30.7% Children	1) Lack of familial and/or social support and inadequate availability of supportive resources 2) Impact on financial status 3) Impact on social and personal relationships	1) Caregiver self-esteem 2) Male caregivers
Van Ryn et al., 2011 (U.S.)	* Solid tumor cancer	* Secondary data analysis * n = 667 * Mean age: 43 years * 79% Female * 63% Spouse	1) Impact on financial status 2) Impact on social and personal relationships	1) Dynamic nature of cancer treatment 2) Caregiver self-esteem
Van Houtven et al., 2010 (U.S.)	* Lung & Colorectal cancer	* Retrospective design * n = 1629 * Age: above 18 years * 75.8% Female * 63.8% spouse	1) Impact on financial status 2) Impact on social and personal relationships	1) Caregiver self-esteem 2) Male caregivers

Table 3.1 Baseline Caregiver Socio-demographic Characteristics

Caregiver characteristics	Frequency	Percent (%)
Sex (n=331)		
<i>Female</i>	192	58
<i>Male</i>	139	42
Race (n=339)		
<i>Asian</i>	13	4
<i>Black</i>	20	6
<i>White</i>	284	84
<i>Others</i>	22	6
Ethnicity (n=347)		
<i>Non-Hispanic/Latino</i>	314	90
<i>Hispanic/Latino</i>	30	9
<i>Refused</i>	3	1
Relationship to cancer patient (n=347)		
<i>Spouse</i>	211	61
<i>Parents</i>	40	12
<i>Adult children/Step children</i>	29	8
<i>Friends</i>	41	12
<i>Others</i>	26	7
Living arrangement (n=344)		
<i>Living with patient</i>	252	73
<i>Not living with patient</i>	92	27
Education (n=349)		
<i>High School or less</i>	51	15
<i>Some college or 2-year college degree</i>	105	30
<i>4-year college degree</i>	94	26
<i>More than 4-year degree</i>	99	29
Employment (n=347)		
<i>Full-time</i>	167	48
<i>Part-time</i>	31	9
<i>Not employed</i>	42	12
<i>Retired</i>	107	31
	Mean (SD)	Min-Max
Age in years	55.37 (14.62)	19.0-89.0
Number of comorbid conditions	3.15 (2.62)	0-15

Table 3.2 Descriptive Statistics of Baseline Caregiver Burden, Anxiety, and Depression

Variables	Mean	Standard deviation	Min-Max
Caregiver burden subscales			
<i>Self-esteem (higher mean=less burden)</i>	4.53	0.42	2.29-5.00
<i>Lack of family support (lower mean=less burden)</i>	1.72	0.73	1.00-4.60
<i>Financial burden (lower mean=less burden)</i>	1.89	0.87	1.00-4.67
<i>Schedule burden (lower mean=less burden)</i>	2.46	0.89	1.00-5.00
<i>Health burden (lower mean=less burden)</i>	1.46	0.67	1.00-4.00
Anxiety	47.48	8.32	40.3-81.6
Depression	46.47	7.27	41.0-79.4

Note. Caregiver burden subscales variables has a potential scale range of 1-5.

Anxiety and depression are T-score with mean =50 and SD =10.

Table 3.3 Correlation Matrix for Study Variables

Variables	1	2	3	4	5	6	7	8
1. Age	-							
2. Number of comorbid conditions	.31**	-						
3. PROMIS-Anxiety subscale	-.18**	.07	-					
4. PROMIS- Depression subscale	-.11*	.12*	.74**	-				
5. Self-esteem subscale	-.11*	-.08	-.10*	-.05	-			
6. Lack of family support subscale	-.05	.12*	.20**	.24**	-.23**	-		
7. Financial burden subscale	-.17**	.19**	.22**	.24**	-.05	.38**	-	
8. Schedule burden subscale	-.15**	-.02	.35**	.37**	-.07	.34**	.23**	-
9. Health burden subscale	-.05	.19**	.29**	.29**	-.25**	.25**	.27**	.40**

Note: * $p < .05$ ** $p < .01$

Table 3.4 General Linear Models for Caregiver Burden Subscales

Variables	Esteem			Family support			Finances			Schedule			Health		
	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>
Model 1															
Age	.001 (.001)	.47	.62	-.01 (.001)	-1.73	.08	-.01 (.01)	-1.19	.24	-.002 (.001)	-.52	.60	-.01 (.001)	-1.71	.09
Comorbid conditions	-.01 (.01)	-.86	.39	.03 (.02)	1.64	.10	.06 (.02)	3.12	< .01	-.12 (.02)	-.64	.52	.05 (.01)	3.70	< .01
Sex															
Female	-.11 (.06)	-1.98	.05	.17 (.10)	1.77	.08	-.07 (.11)	-.57	.57	.001 (.11)	.01	.99	.20 (.08)	2.39	.02
Male (Ref.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Race															
Asian	-.06 (.12)	-.49	.63	-.14 (.20)	-.66	.51	.08 (.24)	.34	.73	.23 (.24)	.97	.33	.39 (.18)	2.17	.03
Black	.07 (.10)	.67	.51	.21 (.17)	1.22	.22	.21 (.20)	1.03	.30	.16 (.20)	.81	.42	.02 (.15)	.16	.87
Other	-.17 (.09)	-1.81	.07	.20 (.16)	1.27	.20	-.13 (.19)	-.67	.50	.22 (.19)	1.20	.23	.04 (.14)	.27	.79
White (Ref.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Education															
4-year college graduate	.09 (.06)	1.52	.13	-.24 (.11)	-2.26	.02	-.18 (.12)	-1.47	.14	-.10 (.12)	-.83	.40	-.001 (.09)	-.04	.97
high school graduate or less	.13 (.08)	1.69	.09	-.08 (.13)	-.61	.55	.27 (.15)	1.76	.08	.02 (.15)	-.13	.90	.06 (.12)	.50	.62
More than a 4-year college	-.02 (.06)	.12	.63	-.13 (.11)	-1.23	.22	-.30 (.13)	-2.38	.02	-.07 (.12)	-.55	.58	-.05 (.09)	-.53	.60
Some college (Ref.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 3.4 (cont'd)

