Walden University

College of Nursing

This is to certify that the doctoral study by

Yada Wimes

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

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Walden University
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Abstract

Evidenced-based Clinical Practice Guideline to Address Cancer-Related Fatigue to Improve Compliance with Chemotherapy and Radiation Therapy

by

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MSN, Walden University, 2015

BS, Albany State University, 2002

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Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice

Walden University

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Abstract

Cancer-related fatigue (CRF) is a perilous issue among cancer patients as it affects treatment adherence and lowers the quality of life. The problem identified in this project was the lack of an evidence-based clinical practice guideline (CPG) on identifying CRF among patients and their poor treatment adherence with cancer due to fatigue. Addressing the problem is important in the nursing practice to promptly identify and treat CRF among patients and improve treatment adherence. The project was conducted to establish the most effective evidence to guide the development of a CPG for effective interventions on early detection and management of CRF compared to standard practice to reduce the rate of poor treatment adherence among patients with cancer. The Iowa and Orem self-care theories were used as the scientific underpinning for the project. An extensive literature review was conducted to obtain evidence to develop the CPG, and the articles' quality was assessed. The Appraisal of Guidelines for Research & Evaluation (AGREE) II tool was used by four nurse practitioners as expert panelists to assess the quality and applicability of the CPG across 23 items in six domains. An overall mean domain score of 87.2% was attained, revealing that the CPG was reviewed as a high-quality guideline. The mean overall quality score was 6.5 on a Likert scale from 1 (*lowest*) to 7 (*highest*) with 100% (n = 4) recommending using the CPG in their practice without any modification to screen and treat CRF among patients with cancer and in active treatment. The CPG has the potential for positive social change by improving treatment adherence and reducing the rate of treatment dropout by frequent screening, monitoring, and conducting follow-ups.

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Section 1: Nature of the Project

Introduction

Cancer-related fatigue (CRF) is a common side effect among cancer patients undergoing chemotherapy, radiotherapy, hormone therapy, immunotherapy, and bone marrow transplantation. According to the American Cancer Society (2023), approximately 80% to 100% of individuals with cancer experience CRF. CRF is different from the typical sense of weakness and fatigue as it is associated with general weakness, lack of energy, feeling drained, slowness, listlessness, or worn out that reduces for a short period but re-emerges (American Cancer Society, 2023; National Cancer Institute, 2021). CRF cannot be relieved by rest or sleep as opposed to the commonly known fatigue and can hamper the daily activities of a person as well as reduce the quality of life of the patient and lasts for a longer period. Notably, CRF can persist for months and years after completing the treatment (National Cancer Institute, 2021).

Individuals who experience CRF have difficulty participating in social events, engaging in community activities, and actively taking part in relationships and daily activities. There are instances when CRF has resulted in mood changes and mental fatigue (National Cancer Institute, 2021). Approximately one in four people with CRF are diagnosed with depression (Cleveland Clinic, 2021). Additionally, CRF is associated with complications such as a lack of concentration and the failure to think clearly (Cleveland Clinic, 2021).

The causes of CRF include cancer-associated treatments (chemotherapy, radiotherapy, hormone therapy, and immunotherapy) and surgeries (Cleveland Clinic,

2021; National Cancer Institute, 2021). Additional causes include anemia, dietary changes, depression and anxiety, sleep problems, and prescribed medications (National Cancer Institute, 2021). Generally, cancer treatments and medications alter how the cells work in the body, cause inflammation, modify the hormone levels, damage the cells and tissues, decrease the blood level resulting in anemia, and stimulate the production of toxic protein cells that causes CRF among patients with cancer (American Cancer Society, 2023; Cleveland Clinic, 2021).

As indicated, CRF can persist for weeks, months, and years after completing the treatment. The persistent duration of CRF is unique to each cancer patient and is dependent on varied factors, such as the type of treatment (Cleveland Clinic, 2021). For example, individuals who underwent bone marrow transplants can experience CRF for up to a year. For patients undergoing radiation therapy, CRF worsens during the course of the treatment but reduces a few months after completion (Cleveland Clinic, 2021). In systematic treatments that involve medication that circulates in the blood, CRF is inconsistent as it happens for a short while and disappears. During the course of the treatment, CRF worsens, and when it stops, the patients are re-energized (Cleveland Clinic, 2021). Patients who undergo surgical treatment experience temporary CRF that disappears after recovery (Cleveland Clinic, 2021). CRF can be diagnosed at different stages of cancer, from diagnosis to after treatment. Fabi et al. (2020) reported that approximately 65% of patients with cancer experience CRF, and more than two-thirds of the individuals experience it for up to six months, and for one-third, it persists for over a year.

In this project, I focused on CRF and the development of an evidence-based guideline that has the potential to have an effect on treatment adherence. The potential positive change associated with the project includes providing staff the best evidence for treatment for cancer-related fatigue, which improved treatment adherence. The project may also result in patients engaging in social activities such as team physical activities, increasing the social support system, which has a positive effect on CRF. According to Mardanian-Dehkordi and Kahangi (2018), social support among patients with cancer and experiencing fatigue was associated with positive health outcomes.

Problem Statement

The nursing practice problem was the lack of an evidence based CPG on the identification of CRF among the patients and poor treatment adherence among patients with cancer due to fatigue. Forty percent of patients experience CRF at diagnosis and 80% to 90% during chemotherapy and radiotherapy (Fabi et al., 2020). Approximately 17% to 21% of the patients who underwent chemotherapy treatment alone experience CRF, and 33% to 53% of the patients in radiotherapy reported CRF (Fabi et al., 2020). Immunotherapy is associated with a 12% to 37% CRF prevalence, and the rate increases to 71% when combined with chemotherapy, antiangiogenic agents, monoclonal antibodies, and targeted therapies (Fabi et al., 2020).

CRF has a significant impact on treatment adherence at different stages of treatment. Vorobiof et al. (2018) assessed treatment adherence of patients diagnosed with varied types of cancer and undergoing distinct treatments. The authors found that CRF substantially affected treatment adherence as 11.5% withdrew from the treatment 6

months before completion, 17.2% experienced CRF weekly, and 66% reported mild, moderate, to severe CRF daily. Nineteen percent of the patients with lung and breast cancer experiencing CRFreported poor treatment compliance (Vorobiof et al., 2018). Savina and Zaydiner (2019) reported that the prevalence of CRF ranges between 40% to 100% and highlighted that the disparities can be attributed to inadequate diagnostic criteria and assessment.

The problem that I addressed in this doctoral project was the identification of CRF among patients and its effect on patients' compliance with cancer treatments, specifically chemotherapy and radiotherapy. Addressing the problem is necessary to establish the most effective measures that can be implemented to improve treatment compliance and manage CRF among patients. Miller and Evers (2022) reported that effective strategies should be implemented to enhance treatment adherence and improve the general quality of life of the patients. This doctoral project will significantly impact the nursing practice by including best practices in which treatment adherence can be enhanced among patients with cancer experiencing CRF with the development of an evidence-based practice guideline (CPG). I used the evidence from my study to address the issues associated with a high rate of poor treatment adherence, such as type of treatment, cancer, and stages of cancer associated with high CRF prevalence. Based on Fabi et al.'s (2020) findings, it can be concluded that CRF may affect treatment adherence at various stages and intervals such as daily, weekly, and monthly.

This project may have a significant impact on the nursing practice as I developed evidence-based guidelines that can be applied to help manage CRF among patients with a

positive diagnosis of cancer and consequently increase treatment adherence. The nurse practitioners were able to promptly identify patients with CRF and initiate an accurate treatment for relieving fatigue and increasing compliance with treatment compliance. Belloni et al. (2023) stated that CRF is under-identified, evaluated, and treated due to a limited understanding of the condition and discrepancies in information regarding fatigue among patients with cancer. Therefore, I anticipated that the project would have a significant impact on nursing practice by including reliable evidence from various studies and developing an evidence-based CPG that can be applied to increase prompt screening of CRF and implementing accurate treatment.

Purpose Statement

The gap that I identified in the research was the lack of a CPG used in identifying, screening, and treating CRF among patients diagnosed with cancer and in active treatment. Thus, this doctoral project involved an investigation of the evidence to support the identification of CRF and treatment compliance among patients experiencing CRF and undergoing chemotherapy and radiotherapy treatments. The practice-focused question that guided the project was: In CRF, what is the best available evidence to guide the development of a clinical practice guideline for effective interventions on early detection and management of CRF compared to standard practice to reduce the rate of poor treatment adherence? The gap that I identified was the lack of a CPG used in identifying, screening, and treating CRF among patients diagnosed with cancer and in active treatment. I analyzed the data that I obtained to obtain findings to fill the gap and contribute information on CRF and treatment adherence to the existing literature.

Nature of the Doctoral Project

The evidence that I collected in this project for the CPG development was from research that included patients with a positive diagnosis of cancer, the type of cancer treatment (chemotherapy and radiotherapy), CRF level, and adherence to the treatment. I explored evidence based on the type of cancer, treatment, patients diagnosed with CRF, and those with treatment compliance issues.

I used the Walden University DNP manual to guide my development of CPG. I used the Appraisal of Guidelines Research and Evaluation (AGREE) II tool (Brouwers, 2010) to provide a framework to develop and evaluate the quality of the evidence obtained from a comprehensive literature search. I performed the literature review search in scientific databases to obtain peer-review articles, and the evidence from the studies was used to develop a CPG. I used the AGREE II tool, which has has six domains, in the project for evidence appraisal.

An expert panel of approximately four members was included to audit and approve the CPG. After a comprehensive review and approval by the expert panel, it can be applied to the end users. The purpose of this doctoral project wasto develop an evidence-based clinical practice guideline on screening, detecting, and treating cancer-related fatigue among patients diagnosed with cancer and in active therapy to increase treatment adherence.

Significance

The stakeholders in the project included patients with a positive diagnosis of cancer, health care providers, and the nursing profession. The patients were positively

impacted through prompt identification of CRF and initiating treatment that enabled them to comply with the treatment. The health care providers were also impacted as they were able to identify CRF among patients and initiate mitigating strategies that helped the patients to manage fatigue during and after the treatment. There are measures that can be implemented to help manage and treat CRF, such as physical activity, mental health support, dietary changes, and mind-body approaches such as acupuncture and yoga (Cleveland Clinic, 2021). Additionally, specific drugs can be prescribed, as well as treatment options for the causes of fatigue, such as anemia, depression, and pain (National Cancer Institute, 2021). The nursing profession can be impacted through prompt and accurate screening and diagnosis of CRF among patients with cancer and implement management and treatment measures and consequently reduce poor compliance among patients, thus, contributing to the nursing practice.

The findings can be extrapolated to wider contexts, such as cancer patients, facilities, and organizations that are affiliated with cancer patients. For example, the findings can be extrapolated to health care facilities that treat cancer patients by implementing the use of this guideline and the evaluation tools in screening and diagnosing patients with CRF and determining their adherence rate to treatment so as to initiate management strategies to reduce fatigue among the patients. The implication of positive social change will be the use of a guideline which has valid and reliable tools to diagnose and manage CRF among patients during active treatment. According to Schmidt et al. (2020), the majority of health care providers do not inquire about fatigue and exhaustion to patients with cancer. I anticipated that the findings of this project would

enhance the relevance of screening and diagnosis CRF to determine the treatment compliance among patients in active cancer treatment.

Summary

CRF is a common side effect of cancer that affects most patients during and after treatment. CRF results in poor treatment adherence due to extreme fatigue, lack of energy, and social, emotional, and physical exhaustion. The mechanisms of CRF are associated with the treatment and the medication prescribed that alter the cell functioning, releasing toxic cells, lowering the blood count in the body, modifying hormone levels, inflammation, and damaging the tissues. In this doctoral project, I focused on developing a CPG to aid in prompt screening of CRF and implementing accurate treatment. Section 2 includes the concepts, models, and theories used in the project, the relevance of the project to the nursing practice, local background and context, and the project team's role in the study.

Section 2: Background and Context

Introduction

CRF is a significant concern among cancer patients during and after treatment in the United States and globally. Approximately 62 to 85% of cancer patients experience CRF in the active or maintenance treatment phase (Thong et al., 2020). Cancer-related fatigue may disrupt adherence to treatment among cancer patients, leading to poor health outcomes. However, CRF is underrecognized and therefore undertreated. About 41% of cancer survivors experiencing CRF have not been recommended for treatment (Thong et al., 2020). In addition, 50% of cancer survivors do not discuss or receive the desired help for the condition (Thong et al., 2020). I used the following practice-focused question for this project: In CRF, what is the best available evidence to guide the development of a clinical practice guideline for effective interventions on early detection and management of CRF compared to standard practice to reduce the rate of poor treatment adherence? The purpose of this doctoral project was to develop an evidence-based clinical practice guideline on screening, detecting, and treating cancer-related fatigue among patients diagnosed with cancer and in active therapy to increase treatment adherence.

Concepts, Models, and Theories

Nursing theories assist in learning assessment of patients, planning, implementing, and evaluating practice professionally (Arif & Hussain, 2019). Implementation of nursing theories is crucial in the provision of quality care for the best patient outcomes. Additionally, evidence-based (EBP) models are used to integrate the most current research into practice to create the best patient care. Therefore, Orem's self-

care deficit theory and the Iowa model provided the scientific underpinning for the project.

Orem Self-Care Theory

Orem's (1971) self-care theory was founded on the premise that individuals possess the capacity, moral commitment, and innate responsibility to care for their well-being. Orem (1971) defined self-care as maintaining, restoring, and improving an individual's health. Nurses should view patients as dependable, accountable, potent, and knowledgeable decision-makers who can effectively manage their health care. Individuals should also be accountable for their own and their families welfare. According to Orem (1971), there are three types of nursing systems: (a) Wholly compensatory, (b) partially compensatory, and (c) supportive educational. Nurses provide supportive education when patients must learn but cannot do so independently. The application of Orem's self-care theory in the project aided in educating cancer patients undergoing radiation therapy or chemotherapy about CRF to increase their treatment adherence, thereby contributing to improved health outcomes.

In a randomized controlled trial, Rakhshani et al. (2021) examined the efficacy of education based on Orem's theory of self-care in enhancing the self-efficacy of chemotherapy patients. There were 100 participants, 50 in the experimental group and 50 in the control group. Based on Orem's self-care theory, the dependent variable in the study was self-care competence, while the independent variable was education. Rakhshani et al. discovered that education based on Orem's self-care theory effectively enhances patients' self-care ability. The researchers used various educational methods

such as film screenings, lectures, group discussions, and questions and answers, which may be incorporated into the project' CPG.

The Iowa Model

The Iowa model of EBP was used to guide the DPI project's implementation. A group of nurses at the University of Iowa Hospital and faculty at the University of Iowa College of Nursing established the model more than 25 years ago (Iowa Model Collaborative et al., 2017). The model criteria focused on the entire health care system, that is, health providers, patients, and infrastructure, to implement evidence-based changes in practice. The Iowa model was updated in 2017 to assist health care systems in satisfying the evolving needs of patients (Iowa Model Collaborative et al., 2017).

The first phase of the model involves identifying the issue and the knowledge-based triggers within the health care facility and determining whether it is a priority in the organization (Iowa Model Collaborative et al., 2017). After identifying the problem, a team is formed to gather, evaluate, and synthesize evidence regarding effective strategies for addressing the problem. Then, a pilot study is conducted to evaluate the efficacy of the practice change and the results disseminated (Iowa Model Collaborative et al., 2017). The change is then implemented and incorporated into practice, with periodic evaluation, based on the findings obtained from the pilot study.