Variables	Esteem			Family support			Finances			Schedule			Health		
	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>
Employment															
Full-time Employed	.12 (.07)	1.80	.07	-.23 (.12)	-2.00	.04	.09 (.14)	.70	.49	.17 (.14)	1.25	.21	-.10 (.10)	-1.00	.31
Part-time Employed	-.07 (.09)	-.73	.47	-.29 (.16)	-1.84	.07	.11 (.19)	.60	.55	.10 (.19)	.51	.61	-.04 (.14)	-.26	.80
Not employed	.11 (.09)	1.14	.25	-.20 (.16)	-1.29	.20	.23 (.18)	1.27	.21	-.04 (.18)	-.24	.81			
Retired (Ref.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Relationship to patient															
Adult/step Children	.15 (.10)	1.52	.13	-.21 (.17)	-1.23	.22	-.01 (.20)	-.07	.94	.24 (.20)	-1.20	.23	-.44 (.15)	-2.97	< .01
Friend	-.01 (.10)	-.14	.89	.14 (.17)	.86	.39	.09 (.19)	.46	.65	-.67 (.19)	-3.48	< .01	-.62 (.15)	-4.28	< .01
Other	-.05 (.11)	-.42	.67	-.15 (.18)	-.81	.42	-.11 (.21)	-.51	.61	-.49 (.21)	-2.31	.02	-.45 (.15)	-2.81	< .01
Parent	.13 (.09)	1.42	.16	-.05 (.16)	-.29	.77	.07 (.19)	.40	.69	-.23 (.19)	-1.23	.22	-.22 (.14)	-1.54	.13
Spouse (Ref.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Living arrangement															
Not with patient	-.01 (.08)	-.17	.86	.01 (.13)	.04	.97	-.02 (.15)	-.14	.89	-.01 (.15)	-.03	.97	.16 (.12)	1.34	.18
With patient (Ref.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PROMIS-Anxiety	-.01 (.004)	-2.02	.04	.001 (.01)	.03	.98	.01 (.01)	1.15	.25	.01 (.01)	1.67	.09	.01 (.01)	1.64	.10

Table 3.4 (cont'd)

Variables	Esteem			Family support			Finances			Schedule			Health		
	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>
PROMIS-Depression	.01 (.004)	1.54	.12	.02 (.01)	2.13	.03	.02 (.01)	1.83	.07	.03 (.01)	3.34	< .01	.02 (.01)	2.39	.02
R²	.12 (p<.01)			.13 (p<.01)			.18 (p<.01)			.24 (p<.01)			.23 (p<.01)		

Table 3.5 General Linear Models for Caregiver Burden Subscales Excluding Depression

Variables	Esteem			Family support			Finances			Schedule			Health		
	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>
Model 2															
Age	.001 (.00)	.44	.66	-.01 (.00)	- 1.77	.08	-.01 (.01)	- 1.23	.22	-.002 (.01)	-.59	.56	-.01 (.00)	- 1.75	.08
Comorbid conditions	-.01 (.01)	-.71	.48	.03 (.02)	1.84	.07	.06 (.02)	3.30	< .01	-.01 (.02)	-.32	.75	.06 (.01)	3.92	< .01
Sex															
Female	-.11 (.06)	- 1.96	.05	.17 (.10)	1.79	.08	-.06 (.11)	-.54	.59	.01 (.11)	.05	.96	.21 (.09)	2.40	.02
Male (Ref.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Race															
Asian	-.06 (.12)	-.47	.64	-.13 (.21)	-.64	.52	.09 (.24)	.35	.72	.24 (.24)	.98	.33	.39 (.18)	2.17	.03
Black	.06 (.10)	.61	.54	.20 (.17)	1.15	.25	.20 (.20)	.97	.33	.14 (.20)	.69	.49	.01 (.15)	.09	.93
Other	-.17 (.09)	- 1.81	.07	.20 (.16)	1.25	.21	-.13 (.19)	-.68	.50	.22 (.19)	1.16	.25	.04 (.14)	.25	.80
White (Ref.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Education															
4-year college graduate	.09 (.06)	1.49	.14	-.24 (.11)	- 2.28	.02	-.19 (.12)	- 1.49	.14	-.11 (.12)	-.87	.38	-.01 (.09)	-.07	.94

Table 3.5 (cont'd)

Variables	Esteem			Family support			Finances			Schedule			Health		
	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>
high school graduate or less	.12 (.08)	1.54	.12	-.11 (.13)	-.81	.42	.24 (.15)	1.58	.12	-.07 (.16)	-.45	.65	.03 (.12)	.26	.80
More than a 4-year college	-.02 (.06)	-.29	.77	-.14 (.11)	- 1.28	.20	-.30 (.13)	- 2.42	.02	-.08 (.13)	-.63	.53	-.05 (.09)	-.58	.56
Some college or 2-year (Ref.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Employment															
Full-time Employed	.12 (.07)	1.74	.08	-.24 (.12)	- 2.07	.04	.09 (.14)	.63	.53	.15 (.14)	1.11	.27	-.11 (.10)	- 1.08	.28
Part-time Employed	-.06 (.09)	-.68	.49	-.28 (.16)	- 1.77	.08	.12 (.19)	.65	.52	.11 (.19)	.60	.55	-.03 (.14)	-.19	.85
Not employed	.12 (.09)	1.25	.21	-.18 (.16)	- 1.13	.26	.26 (.18)	1.40	.16	.00 (.19)	.00	.99	-.14 (.14)	-.98	.33
Retired (Ref.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Relationship to patient															
Adult/step Children	.15 (.10)	1.52	.13	-.21 (.17)	- 1.22	.22	-.01 (.20)	-.07	.95	-.24 (.20)	- 1.18	.24	-.44 (.15)	- 2.94	< .01
Friend	-.02 (.10)	-.19	.85	.13 (.17)	.80	.43	.08 (.19)	.41	.69	-.69 (.20)	- 3.51	< .01	-.63 (.15)	- 4.31	< .01

Table 3.5 (cont'd)

Variables	Esteem			Family support			Finances			Schedule			Health		
	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>
Other	-.04 (.11)	-.48	.63	.16 (.18)	-.89	.38	-.12 (.21)	-.58	.56	-.51 (.21)	- 2.40	.02	-.46 (.16)	- 2.88	< .01
Parent	.13 (.09)	1.37	.17	-.05 (.16)	-.35	.72	.06 (.19)	.34	.73	-.25 (.19)	- 1.31	.19	-.23 (.14)	- 1.60	.11
Spouse (Ref.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Living arrangement															
Not living with patient	-.02 (.08)	-.25	.81	-.01 (.13)	-.07	.95	-.04 (.16)	-.23	.82	-.03 (.16)	-.19	.85	.14 (.12)	1.22	.22
Living with patient (Ref.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PROMIS- Anxiety	-.00 (.00)	- 1.32	.19	.01 (.00)	2.19	.03	.02 (.01)	3.48	< .01	.03 (.01)	5.68	< .01	.02 (.00)	4.73	< .01
R²	.11 (p<.05)			.11 (p<.01)			.17 (p<.01)			.21 (p<.01)			.22 (p<.01)		

Note: Ref.= Reference Group.

Table 3.6 General Linear Models for Caregiver Burden Subscales Excluding Anxiety

Variables	Esteem			Family support			Finances			Schedule			Health		
	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>
Model 3															
Age	.001 (.002)	.77	.44	-.01 (.00)	- 1.74	.08	-.01 (.01)	-1.37	.17	-.003 (.01)	-.76	.45	-.01 (.00)	- 1.96	.05
Comorbid conditions	-.01 (.01)	-.98	.33	.03 (.02)	1.57	.12	.06 (.02)	3.19	< .01	-.01 (.02)	-.59	.56	.05 (.01)	3.74	< .01
Sex															
Female	-.12 (.06)	- 2.08	.04	.17 (.10)	1.82	.07	-.06 (.11)	-.50	.61	.02 (.11)	.13	.90	.21 (.08)	2.53	.01
Male (Ref.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Race															
Asian	-.05 (.12)	-.44	.66	-.15 (.20)	-.72	.47	.07 (.24)	.31	.76	.21 (.24)	.89	.38	.37 (.18)	2.08	.04
Black	.07 (.10)	.67	.51	.21 (.17)	1.22	.22	.21 (.20)	1.03	.31	.16 (.20)	.81	.42	.02 (.15)	.16	.88
Other	-.18 (.10)	- 1.92	.06	.20 (.16)	1.27	.21	-.11 (.19)	-.60	.55	.24 (.19)	1.30	.19	.05 (.14)	.36	.72
White (Ref.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Education															
4-year college graduate	.09 (.06)	1.49	.14	-.24 (.10)	- 2.25	.03	-.18 (.12)	-1.46	.15	-.10 (.12)	-.81	.41	-.00 (.09)	-.01	.99
high school graduate or less	.12 (.08)	1.50	.14	-.08 (.13)	-.61	.54	.29 (.15)	1.87	.06	.00 (.15)	.02	.98	.07 (.12)	.64	.52

Table 3.6 (cont'd)

Variables	Esteem			Family support			Finances			Schedule			Health		
	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>
More than a 4-year college	-.02 (.06)	-.29	.77	-.12 (.11)	- 1.15	.25	-.30 (.12)	-2.35)	.02	-.06 (.12)	-.45	.65	-.04 (.09)	-.40	.69
Some college or 2-year (Ref.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Employment															
Full-time Employed	.12 (.07)	1.75	.08	-.24 (.12)	- 2.09	.04	.10 (.14)	.71	.48	.17 (.14)	1.23	.22	-.11 (.10)	- 1.05	.30
Part-time Employed	-.07 (.09)	-.70	.49	-.30 (.16)	- 1.96	.06	.11 (.19)	.57	.57	.08 (.18)	.43	.67	-.05 (.14)	-.37	.71
Not employed	.12 (.09)	1.27	.21	-.21 (.16)	- 1.35	.18	.22 (.18)	1.19	.23	-.07 (.18)	-.38	.70	.18 (.14)	- 1.32	.19
Retired (Ref.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Relationship to patient															
Adult/step children	.18 (.10)	1.78	.08	-.19 (.17)	- 1.15	.25	-.41 (.20)	-.21	.83	-.27 (.20)	-1.36	.17	-.46 (.15)	- 3.10	< .01
Friend	.02 (.10)	.21	.83	.18 (.16)	1.15	.25	.06 (.19)	.30	.76	-.69 (.19)	-3.66	< .01	-.62 (.14)	- 4.39	< .01
Other	-.04 (.11)	-.38	.71	-.12 (.18)	-.69	.49	-.11 (.21)	-.52	.60	-.48 (.21)	-2.27	.02	-.43 (.16)	- 2.73	.01
Parent	.15 (.09)	1.62	.11	-.03 (.16)	-.19	.85	.06 (.19)	.30	.77	-.25 (.19)	-1.33	.19	-.22 (.14)	- 1.60	.11
Spouse (Ref.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 3.6 (cont'd)

Variables	Esteem			Family support			Finances			Schedule			Health		
	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>
Living arrangement															
Not with patient	-.03 (.08)	-.44	.66	-.02 (.13)	-.16	.87	-.00 (.15)	-.02	.98	.01 (.15)	.04	.97	.16 (.11)	1.36	.17
With patient (Ref.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PROMIS- Depression	.00 (.003)	.18	.86	.02 (.01)	3.09	< .01	.03 (.01)	3.76	< .01	.04 (.01)	6.45	< .01	.03 (.01)	5.07	< .01
R²	.10 (p<.05)			.13 (p<.01)			.18 (p<.01)			.23 (p<.01)			.22 (p<.01)		

Note: Ref.= Reference Group.

Table 4.1 Baseline Socio-demographic Characteristics for Caregivers of Non-responders Cancer Patients

Caregiver characteristics	Non-responders to reflexology			Non-responders to meditative practices		
	Reflexology alone N (%)	Reflexology + Meditative practices N (%)	Total N	Meditative practices alone N (%)	Meditative practices + Reflexology N (%)	Total N
Sex			48			41
<i>Female</i>	13 (27)	10 (21)	23	8 (20)	13 (32)	21
<i>Male</i>	13 (27)	11 (22)	24	12 (31)	5 (12)	27
<i>Missing</i>	1 (3)	0 (0)	1	2 (3)	1 (2)	3
Race			48			41
<i>White</i>	23 (48)	16 (33)	39	17 (41)	15 (37)	32
<i>Others</i>	3 (6)	5 (10)	8	5 (12)	4 (10)	9
<i>Missing</i>	1 (3)	0 (0)	1			
Ethnicity			48			41
<i>Non-</i>	22 (46)	21 (43)	43	21 (51)	19 (46)	40
<i>Hispanic/Latino</i>	4 (8)	0 (0)	4	1 (2)	0 (0)	1
<i>Hispanic/Latino</i>	1 (3)	0(0)	1			
<i>Missing</i>						
Relationship to patient			48			41
<i>Spouse</i>	17 (35)	12 (25)	29	15 (37)	11 (27)	26
<i>Others</i>	10 (21)	9 (19)	19	7 (17)	8 (20)	15
<i>Missing</i>						
Living arrangement			48			41
<i>Living with patient</i>	19 (40)	14 (29)	33	18 (44)	13 (32)	31
<i>Not living with patient</i>	7 (14)	6 (13)	13	4 (10)	6 (15)	10
<i>Missing</i>	1 (2)	1 (2)	2			
Education			48			41
<i>High School/some college</i>	15 (31)	6 (13)	21	7 (17)	8 (20)	15
<i>College degree or higher</i>	12 (25)	15 (31)	27	15 (37)	11 (27)	26
<i>Missing</i>						