Chiwaula et al. (2021) examined the implementation of evidence-based care in intensive care units (ICUs) based on the Iowa model. The Iowa model was used in the study to implement ICU change. The study included six co-researchers and 26 patients with fever. The study's findings indicated that the use of the Iowa model guided and

supported nurses in providing quality and secure care to ICU patients. Therefore, Chiwaula et al. endorsed using the Iowa model to guide practice changes because it promotes EBP capability and capacity among nurses. In the project, the Iowa model aided in implementing a comprehensive CPG aid in detecting and managing CRF among patients with cancer and in active treatment, resulting in improved treatment compliance.

Relevance to Nursing Practice

In 1988, the fatigue coalition, which is a multidisciplinary group of medical practitioners, researchers, and patient advocates, proposed that CRF involved four criteria, including (a) 2 weeks of daily fatigue, with five of the 10 ten additional fatigue-related symptoms (inability to overcome inactivity, lack of concentration, weakness, decreased motivation, difficulty completing tasks, insomnia, memory difficulties, malaise, and nonrestorative sleep), (b) fatigue resulting in distress or impairment of social and occupational functioning, (c) clinical evidence that fatigue is associated with cancer or its treatment, and (d) fatigue not due to a psychiatric condition such as depression (Fisher et al., 2020).

Epidemiology, Etiology, Pathogenesis

According to Fabi et al. (2020), about 40% of cancer patients experienced fatigue at diagnosis. Approximately 50 to 90% of cancer patients experienced CRF globally (Nugusse et al., 2021). About 80% of patients undergoing radiation therapy and 90% of those receiving chemotherapy experienced CRF (Nugusse et al., 2021). Over the last few years, researchers have focused on the epidemiology, etiology, and pathogenesis of fatigue among cancer patients (Strebkova, 2020).

CRF was found to be linked to adverse effects on cancer patients' psychological, physiological, and social activities (Ma et al., 2020). Consequently, cancer patients may lose confidence in life and may not adhere to treatment regimens, leading to poor quality of life. According to Muthanna et al. (2021), fatigue among cancer patients has been linked to treatment discontinuation among cancer patients. The known high prevalence of CRF and the negative impact linked to the condition necessitate the implementation of the project.

The pathogenesis underlying CRF is not well understood. However, disruptions originating in the central (inflammation, hypothalamic-pituitary-adrenal axis) and peripheral (reduced energy metabolism) nervous systems may be associated with CRF (Thong et al., 2020). Additionally, pre-existing conditions such as anemia, mental issues, and diabetes mellitus may be linked to fatigue severity at the beginning of cancer treatment. Medications such as antidepressants and beta-blockers, which are used to manage these conditions, may also contribute to CRF. Also, treatment such as hormone therapy, chemotherapy, radiotherapy, surgery, endocrine therapy may lead to CRF (Thong et al., 2020). A history of psychological distress or depression before starting cancer treatment may cause CRF. Educating health providers on CRF will promote timely recognition and treatment of the condition using evidence-based strategies.

Evidence-Based Strategies for Managing CRF

Various interventions have been used to manage CRF (He et al., 2020; Rau et al., 2023; Wu et al., 2019). For instance, regular screening and treatment of CRF may aid in mitigating the condition (Rau et al., 2023). According to Rau et al. (2023), patient

education, energy conservation, and activity management measures are crucial in improving the assessment skills and fatigue awareness among individuals with cancer. Additionally, patients should be educated on how to review and record their fatigue severity, improving their self-efficacy. Regular exercise during and after cancer treatment may manage CRF (Rau et al., 2023). Also, face-to-face cognitive behavioral therapy (CBT) is the most effective method for CRF reduction in cancer patients who have completed treatment. Sleep hygiene and higher fiber and low-fat diets in whole grains, vegetables, fruits, and foods rich in omega-3 polyunsaturated fatty acids may be utilized to manage CRF (Rau et al., 2023). Pharmacological treatments such as methylphenidate and steroids, among others, may mitigate CRF among cancer patients. Wu et al. (2019) indicated that CBT, multimodal therapy, aerobic resistance exercise, mindfulness-based stress reduction (MBSR), acupuncture, and qigong may help reduce CRF. Di Meglio et al. (2022) also stated that physical activity and psychosocial interventions such as mindfulness-based meditation, acupuncture, and yoga may help manage CRF among cancer patients. Acupuncture may effectively manage persistent CRF (Di Meglio et al., 2022).

In their study, He et al. (2020) argued that MBSR may help reduce CRF. Yuan et al. (2022) conducted a systematic review and meta-analysis and found that CBT, MBSR, psychoeducational therapy, stress management therapy (SMT), medication, and comprehensive therapy may be utilized to manage CRF. However, Yuan et al. (2022) argued that MBSR is the most effective strategy in the management of CRF. According to O'Regan et al. (2019), improving self-care skills among cancer patients is associated

with a reduced likelihood of experiencing CRF. Similarly, Agbejule et al. (2022) revealed that health care professionals should offer self-management support face-to-face and immediately post-treatment to mitigate CRF.

Patient Education

According to Thong et al. (2020), most cancer patients have limited knowledge of CRF. CRF remains underrecognized and undertreated by health care providers. Schmidt et al. (2021) revealed that about 58% of cancer patients do not feel informed about CRF. Approximately 41% of cancer patients have never been asked if they were tired by the treating physician (Schmidt et al., 2021). Therefore, the inadequate knowledge of CRF among patients and the lack of effective recognition are major practice gaps that may be associated with disruption of treatment and poor health outcomes.

Based on a review of the extant literature, a draft guideline was developed identifying strategies to manage or reduce how CRF negatively impacts compliance with chemotherapy and radiotherapy among cancer patients is warranted. After the evidence-based guidelines have been evaluated using the AGREE II tool, they were implemented at the project site and in practice to mitigate the issue, contributing to improved adherence to treatment.

Local Background and Context

The local problem was the lack of a comprehensive CPG to aid in the identification of CRF among patients and poor treatment adherence to cancer-based treatments. The gap identified is the lack of identification of CRF and information on management strategies to address poor treatment adherence among patients diagnosed

with cancer experiencing fatigue during active treatment due to incomprehensive CPGs. The target population was nurse practitioners who are in direct contact with patients with cancer and in active treatment. Hence, the purpose of this doctoral project was to develop an evidence-based clinical practice guideline on screening, detecting, and treating cancer-related fatigue among patients diagnosed with cancer and in active therapy to increase treatment adherence.

The project was conducted in a cancer clinic that provides chemotherapy and radiation therapy services. The cancer clinic provides consultations, diagnosis, and treatment for various types of cancer, such as breast, cervical, bone, anal, adrenal, brain, bile duct, colorectal, lung, prostate, and uterine cancer. The facility is located in Atlanta and is staffed with experts who use top-notch technologies and advanced cancer treatment options to provide patients with holistic and customized care.

The organization's mission is to provide the highest quality, evidence-based care every day. The organization's strategic vision is to provide holistic and customized care to cancer patients. In addition, cancer patients and caregivers in the community are provided with educational tools, resources, and information to navigate their condition and make informed care decisions. The organization accepts a variety of insurance plans and engages in clinical trials on novel treatment options. The facility currently has 1257 patients aged 18 years and above receiving outpatient care.

Definitions

The following terms were used throughout this study. *Cancer-related fatigue* is a distressing, persistent, subjective sense of tiredness related to cancer or its treatment that

is not proportional to recent activity and interferes with usual functioning (Yang et al., 2019).

Chemotherapy involves using one or more cytotoxic agents to treat cancer (Amjad et al., 2020). The main aim of chemotherapy is to mitigate cell proliferation and tumor multiplication, preventing invasion and metastasis.