Table 4.1 (cont'd)

Caregiver characteristics	Non-responders to reflexology			Non-responders to meditative practices		
	Reflexology alone N (%)	Reflexology + Meditative practices N (%)	Total N	Meditative practices alone N (%)	Meditative practices + Reflexology N (%)	Total N
Employment			48			41
<i>Employed</i>	16 (33)	11 (23)	27	14 (34)	7 (17)	21
<i>Not employed</i>	11 (23)	10 (21)	21	8 (20)	12 (29)	20
<i>Missing</i>						
	Mean (SD)		Total	Mean (SD)		Total
Age in years	51.63 (14.25)	61.48 (17.20)	56.55 (15.73)	58.21 (14.66)	52.71 (15.39)	55.46 (15.03)
Number of comorbid conditions	3.59 (2.32)	3.33 (2.50)	3.46 (2.41)	3.68 (3.50)	2.64 (1.97)	3.16 (2.74)
Caregiver burden subscales						
<i>Self-esteem</i>	4.59 (.41)	4.65 (.40)	4.62 (.40)	4.47 (.47)	4.54 (.37)	4.50 (.42)
<i>Lack of family support</i>	1.75 (.74)	1.64 (.62)	1.70 (.68)	1.91 (.98)	1.56 (.84)	1.74 (.91)
<i>Financial burden</i>	1.85 (.84)	1.76 (.72)	1.80 (.78)	2.31 (.92)	1.64 (.67)	1.98 (.80)
<i>Schedule burden</i>	2.44 (.74)	2.66 (.88)	2.55 (.81)	2.45 (1.0)	2.15 (.85)	2.3 (.93)
<i>Health burden</i>	1.56 (.66)	1.62 (.92)	1.59 (.80)	1.23 (.42)	1.48 (.82)	1.35 (.62)

Note. Caregiver burden subscales variables has a potential scale range of 1-5.

Table 4.2 Comparison of Caregiver Burden Subscale at Week 12, between the Two Groups that Began with Meditative Practices

Items	Non-responders to initial meditative practices		
	Meditative practices + Reflexology LS Mean (SE)	Meditative practices alone LS Mean (SE)	p-value
Self-esteem subscale	4.54	4.42	.30
Lack of family support subscale	1.86	1.50	.03
Financial burden subscale	2.10	1.74	.13
Schedule burden subscale	2.53	2.02	.02
Health burden subscale	1.61	1.23	.01

Significant level $\leq .05$

Table 4.3 Comparison of Caregiver Burden Subscale at Week 12, between the Two Groups that Began with Reflexology

Items	Non-responders to initial reflexology		
	Reflexology alone LS Mean (SE)	Reflexology + Meditative practices LS Mean (SE)	p-value
Self-esteem subscale	4.57	4.45	.35
Lack of family support subscale	1.72	1.85	.51
Financial burden subscale	1.90	2.17	.28
Schedule burden subscale	2.50	2.55	.80
Health burden subscale	1.42	1.76	.08

Significant level $\leq .05$

Table 4.4 General Linear Model Comparing Caregiver Burden Subscales at Week 12 for the Two Subgroups of Caregivers of Non-responders Who Were Initially Randomized to Meditative Practices

Variables	Self-esteem at week-12		Lack of support at week-12		Financial burden at week-12		Schedule Burden at week-12		Health burden at week-12	
	β (SE)	p value	β (SE)	p value	β (SE)	p value	β (SE)	p value	β (SE)	p value
Second Randomization Group 1: Meditative practice + Reflexology vs Group 2: Meditative practice alone	.13 (.12)	.30	.36 (.15)	.03	.35 (.23)	.13	.51 (.20)	.02	.38 (.14)	.01
Self-esteem at baseline	.78 (.14)	<.01								
Lack of family support at baseline			.45 (.08)	<.01						
Financial burden at baseline					.62 (.13)	<.01				
Schedule burden at baseline							.50 (.11)	<.01		
Health burden at baseline									.55 (.10)	<.01
Employment										
Employed vs Not employed	.02 (.12)	.85	-.05 (.15)	.74	-.28 (.21)	.19	-.09 (.20)	.66	.20 (.14)	.16
Relationship to patient										
Others vs Spouse	-.02 (.18)	.92	.24 (.23)	.30	.15 (.31)	.64	.13 (.30)	.66	.15 (.21)	.47
Living arrangement										
Not with patient vs Live with patient	.12 (.20)	.55	-.21 (.26)	.42	-.06 (.35)	.86	-.21 (.34)	.54	-.002 (.24)	.99
R ²	.47 (p<.01)		.56 (p<.01)		.55 (p<.01)		.51 (p<.01)		.47 (p<.01)	

Table 4.5 General Linear Model Comparing Caregiver Burden Subscales at Week 12 for the Two Subgroups of Caregivers of Non-responders Who Were Initially Randomized to Reflexology

Variables	Self-esteem at week-12		Lack of support at week-12		Financial burden at week-12		Schedule Burden at week-12		Health burden at week-12	
	β (SE)	p value	β (SE)	p value	β (SE)	p value	β (SE)	p value	β (SE)	p value
Second Randomization Group 1: Reflexology alone vs Group 2: Reflexology and meditative practice	.12 (.12)	.35	-.13 (.20)	.51	-.27 (.25)	.28	-.05 (.20)	.80	-.33 (.18)	.08
Self-esteem at baseline	.88 (.15)	<.01								
Lack of family support at baseline			.46 (.15)	<.01						
Financial burden at baseline					.51 (.16)	<.01				
Schedule burden at baseline							.58 (.13)	<.01		
Health burden at baseline									.58 (.12)	<.01
Employment										
Employed vs Not employed	-.05 (.12)	.70	.004 (.15)	.98	-.06 (.25)	.82	.49 (.21)	.03	-.02 (.18)	.91
Relationship to patient										
Others vs Spouse	.08 (.20)	.68	.05 (.33)	.89	.29 (.41)	.49	-.58 (.34)	.10	.21 (.30)	.50
Living arrangement										
Not with patient vs Live with patient	-.03 (.22)	.89	.10 (.36)	.78	.01 (.44)	.98	.53 (.36)	.15	-.24 (.32)	.47
R ²	.47 (p<.01)		.23 (p=.06)		.24 (p=.04)		.49 (p<.01)		.42 (p<.01)	