Clinical practice guidelines are systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances (Institute of Medicine, 1990).

Radiation therapy involves using beams that have intense energy to kill cancer cells (NHS, 2023). Clinical practice guidelines are scientific-based recommendations aimed at improving patient care to help achieve the best health outcomes (European Observatory on Health Systems and Policies [EOHSP], 2021).

Treatment adherence refers to the degree to which patients can comply with the prescribed medications from a health care provider (Fernandez- Lazaro et al., 2019).

State and National Context

The project's findings were applicable to cancer patients experiencing CRF in oncological care settings in health care systems across the United States. Approximately 20.6 million individuals will have cancer by 2026 in the United States (Fisher et al., 2020). However, only 36% of oncology health care providers screen for CRF at each clinic visit (Fisher et al., 2020). Also, low CRF recognition and treatment rates lead to poor health outcomes among cancer patient (Fisher et al., 2020). Hence, oncology health care providers must evaluate CRF effectively, have adequate awareness of the risk of

cancer patients developing CRF, and use the necessary steps to screen and assess the condition, contributing to establishing effective management approaches (Fisher et al., 2020). The project was crucial in establishing an evidence-based clinical practice guideline on screening, detecting, and treating cancer-related fatigue among patients diagnosed with cancer and in active therapy to increase treatment adherence. Health providers at the project site were educated on the impact of CRF on treatment compliance, contributing to effective and timely screening and treatment of the condition.

Role of the DNP Student

The site of this project was a facility whose mission was to provide the highest quality, evidence-based care every day. My role in this project was as the project leader to guide the project team and oversee all project activities. I sought site approval from the facility's leadership to implement the project. Then, I developed and received committee-approval for the proposal, I submitted to the Walden Institutional Review Board (IRB) The project was feasible as this guideline helped fill the gap at the clinic for addressing non-compliance to chemotherapy and radiation therapy among cancer patients experiencing CRF; thus, achieving better health outcomes. The DNP student educated health professionals at the clinic about the project and invited their participation in the review and evaluation of the CPG.

The guideline inclusion criteria addressed management for adult patients over 18 years of age with a positive diagnosis of cancer (any type), who are in chemotherapy or radiotherapy treatments. After data collection, I analyzed the information obtained using MS Excel. A panel of experts was formed to review and approve the CPG developed

from the obtained evidence on the literature review search articles. The CPG was evaluated using the AGREE II tool. Finally, I wrote a report or manuscript to present the project's findings. I will disseminate the project's findings to major stakeholders in the project to help improve practice and achieve better compliance with chemotherapy and radiation therapy among cancer patients.

My motivation to implement the DNP project was to reduce the prevalence of CRF among cancer patients and improve compliance with chemotherapy and radiation therapy and is based on my observation that CRF is underrecognized and undertreated. Due to the lack of an evidence-based guideline, health care providers should be educated on the best methods for screening and managing the condition to improve chemotherapy and radiation therapy compliance.

Also, I noticed health care providers treating cancer patients rarely or discussing CRF or its treatment options with patients, creating the need to educate patients on the condition, its effects, and the need to manage it. Finally, I noted the impact of CRF on non-compliance with chemotherapy and radiation therapy and its effects on patients' quality of life. This necessitates the project's implementation to develop this guideline to facilitate the establishment of effective strategies to mitigate the condition of CRF .

Potential biases that I possessed include those on race and sexual identity, a bias often seen in health care (Marcelin et al., 2019). According to Marcelin et al., patients from minority groups may experience the effects of unconscious bias derived from cultural stereotypes, leading to health disparities. In addition, biases negatively impact on patient-provider relationships and interprofessional interactions. I have experienced race

and sexual identity biases when working/providing patient care to individuals from minority groups and particularly, those who identify as lesbian, gay, bisexual, transgender, intersex, queer/questioning, and asexual (such as non-binary and pansexual) (LGBTIQA).

To address the biases, I self-reflected regularly, questioned, and actively countered the stereotypes (Marcelin et al., 2019). In addition, I collaborated with and included diverse individuals in the project team. I also sought mentorship from my preceptor and leaders at the project site. I practiced cultural humility to maintain respect during my interactions with site leaders, health care providers, and cancer patients from diverse backgrounds (Marcelin et al., 2019). I developed a guideline that is inclusive of diversity among people of different abilities, races, and gender identities as I reviewed the evidence for managing CRF among patients. Lastly, I included people of diverse backgrounds on the project team.

Role of the Project Team

The project team, including the site leaders and health care providers, were crucial in facilitating successful implementation. The site leaders were responsible for approving the project, developing a schedule so that the project would not interfere with the normal clinic operation and supervising and managing the stakeholders involved (Whyte et al., 2022). The site leaders also provided the necessary resources and support to ensure the successful implementation of the project.

Opportunities for team members to share their expertise and contextual insight relative to the DNP project included biweekly meetings with the DNP student throughout

the project's guideline development and evaluation. In addition, the team members shared their expertise regarding CRF recognition and treatment and offer contextual insight on the strategies to manage the CRF condition as outlined in the CPG. The aim was the creation of a CPG to guide practice, contributing to improved compliance with chemotherapy and radiation therapy.

Summary

Cancer-related fatigue is a significant concern among cancer patients during and after treatment. Cancer-related fatigue may also affect cancer patients' medication adherence, causing poor health outcomes. Thus, the project was guided by the following practice-focused question: In CRF, what is the best available evidence to guide the development of a clinical practice guideline for effective interventions on early detection and management of CRF compared to standard practice to reduce the rate of poor treatment adherence? The purpose of this doctoral project was to develop an evidence-based clinical practice guideline on screening, detecting, and treating cancer-related fatigue among patients diagnosed with cancer and in active therapy to increase treatment adherence. Cancer-related fatigue's prevalence and detrimental effects necessitates the project. Orem's self-care deficit theory and Iowa model provided the scientific underpinning for the project. The epidemiology, etiology, and pathophysiology of cancer patient fatigue have been studied in recent years. Face-to-face CBT, patient education, MBSR, nutrition and sleep hygiene, aerobic resistance training, and methylphenidate and steroids can be used to control CRF. The project was conducted in a cancer clinic that provides chemotherapy and radiation therapy services. The project's findings benefited

US oncology patients with CRF. As a DNP student and project lead, I (a) searched the project site, (b) sought approval, (c) wrote a proposal and submitted it to the IRB to determine project feasibility, (d) educated health care professionals and patients at the project site, (e) collected data, (f) analyzed data, and (g) wrote a report to help disseminate the findings. The project team, included the site leaders and health care providers, were crucial in facilitating successful implementation. Opportunities for team members to share their expertise and contextual insight relative to the DNP project included biweekly meetings with the DNP student throughout the project's implementation. Section 3 contains a discussion of the project's methodology. Data collection and analysis methods are discussed in Section 3.

Section 3: Collection and Analysis of Evidence

Introduction

CRF is defined as a severe form of fatigue that manifests during cancer treatment, hampers the performance of a person's daily activities, and deteriorates the quality of life (American Cancer Society, 2023). The main problem identified was the lack of a comprehensive CPG that can be used to detect CRF among patients with cancer and in active treatment. Consequently, the lack of a comprehensive CPG for detecting and managing fatigue among cancer patients results in poor treatment adherence among the patients. According to Savina and Zaydiner (2019), CRF is under-reported, under-assessed, and under-treated as it is not mostly understood. Therefore, the purpose of this doctoral project was to develop an evidence-based clinical practice guideline on screening, detecting, and treating cancer-related fatigue among patients diagnosed with cancer and in active therapy to increase treatment adherence. The subtopics included in this section are the practice-focused question, sources of evidence, analysis and synthesis, and summary.

Practice-Focused Question

The local problem recognized was the lack of a comprehensive CPG to aid in the identification of CRF among patients and poor treatment adherence to cancer-based treatments. The practice gap identified was the lack of identification of CRF and information on management strategies to address poor treatment adherence among patients diagnosed with cancer experiencing fatigue during active treatment due to incomprehensive CPGs. For example, Miller and Evans (2022) reported that cancer side

effects resulted in poor treatment compliance. Similarly, Vorobiof et al. (2018) stated that CRF resulted in patients withdrawing from cancer treatment six months before completion. Thus, the practice-focused question that was assessed in this project was: In CRF, what is the best available evidence to guide the development of a clinical practice guideline for effective interventions on early detection and management of CRF compared to standard practice to reduce the rate of poor treatment adherence?

This focus of the project was determine to what extent CRF affected treatment compliance among patients with a positive diagnosis of cancer during active chemotherapy and radiotherapy and what strategies mitigated CRF. The purpose aligned with the practice-focused question as it entailed establishing and drawing a conclusion about the best available evidence that can be used to outline recommendations for strategies that have an effect on CRF to improve treatment adherence among patients with cancer in active chemotherapy and radiotherapy. The data collected to address the practice-focused question were drawn from the extant literature on CRF. The data were collected during the project using the AGREE II instrument to evaluate the quality and usability of the developed CPG that was based on the literature review evidence from peer-reviewed articles. A panel of experts was formed to review and approve the CPG that was developed from the obtained evidence on the literature review search articles. The main outcomes of this doctoral project included CPG recommendations for screening, detecting, and managing (treating) CRF among patients with cancer and in active treatment.

Sources of Evidence

The sources of information were drawn from a comprehensive literature search that is performed in scientific databases and search engines such as Google Scholar, PubMed, COCHRANE, Elsevier, Embase, CrossRef, BioMed Central (BMC), and PROSPERO. The articles were included in the review if they are (a) published between 2010 to 2023, (b) published in English, (c) available in full text, (d) contained empirical findings, and (e) were in Level 1, 2, 3, and 4 of evidence of effectiveness as stated in the Joanna Briggs Institute (JBI) guidelines. The exclusion criteria for the articles included Level 5 of the JBI level of evidence. Notably, only Levels 3a, 3b, 3c, and 4b of the JBI evidence levels for effectiveness were included, 3d and 3e were excluded from the review. All cancer types were included in the search. The articles used to obtain the evidence are displayed in Appendix A.

Evidence Generated for the Doctoral Project

Participants

The target stakeholders who were the audience for using this CPG were five nurse practitioners who were in direct contact with patients with cancer and in active treatment. Nurse practitioners from the facility were included to aid in the development of the CPG to promote frequent screening and administer prompt treatment to patients with CRF. The inclusion criteria for the nurse practitioners included registered nurse practitioners, affiliated with the project site, and available for the project duration. Nurse practitioners were excluded if they are not employed at the site or are not in direct practice with patients diagnosed with cancer. Nurse practitioners are relevant to the practice-focused

question as they helped in frequent screening and prompt identification of CRF among patients with cancer and administer the most accurate treatment.

Procedures

The methodology section was guided by the six domains of the AGREE II tool.The domains included (a) scope and purpose, (b) stakeholder involvement, (c) rigor of development, (d) clarity of presentation, (e) applicability, and (f) editorial independence (AGREE, 2017). The AGREE II checklist was used to guide the CPG development and validation process.

Domain 1 was scope and purpose, encompassing the aim, health question, and target population (Brouwers, 2010). The practice-focused question that guided the project was: In CRF, what is the best available evidence to guide the development of a clinical practice guideline for adequate interventions on early detection and management of CRF compared to standard practice to reduce the rate of poor treatment adherence? The target stakeholders were the nurse practitioners who helped patients diagnosed with cancer.

Domain 2 was stakeholder involvement which details the roles of the stakeholders in the project (Brouwers, 2010). The stakeholders in the project were the nurse practitioners who help patients with a positive cancer diagnosis. The role of the nurse practitioners was to screen patients with cancer using the CPG developed and initiate the appropriate treatment.

Domain 3 was the rigor of development which details the process used to obtain the evidence, appraise, and formulate recommendations (Brouwers, 2010). A comprehensive literature search was performed in scientific databases and search

engines, and inclusion and exclusion criteria were used to select the eligible articles. Keywords, medical subject headings (MeSH), and controlled vocabulary were used to facilitate the search in the aforementioned databases. Notably, the keywords used were based on the PICO question and the purpose of the project. The quality of the evidence in the articles was assessed. The evidence obtained was recorded in Appendix A. Based on the appraised evidence, a CPG was drafted for this proposal (Appendix B).

Domain 4 was clarity of presentation, which involved the language, structure, and format used in the guideline (Brouwers, 2010). The CPG was presented as a chart to detail a chain of steps and a narrative to provide the rationale for the assessment made.

Applicability was Domain 5 that involve barriers and facilitators supporting the development of the CPG(Brouwers, 2010). The facilitators of implementing the CPG were the availability and cooperation of the site leadership and the nurse practitioners. Additionally, the CPG does not involve purchasing equipment or tool; hence, cost-effective. The barriers to initiating the CPG included a lack of support from the site leadership.

Domain 6 was editorial independence which entails developing the CPG without biases or conflict of interest (Brouwers, 2010). A panel of content experts was formed to review and approve the CPG developed by using the AGREE II instrument. The inclusion criteria for the expert panelist included registered nurse practitioners with more than two years of experience. The exclusion criteria were nurse practitioners with fewer than 2 years of experience in nursing practice. The feedback obtained from the assessment was applied to ensure that the CPG was bias-free and of good quality.

AGREE II contains 23 items clustered in six domains. Melissa et al. (2010) assessed the psychometric properties of the AGREE tool and concluded a good validity and reliability. Five of the six dimensions were significant predictors of individuals' outcome measures at $p < 0.05$, and the internal consistency of the instrument ranged between 0.64 to 0.98 (Melissa et al., 2010).

The invited expert panel used the AGREE II Instrument to review the guideline to validate content. I revised the guideline based on the results of their review and recommendations.

I identified a group of end-users to present a revised guideline should this be needed based on the review by the content expert panel to gain further information on usability. Finally, once completed, the DNP student developed and shared a final report with each of the key stakeholders.

Protections

The project was a CPG development doctoral project; thus, the Walden University IRB pre-approved the project manual that guided the project. However, a formal application was submitted to the Walden University ethics committee and approved before commencing the project (# 07-19-23-0399277). This CPG development project was conducted with reference to Walden University's ethical requirements. First, the expert panelist's information was kept private and confidential by avoiding using personal identifiers such as names. Second, patients' data were not collected. In this project, data were obtained from peer-reviewed articles to develop a CPG on CRF identification,

diagnosis, and management. Notably, the project did not involve direct interaction with patients.

Analysis and Synthesis

The project involved developing and validating a CPG that was formulated using evidence obtained from peer-reviewed articles. The synthesis performed involved the quality assessment of the articles obtained (see Appendix C). The quality of the evidence in the articles was assessed. The assessment of multiple systematic reviews (AMSTAR-2) was used to examine the quality of systematic reviews, meta-analysis, and systematic reviews with meta-analysis.

The AGREE II Instrument data were reviewed and analyzed using descriptive statistics. The AGREE II instruments was divided into six domains, therefore, the total summation of each of the domains was obtained and used to find the domain percentage score (AGREE, 2017). The percentage score was used to make inferences on the quality of the CPG developed (AGREE, 2017).