APPENDIX B

Figures

Figure 1.1 The Organizing Framework for Caregiver Interventions by VanHoutven et al. (2011)

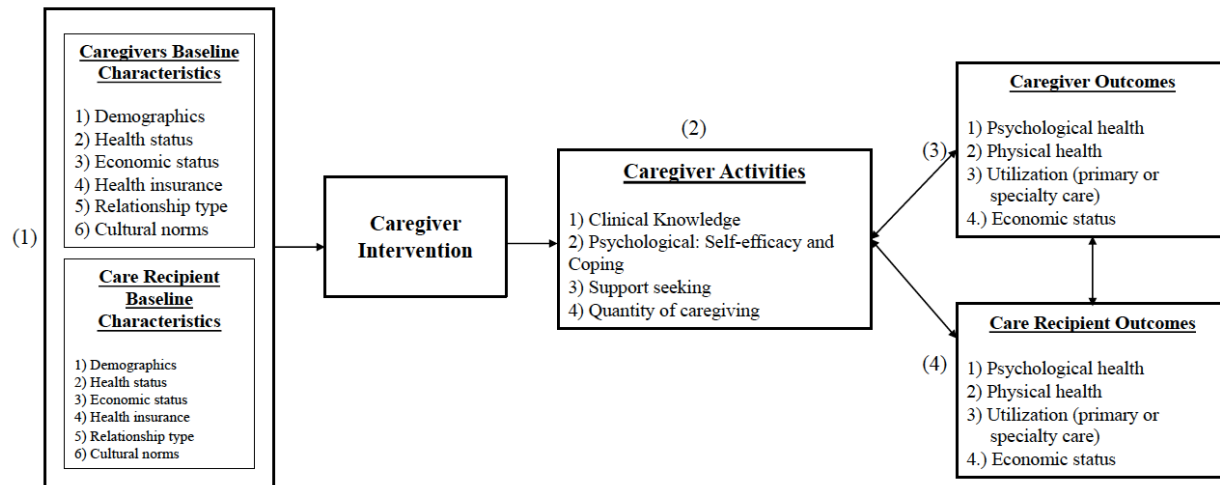


Figure 1.2 Adapted Model of Organizing Framework for Caregiver Interventions

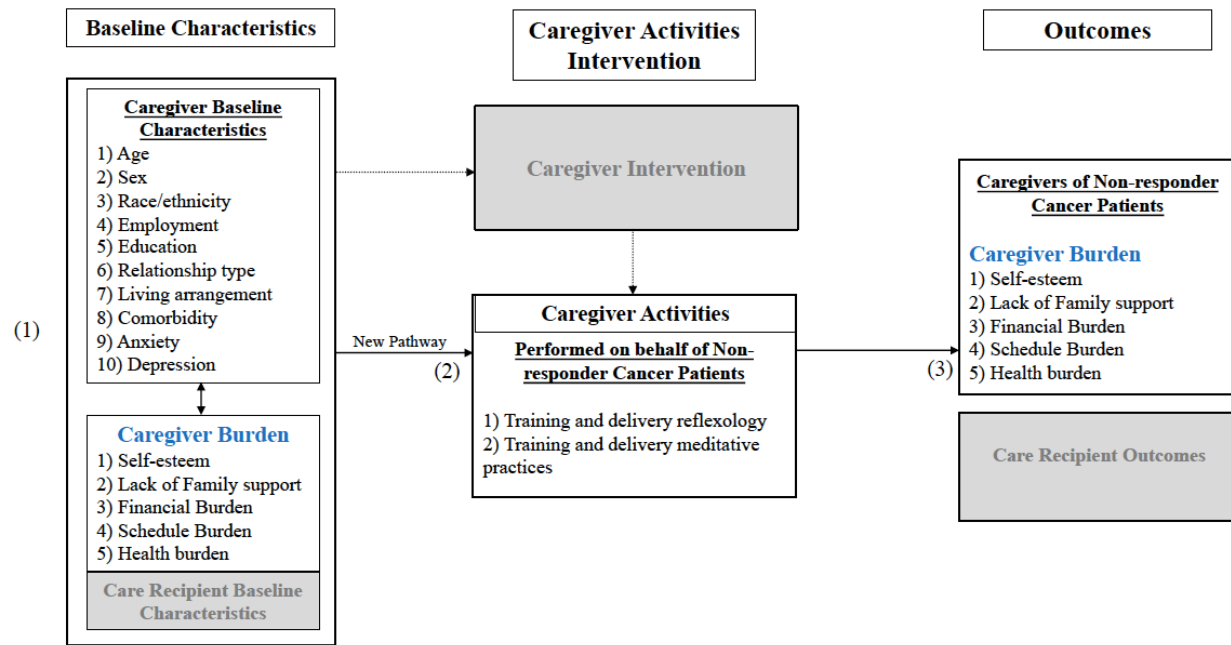


Figure 1.3 The Caregiver Burden Model for Caregivers of Non-responders Cancer Patients