Summary

This doctoral project aimed to develop an evidence-based clinical practice guideline on screening, detecting, and treating cancer-related fatigue among patients diagnosed with cancer and in active therapy to increase treatment adherence. A comprehensive literature search was performed in scientific databases and search to obtain relevant evidence from peer-reviewed articles. The evidence obtained was used to develop a CPG on identifying, diagnosing, and managing fatigue among patients with cancer and in active treatment. The AMSTAR-2 was applied to assess the quality of the

articles obtained from the search. An expert panelist was included to evaluate and validate the developed CPG. The project was conducted in accordance with Walden University ethics regulations. Section 4 includes the presentation of the findings and recommendations from the analysis. The subtopics covered include findings and implications, recommendations, contribution to the doctoral project, and the strengths and limitations of the project.

Section 4: Findings and Recommendations

Introduction

The problem identified in the project was poor identification of cancer-related fatigue and treatment adherence among patients diagnosed with cancer due to CRF. The gap identified was the lack of a CPG used in identifying, screening, and treating CRF among patients diagnosed with cancer and in active treatment at the time this project began. CRF has a substantial effect on treatment adherence among patients at different stages of cancer treatment. According to Vorobiof et al. (2018), approximately 11.5% of the patients withdrew from treatment 6 months before completing the therapy due to CRF. Therefore, based on the gap identified, the aim of the project to the development of a CPG to improve the identification and screening of CRF among patients with cancer and improve treatment compliance among individuals undergoing radiotherapy and chemotherapy. The practice question that was addressed was: In CRF, what is the best available evidence to guide the development of a clinical practice guideline for effective interventions on early detection and management of CRF compared to standard practice to reduce the rate of poor treatment adherence? This section includes findings and implications, recommendations, contribution to the doctoral project team, and strengths and limitations.

The evidence used in the project was obtained from peer-reviewed journals. An exhaustive literature review was performed in scientific databases such as PubMed, Elsevier, Google Scholar, BioMed Central, and PROSPERO. Inclusion and exclusion criteria, limits, and filters were used to refine the search. The inclusion criteria included

articles published between 2010 and 2023, in English, available in full text, containing empirical findings, and were in Level 1, 2, 3, and 4 of evidence of effectiveness as stated in the Joanna Briggs Institute (JBI) guidelines. The exclusion criteria for the articles included level five of the JBI level of evidence. Notably, only Levels 3a, 3b, 3c, and 4b of the JBI evidence levels for effectiveness were included, 3d and 3e were excluded from the review. Thirty articles were included as evidence in the project. Eighty percent of the articles were level I evidence (high quality), 13.33% were level II, 10% were level III, and 16.67% were level IV; hence, the evidence included was valid and reliable. The quality of the articles was assessed to ensure that the evidence extracted to develop the CPG was valid. The findings revealed that the evidence obtained was accurate, applicable, and reliable.

The AGREE II tool was used to guide the development and appraisal of the CPG by content experts and potential users of the guideline. The AGREE II tool was used to assess the quality and usability of the CPG in identifying, screening, and treating CPG (AGREE, 2017). There are six domains and 23 items. Two items assess the overall quality from 1 (*lowest*) to 7 (*highest*) and the usability (*yes* / no) with or without modification, while 23 items evaluate the quality of the CPG across six domains. The domains include (a) scope and purpose, (b) stakeholder involvement, (c) rigor of development, (d) clarity of presentation, (e) applicability, and (f) editorial independence (AGREE, 2017). An expert panel consisting of four health care professionals was selected to review the CPG using the AGREE II tool. Additionally, the quality of the studies was appraised utilizing the Grading of Recommendations Assessment,

Development, and Evaluation (GRADE) and the assessment of multiple systematic reviews (AMSTAR-2; Appendix A). The findings are presented below.

Findings and Implications

Four expert panelists were invited to aid in assessing the quality and the applicability of the CPG developed. The AGREE II tool was used by each of the four expert panelist independently (Appendix D). The score for the individual domains was calculated as a percentage. The scale ratings of the domains were based on Zhou et al. (2023) that a domain score above 60% was considered of high quality. A mean score of 6.0 and higher suggested satisfactory and high quality.

Domain 1: Scope and Purpose

For Domain 1 (Table 1), the quality for the four panelists was 83.33%. The score reveals that the scope and purpose of the CPG were sufficiently explained. Item 2 scored the lowest rating (*M = 5.25),* revealing that the health questions were sufficiently addressed and specific. Based on the outcome, the health question revealing CPG were structured with specific health questions. The health question that was addressed was: In CRF, what is the best available evidence to guide the development of a clinical practice guideline for effective interventions on early detection and management of CRF compared to standard practice to reduce the rate of poor treatment adherence? The formula used to calculate the percentage score for the domains depended on the number of items, expert panelist, and the score provided (Appendix E).

Table 1

Domain 1 Percentage Score

	Domain 1			
	Item 1	Item 2	Item 3	Total
4377A	6	5	7	18
C385B9	6	5	7	18
22PEA	7	6	7	20
91ER	7	5	4	16
M	6.5	5.25	6.25	
Total	26	21	25	72
Maximum score				84
Minimum score				12
% Score				83%

Domain 2: Stakeholder Involvement

For Domain 2, the total quality score was 89% (see Table 2). The second domain assessed the stakeholder involvement in the CPG. The overall score was 89%, revealing that the involvement of the stakeholders in the CPG was sufficiently included and described. Item 5 had the lowest rating ($M = 6$) revealing that although being the lowest of scores in this domain, the perceptions, preferences, and views of the target population were fairly sought. The development of the CPG was based on evidence-based articles and research that were obtained from scientific databases and peer-reviewed journals. Item 4 had the highest rating ($M = 6.75$), indicating that the development of the CPG included people from appropriate professional groups; thus, of high quality. The expert panelist included health care practitioners. The targeted users of the CPG were clearly defined (item 6).

Table 2

Domain 2 Percentage Scores

	Item 4	Item 5	Item 6	Total
A	7	6	6	19
B	6	6	6	18
C	7	6	6	19
D	7	6	7	20
M	6.75	6	6.25	
Total	27	24	25	76
Maximum				84
Minimum				12
% Score				89%

Domain 3: Rigour of Development

For Domain 3, the total quality score was 83%, revealing that the rigour of development was satisfactory (Zhou et al., 2023; see Table 3). Items 8 and 14 had the lowest rating (M = 5.5). Item 8 involves clearly stating the criteria applied in selecting the evidence. In the project, the evidence used was obtained from research articles that were obtained following a comprehensive literature search. Inclusion and exclusion criteria and assessing the level of evidence based on the Joanna Briggs Institute were used to select and filter the articles to be included in the project. A revision of the criteria used was assessed. Item 14 entails including a procedure for updating the CPG. Items 7 and 9 had the highest ratings (M = 6.5). Item 7 involves including clear systematic techniques that are used to search for evidence. A clear search strategy, including the databases searched, keywords and search phrases used, and filters and limits, were included to help in refining the search. Item 9 entails providing a description of the strengths and limitations of the evidence obtained.

Table 3

Domain 3 Percentage Scores

	Item 7	Item 8	Item 9	Item 10	Item 11	Item 12	Item 13	Item 14	Total
A	7	5	6	6	6	7	6	5	48
B	7	5	7	6	6	6	7	7	51
C	6	5	6	6	7	6	6	5	47
D	6	7	7	5	6	5	5	5	46
M	6.5	5.5	6.5	5.75	6.25	6	6	5.5	
Total	26	22	26	23	25	24	24	22	192
Maximum									224
Minimum									32
% Score									83%

Domain 4: Clarity of Presentation

Domain 4 had a total quality score of 90%, suggesting that the presentation was clear (see Table 4). Item 15 had the highest quality rating with a mean score of 7 revealing that the recommendations were specific, while Item 17 had the least rating (M = 6), revealing that the recommendations were somewhat identifiable. Based on the score, step four in the CPG included the recommendation and application of treatment options.