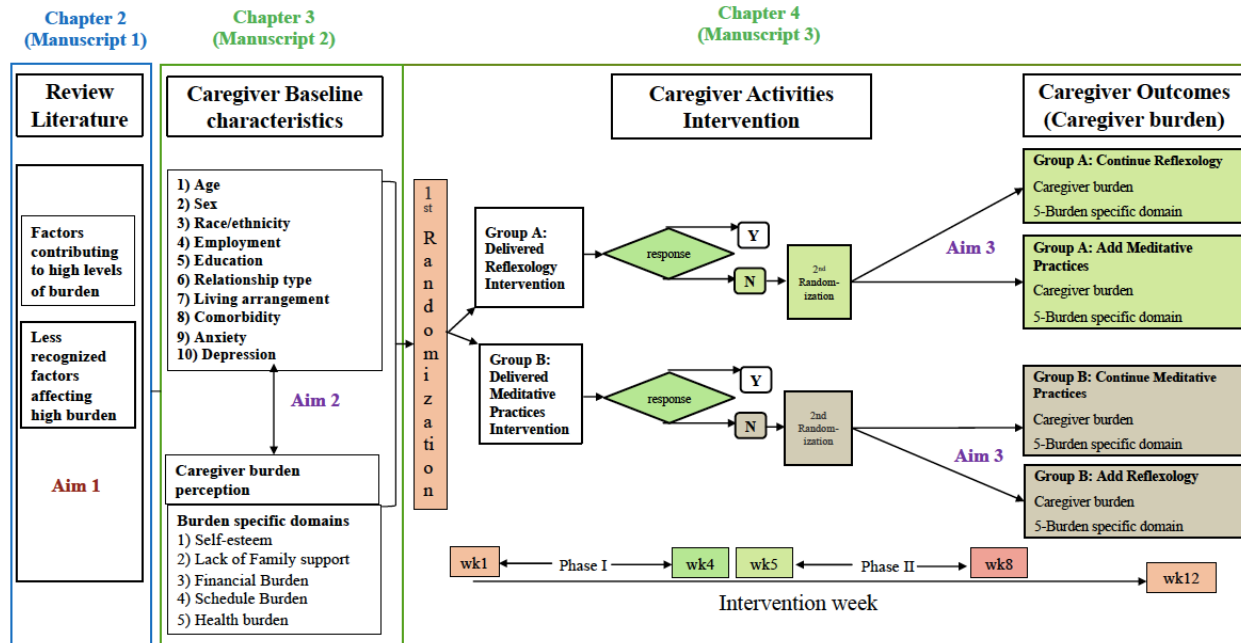


Figure 2.1 A PRISMA Flow Chart of Article Selection

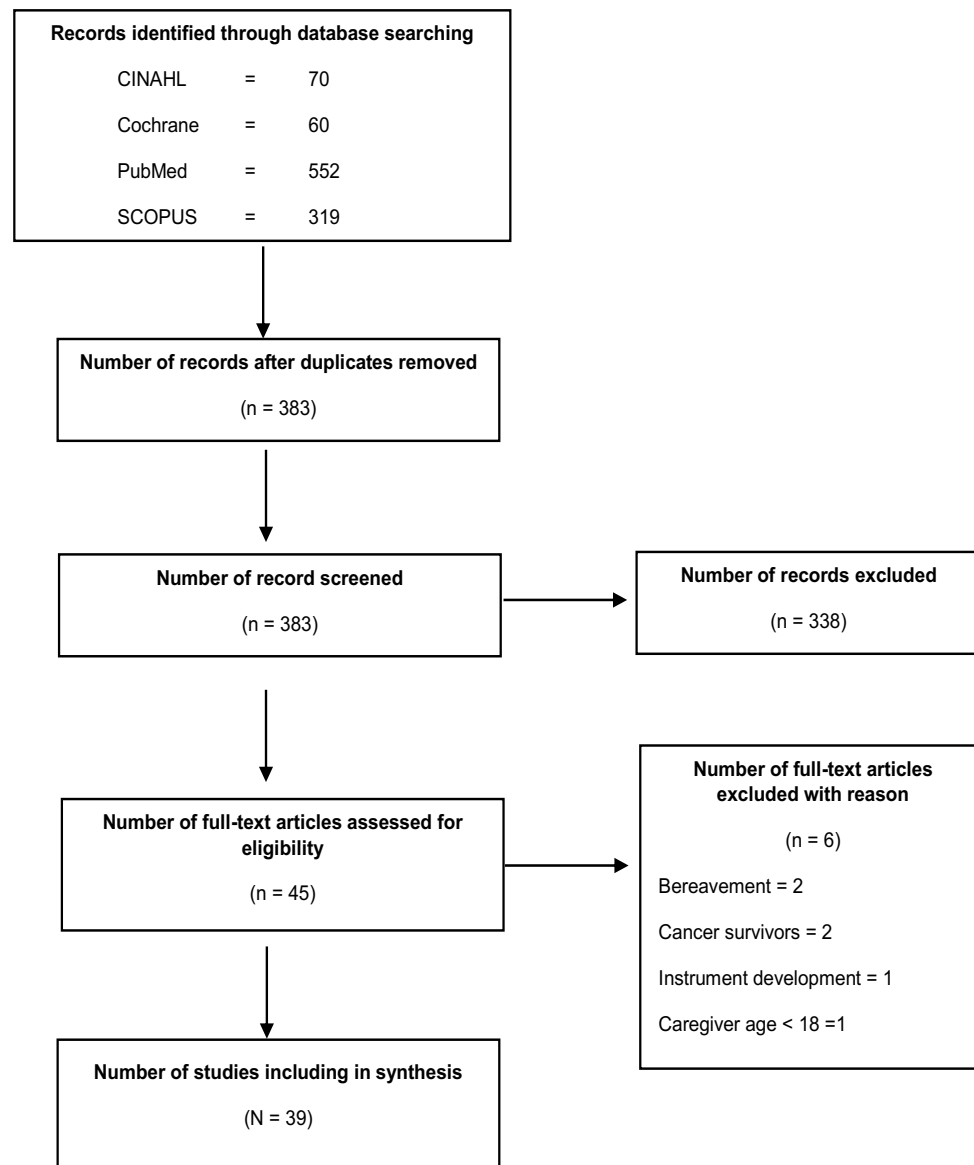


Figure 3.1 The Adapted Model of Caregiver Burden for Cancer Patients

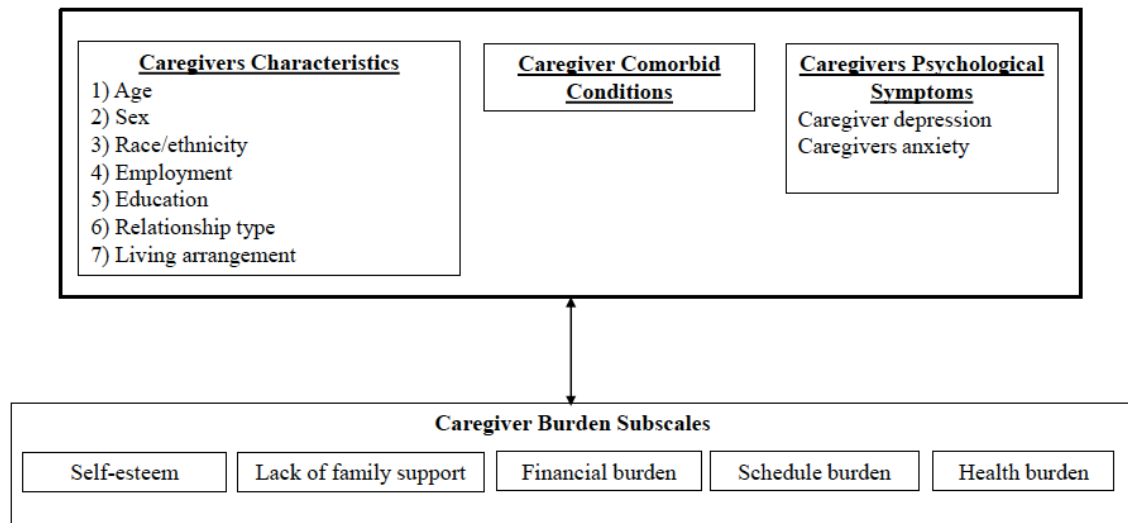


Figure 4.1 The Adapted Model for Caregiver Burden of Non-responder Cancer Patients