Table 4

Domain 4 Percentage Scores

	Item 15	Item 16	Item 17	Total
A	7	6	6	19
B	7	6	5	18
C	7	7	6	20
D	7	6	7	20
M	7	6.25	6	
Total	28	25	24	77
Maximum				84
Minimum				2
% score				90%

Domain 5: Applicability

The total quality score in Domain 5 was 88%, suggesting that the CPG was applicable (see Table 5). Items 18 and 19 had the least rating with a mean score of 6, while items 20 and 21 had the highest rating ($M = 6.25$). Item 18 assessed the description of the barriers and facilitators of the application. The facilitators of the application are the inclusion of an expert panel of health care professionals to assess the quality and applicability of the CPG and incorporate their feedback. Additionally, using evidence-based evidence from peer-reviewed articles helped improve the quality of the CPG. The barrier in the application of the CPG is that only the patients in active chemotherapy and radiotherapy were included. Item 19 involves the provision of advice on how the recommendation can be made practical.

Table 5

Domain 5 Percentage Scores

	Item 18	Item 19	Item 20	Item 21	Total
A	6	6	7	6	25
B	6	6	5	7	24
C	6	6	7	7	26
D	6	6	7	6	25
M	6	6	6.5	6.5	
Total	24	24	26	26	100
Maximum					112
Minimum					16
%score					88%

Domain 6: Editorial Independence

In Domain 6, the total quality score was 90%, suggesting that there was editorial independence. The DNP student did not receive funding, and there were no conflicting interest (see Table 6).

Table 6

Domain 6 Percentage Scores

	Item 1	Item 2	Total
A	7	6	13
B	7	7	14
C	6	6	12
D	6	6	12
M	6.5	6.25	
Total	26	25	51
Maximum			56
Minimum			8
%score			90%

The Overall Quality Assessment

The four experts rated the two AGREE II items designed to provide overall quality assessment with overall quality rating from 1 to 7 (lowest to highest) and their recommendation on whether they would recommend the use of the tool with or without modification answering "Yes" or "No" or "Yes with modification." This is intended to be a subjective rating according to Hoffmann-Eßer et al. (2017). The CPG rated by the health care providers had a mean domain score of 87.2%; thus, the CPG is of high quality and can be used in health care facilities (see Table 7). Based on the feedback of the panelist, they reported that they would recommend the CPG without any modification and the panelists recommended using the CPG in their practice.

Table 7

Overall Quality Score

Expert	Item 1	Recommendations		
		No	Yes	Yes with recommendation
A	7	0	1	0
B	6	0	1	0
C	6	0	1	0
D	7	0	1	0
Mean	6.5			

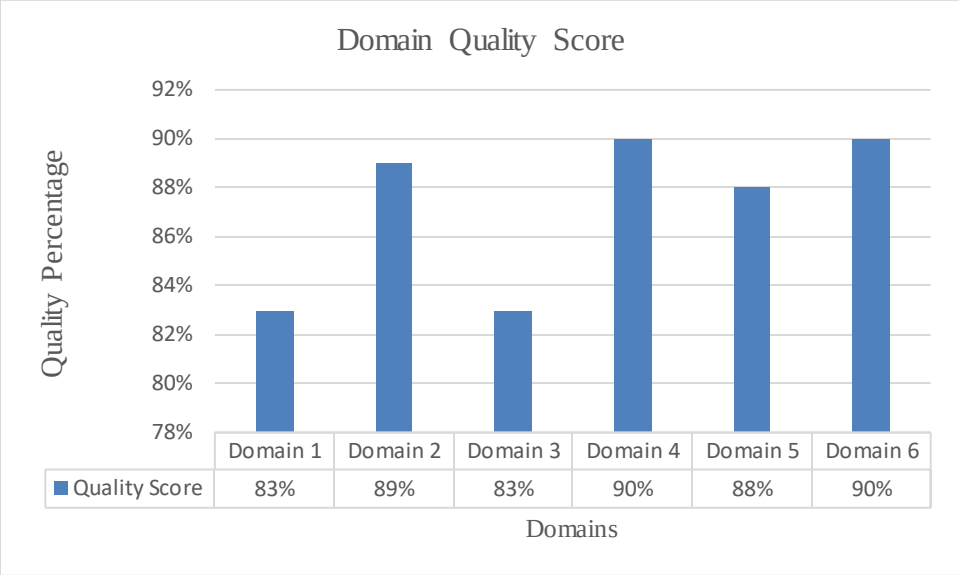
Summary of Findings

Generally, the CPG was satisfactory, with sufficient information on scope and purpose, stakeholder development, rigour of development, clarity of presentation, applicability, and editorial independence. Figure 1 shows the total quality score for each domain. The mean scores of the domains ranged between 5.25 to 7, only four of the items

wwere below 6. The majority of the items, 19 out 23 had a mean of 6 or above and were within the benchmark range described in Zhou et al. (2023), indicating that they are satisfactory and of high quality. The quality domain scores ranged between 83% to 90% with mean domain score of 87.2%; therefore, the CPG is rated as being of high quality and with 100% expert panelsist's recommendation to use the guideline without modification, this guideline can be recommended to be used in health care facilities involved in cancer treatment.

Figure 1

Quality Score for the Six Domains



Note: 1- scope and purpose, 2 - stakeholder development, 3 - rigour of development, 4 - clarity of presentation, 5- applicability, and 6 - editorial independence

The project aimed to develop an evidence-based CPG to aid in identifying and screening CRF among patients with cancer. Based on the overall quality assessment scores by the panelist, the CPG can be recommended to be incorporated into health care facilities. The CPG can be used by health care practitioners in facilities for frequent screening of CRF among patients so as to improve medication adherence among the patients. Health care practitioners can apply the CPG to aid in providing patient-centered care, from screening to monitoring and conducting follow-ups. The CPG has potential implications for social change, such as prevention and early detection of CRF among patients with cancer through routine screening. The CPG emphasizes on frequent screening for all patients with cancer, from children aged five to individuals above 12

years. Additionally, Vorobiof et al. (2018) CRF is associated with poor treatment adherence and withdrawal from therapies and treatments. Hence, the CPG has the potential for positive social change by improving treatment adherence and reducing the rate of treatment dropout.

Recommendations

My recommendations are based on the implementation of the CPG into the project site. Future steps by the clinicians in practice could apply a quality improvement project to evaluate the effectiveness of the CPG in a clinical setting once it is implemented. Additionally, the DNP student could train the health care providers on implementing the CPG to help in prompt identification, screening, and recommending appropriate treatment options for patients with CRF. Future steps in increasing the rate of screening in the project site should be based on the developed CPG to monitor the CRF of patients with cancer and in active treatment and help increase medication//therapy adherence.

Future researchers could conduct an empirical study such as a randomized control trial to determine the effectiveness of the CPG in identifying CRF among patients and determine their treatment adherence to gain more knowledge on the effects of CRF screening and treatment. A quasi-experimental study or experimental research as randomized controlled trials should be performed to determine if incorporating the CPG as an intervention is effective in promptly identifying patients with CRF and the rate of treatment adherence. The findings can be used to add to the literature and provide evidence to support the importance of frequent screening in identifying CRF among

patients diagnosed with cancer and undergoing cancer treatments such as radiotherapy or chemotherapy and the strategies to manage CRF and address quality of life during treatments.

Contribution to the Doctoral Project Team

The project team contained the expert panelist and health care providers. The health care providers included the site leaders who provided support during project development and implementation. Prior to development of the CPG, I gained insights from healthcare providers about the effects of CRF on patients in practice. The health care providers at the partner site were collaborative and provided sufficient information helping me to understand the problem and the gap in health care in screening for CRF among the patients with cancer and how to determine the appropriate treatment based on the stage of treatment.

The responsibilities of the expert panelist included appraising the CPG on CRF and providing their feedback and recommendations. Working with the panelist was effective as they ensured that they provided authentic feedback on the developed CPG. The panelists included certified health care providers with experience in working with patients diagnosed with cancer and undergoing treatment.