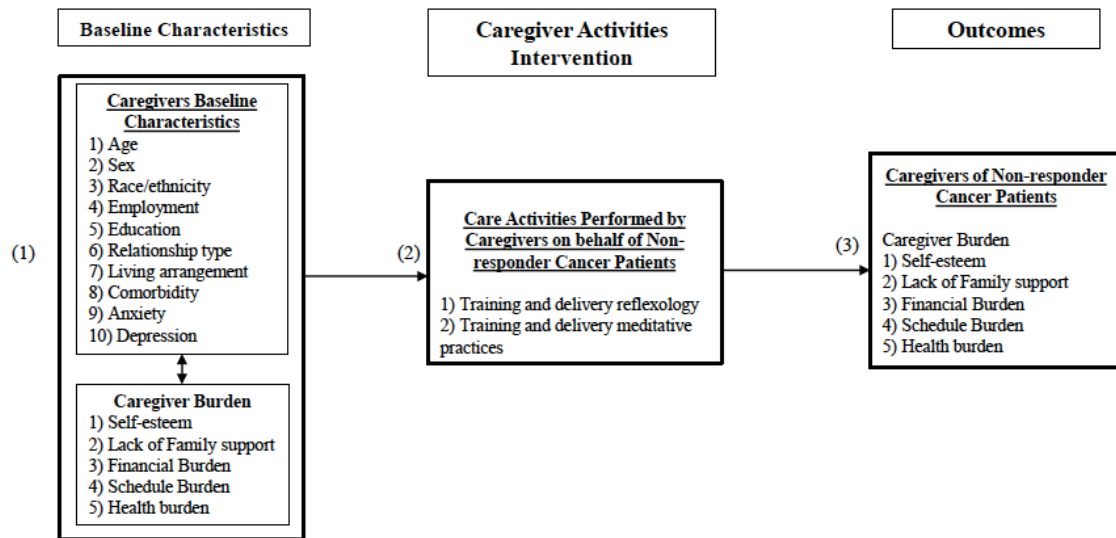
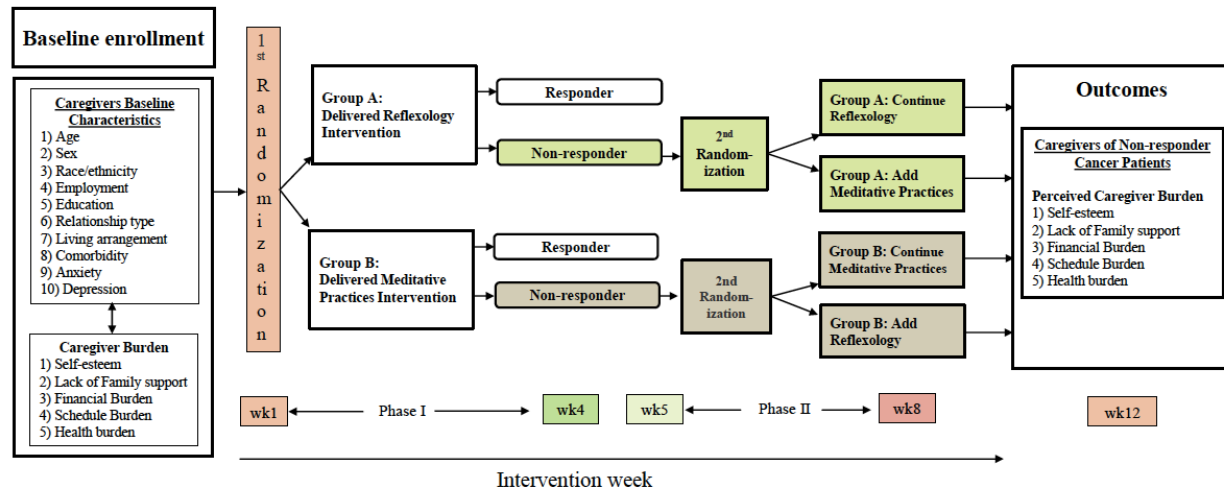


Figure 4.2 The Schematic of Non-responder Cancer Patients



APPENDIX C

Data Collection Instruments

CAREGIVER DEMOGRAPHICS

Baseline

1. What is your relationship to the person with whom you are participating in this study?
She/He is your:

☐ Spouse or partner
☐ Parent or step-parent
☐ Brother/step-brother or sister/step-sister
☐ Cousin
☐ Daughter-in-law or son-in-law
☐ Aunt or Uncle
☐ Niece or nephew
☐ Daughter/step-daughter or son/step-son
☐ Friend
☐ Other (Specify: _____)

2. Does the person with whom you are participating in this study currently live with you?

☐ Yes ☐ No

- 2.a If no, approximately how far from you does that person live?

☐ < 10 miles
☐ 11-50 miles
☐ > 50 miles

3. What year were you born? _____ ☐ Refused/NA

4. Caregiver is: ☐ Male ☐ Female

5. What is your ethnic background?
- _____ Hispanic or Latino
- _____ Not Hispanic or Latino
- _____ Refused/NA
6. What is your racial background? (check all that apply)
- _____ American Indian or Alaska Native
- _____ Asian
- _____ Black or African American
- _____ Native Hawaiian or Other Pacific Islander
- _____ White
- _____ Refused/NA
7. What is your marital status?
- _____ Never married
- _____ Married/living with partner
- _____ Divorced/separated
- _____ Widowed
- _____ Refused/NA
8. What is your highest level of education completed?
- _____ 8th Grade or less
- _____ 9th Grade to high school graduate or GED
- _____ Some college or 2-year degree
- _____ 4-year college graduate
- _____ More than a 4-year college degree
- _____ Refused/NA

9. What is your employment status?

_____ Employed full time

_____ Employed part time

_____ Not employed

_____ Retired

_____ Disabled

_____ Homemaker

_____ Other (specify: _____)

_____ Refused

10. What is your annual income, before taxes?

_____ \$1 - \$24,999

_____ \$25,000 - \$49,999

_____ \$50,000 - \$99,999

_____ \$100,000 or more

_____ Refused

Bayliss Tool (Chronic Conditions)

Disease Burden: Morbidity Assessment by Self-Report*

Baseline

This is a list of common chronic medical conditions.

For each condition please tell me whether you have this condition. If you do have it, please tell me how much it limits your daily activities from 1 (NOT AT ALL) to 5 (A LOT). Please refer to the light blue six-point response guide D1.

	I DON'T HAVE THIS CONDITION	I DO have this condition and it limits my daily activities...				
		NOT AT ALL				A LOT
High blood pressure	0	1	2	3	4	5
High cholesterol	0	1	2	3	4	5
Asthma	0	1	2	3	4	5
Diabetes	0	1	2	3	4	5
Thyroid disorder	0	1	2	3	4	5
Cancer	0	1	2	3	4	5
Chronic back pain or sciatica	0	1	2	3	4	5
Rheumatoid arthritis	0	1	2	3	4	5
Rheumatic disease such as fibromyalgia or lupus	0	1	2	3	4	5
Stomach problem such as an ulcer or gastritis or reflux	0	1	2	3	4	5
Colon problem such as irritable bowel or colitis	0	1	2	3	4	5
Poor blood circulation in your legs	0	1	2	3	4	5
Overweight	0	1	2	3	4	5
Hard of hearing	0	1	2	3	4	5
Vision problem	0	1	2	3	4	5
Chronic bronchitis or emphysema	0	1	2	3	4	5
Osteoarthritis ("regular" arthritis, not rheumatoid arthritis)	0	1	2	3	4	5
Osteoporosis (thinning of the bones)	0	1	2	3	4	5
Congestive heart failure	0	1	2	3	4	5
Heart disease such as angina (chest pain from heart problem), heart attack, bypass surgery or angioplasty	0	1	2	3	4	5
Stroke	0	1	2	3	4	5
Do you have any other chronic medical conditions that we did not already mention? (If so, please list them here)						
	0	1	2	3	4	5
	0	1	2	3	4	5

*Sensitivity relative to chart review for all conditions:

Mean: 79.4

Median: 78.0

Range: 41.0 (one condition) – 100.0 (two conditions)

It is possible to add other conditions to the list as there is no 'ceiling' score. Total score is the sum of all responses.

Modified from: Bayliss EA, Ellis JL, Steiner JF. (2009). Seniors' self-reported multimorbidity captured biopsychosocial factors not incorporated into two other data-based morbidity measures. *Journal of Clinical Epidemiology*, 62, 550-557.

PROMIS-29 Profile v1.0
Caregivers baseline & Week 12

This is the last set of questions for this interview. There are 29 questions total in this set. For this section, please refer to the blue five-point response guide C4.

	Without any difficulty	With a little difficulty	With some difficulty	With much difficulty	Unable to do
1. Are you able to do chores such as vacuuming or yard work?	0	1	2	3	4
2. Are you able to go up and down stairs at a normal pace?	0	1	2	3	4
3. Are you able to go for a walk of at least 15 minutes?	0	1	2	3	4
4. Are you able to run errands and shop?	0	1	2	3	4

For this section, please refer to the blue five-point response guide C5.

In the past 7 days	Never	Rarely	Sometimes	Often	Always
5. I felt fearful	0	1	2	3	4
6. I found it hard to focus on anything other than my anxiety	0	1	2	3	4
7. My worries overwhelmed me	0	1	2	3	4
8. I felt uneasy	0	1	2	3	4
In the past 7 days...	Never	Rarely	Sometimes	Often	Always
9. I felt worthless	0	1	2	3	4
10. I felt helpless	0	1	2	3	4
11. I felt depressed	0	1	2	3	4
12. I felt hopeless	0	1	2	3	4

Caregiver Reaction Assessment Tool
Baseline & Week 12

The response format for the questions is as follows: Strongly disagree (1), Disagree (2), Neither agree or disagree (3), Agree (4), Strongly agree (5).

		Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly agree
1	I feel privileged to care for ____.	1	2	3	4	5
2	Others have dumped caring for ____ onto me.	1	2	3	4	5
3	My financial resources are adequate to pay for things that are required for caregiving.	1	2	3	4	5
4	My activities are centered around care for ____.	1	2	3	4	5
5	Since caring for ____, it seems like I'm tired all of the time.	1	2	3	4	5
6	It is very difficult to get help from my family in taking care of ____.	1	2	3	4	5
7	I resent having to take care of ____.	1	2	3	4	5
8	I have to stop in the middle of work.	1	2	3	4	5
9	I really want to care for ____.	1	2	3	4	5
10	My health has gotten worse since I've been caring for ____.	1	2	3	4	5
11	I visit family and friends less since I have been caring for ____.	1	2	3	4	5
12	I will never be able to do enough caregiving to repay ____.	1	2	3	4	5
13	My family works together at caring for ____.	1	2	3	4	5
14	I have eliminated things from my schedule since caring for ____.	1	2	3	4	5

		Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly agree
15	Since caring for ____, I feel my family has abandoned me.	1	2	3	4	5
16	Caring for ____ makes me feel good.	1	2	3	4	5
17	The constant interruptions make it difficult to find time for relaxation.	1	2	3	4	5
18	I am healthy enough to care for ____.	1	2	3	4	5
19	Caring for ____ is important to me.	1	2	3	4	5
20	Caring for ____ has put a financial strain on the family.	1	2	3	4	5
21	My family (brothers, sisters, children) left me alone to care for ____.	1	2	3	4	5
22	I enjoy caring for ____.	1	2	3	4	5
23	It's difficult to pay for ____'s health needs and services.	1	2	3	4	5

Score responses with the following points. Questions 3, 7, 13, 15 and 19 should be reverse scored.

Strongly disagree (1 point)

Disagree (2 points)

Neither agree nor disagree (3 points)

Agree (4 points)

Strongly agree (5 points)

Additional information about this tool can be found at:

Given, C.W., Given, B., Stommel, M., Collins, C., King, S., & Franklin, S. (1992). The caregiver reaction assessment (CRA) for caregivers to persons with chronic physical and mental impairments. *Research in Nursing and Health*, 15(4), 271-283.

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