The role of the expert panelists in formulating the final recommendation to use the tool in practice was to provide feedback on the CPG on its quality and applicability. The feedback obtained helped in restructuring the health question for more clarity. Also, the panelist supported a recommendation to use the CPG in their practice to aid in identifying, screening, and treating CRF among patients with fatigue. Based on the

feedback obtained from the panelists, the CPG is supported as a CPG that can be implemented in a health care facility as routine practice; hence, the project findings will be disseminated among health care providers. The DNP student will educate the health care providers on the CPG and how to apply it during their practice.

Strengths and Limitations of the Project

The strengths of the project include the use of evidence-based articles and research to develop the CPG. The 30 studies included as evidence in the project to inform guideline development were obtained from scientific databases and peer-reviewed journals. Also, the quality of the articles was assessed to ensure that the evidence extracted to develop the CPG was valid. Second, an extensive literature review was conducted to obtain information that was used in the developing the CPG. A considerable amount of time was invested in literature search to obtain evidence used in CPG development. Third, an expert panel inclusive of health care professionals was included to determine the quality of the CPG. The the mean 23 items scores ranged between 5.25 and 7, and the 100% of the expert panelists indicated that they would recommend using the CPG in their practice without modification. Fourth, the domain scores obtained were 80% and above, which is greater than the benchmark score of 60%, which suggests that the CPG was of high quality and satisfactory (see Zhou et al., 2023).

There were several limitations in the project; first, the scope of the CPG is focused primarily on patients diagnosed with cancer and undergoing chemotherapy and radiotherapy, yet there are other treatment options such as hormone therapy, immunotherapy, or stem cell transplant. Future work should develop CPGs that include

patients with cancer undergoing different therapy modalities. Second, the patient and/or the patients' representatives such as family members were not included in the expert panel, only the health care providers. The content expert reviews were inclusive of nurse practitioners as health care providers. The panel was limited to four expert panelists. Thus, future revisions and reviews should be inclusive of a larger group of experts that is inclusive of patients, families, and other health care providers as stakeholders in the expert panel to obtain their views.

Section 5: Dissemination Plan

The project aimed to develop an evidence-based CPG on screening, detecting, and treating cancer-related fatigue among patients diagnosed with cancer and in active therapy to increase treatment adherence. This section includes the dissemination plan and analysis of self.

The CPG was developed to help identify and screen patients diagnosed with cancer and undergoing treatment for CRF. Based on the expert panel feedback and assessment, the CPG can be recommended in health care facilities and incorporated into practice. The dissemination of the CPG in a health facility will commence with scheduling a formal meeting with the facility leaders to inform them about the guideline and what it entails. The DNP student will present the CPG and the expert panel feedback and assessment to the site leaders. After the site leaders approve implementing the CPG at the site, I plan to educate the health care providers at the site about the CPG, including the recommended steps for practice to assist the providers to implement the CPG in screening, educating, providing a treatment plan, and monitoring the patients. A PowerPoint presentation will be used in the education session for approximately 45 to 60 minutes. Additionally, posters and leaflets containing the CPG will be distributed to all health care staff, particularly in the oncology department.

The target audiences are health care providers in the oncology department and professionals working with patients diagnosed with cancer, such as psychiatrists, dietitians, occupational therapists, and endocrinologists. In treating CRF, the patients can be recommended to a dietitian to help improve their nutritional intake or an occupational

therapist to aid their physical performance. In addition, the patients can be referred to a psychiatrist for psychosocial interventions.

The appropriate venues disseminating the CPG include the health care facilities with oncology departments and clinics. The CPG can be disseminated in nursing schools to help nursing students identify, screen, and treat CRF among cancer patients. Likewise, an abstract containing information on the CPG can be sent to nursing journals such as the Journal of Cancer Survivorship for peer review and publication and to reach a wider audience.

Analysis of Self

My role as a practitioner has helped develop the CPG based on the identified gap. As a practitioner, there were no evidence-based guidelines to help screen CRF among patients; the need to promptly identify fatigue among patients with cancer aided in developing CPG. As a scholar, this project has helped in learning how to search and assess the quality of articles to provide valid and credible evidence. Additionally, as a scholar, the project has helped in learning how to filter information obtained from articles without bias. As a project manager, I have learnt how to plan, select, and identify the role of the team members and coordinate the project activities to ensure cohesion. Conducting this project has been essential in improving the perceptions on improving patient-centred care in the role of a DNP nurse by identifying the problems or challenges in health care delivery. In the present state, I believe that this project has enhanced my holistic experience as health care practitioner and has provided a space to learn more. The

challenges experienced during the project included finding the expert panelists and time consumption during the evidence search.

Summary

Prompt screening and identification of CRF among patients is important in improving treatment adherence among the individuals during active therapy sessions. Therefore, the CPG developed is important in helping the healthcare providers in screening, identification, and recommending the appropriate treatment based on survivorship stages. The CPG has potential to be effective in improving the health outcomes of patients with cancer and should be adhered to reduce the impact of CRF caused by late diagnosis and uneffective treatment recommendations.

The insights gained through the project were based on the importance of addressing the gaps in health care that can help improve the services delivered to the patients. As practitioners, it is important to promptly identify and resolve the issues in the health care system to improve patient outcomes and the health care system in general. The CPG can be used to promptly identify CRF among patients with cancer and initiate appropriate treatment options based on therapy stages. Practitioners and health care facilities should incorporate the CPG to improve patients' health outcomes.

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Appendix A: Evidence Table

Author	Purpose	Patients	Study design	Measures	Treatment/ cancer types	Outcome/conclusion	Level of evidence
Steindorf et al. (2014)	To evaluate the effectiveness of resistance exercise on CRF among patients	160	Randomized control trial (RCT)	CRF Quality of life	Adjuvant radiotherapy Breast cancer	Resistance exercise was effective in improving CRF and the quality of life of the patients.	I
Reidunsdatter et al. (2011)	To explore treatment-based contributors in the development of CRF among patients with cancer	248	Longitudinal study	CRF Health-related quality of life	Radiotherapy Breast cancer	CRF and breast symptoms surged significantly during radiotherapy. The most significant contributor to CRF was the body volume of the patients receiving more than 40Gy	IV
Banipal et al. (2017)	To evaluate the rate of CRF among cancer patients in relation to different treatments	126	Cross-sectional study	CRF Cancer treatment	All cancer type All treatment modalities	CRF was correlated with chemotherapy treatment and drugs such as dacarbazine, vinblastine, and cyclophosphamide	IV
Saligan and Kim (2012)	To assess the patterns between CRF and immunogenic markers	34 studies	Systematic review	CRF immunogenic markers	All cancer type All treatment modalities	In radiotherapy treatment, the markers identified included IL-1ra, IL-6, and high amounts of monocyte/neutrophil	I
Dodd et al. (2010)	To analyze the impact and effectiveness of exercise (home-based) in CRF among women with cancer	119	RCT	CRF Sleep disturbance Depression Pain	Chemotherapy Breast, ovarian, and colorectal cancer	Home-based exercise was not effective on CRF among the patients.	I
Chakrabarty et al. (2015)	To assess the effectiveness of pranayama exercise on CRF among patients with breast cancer	160	RCT	Exercise CRF	Radiation therapy Breast cancer	Pranayama exercise was effective in reducing the level of fatigue among patients.	I
Minton et al. (2011)	To assess the effectiveness of psychostimulants in treating CRF among cancer patients	5 RCT studies	Systematic review with metanalysis	Psychostimulants CRF	All treatment All cancer treatments	The psychostimulants had potential benefits on CRF; however, further research is required.	I

Puetz and Herring (2012)	To evaluate the degree to which exercise impacts CRF across different stages of treatment and recovery	70 studies	Meta-analysis	CRF Exercise	All treatment All cancer types	Exercises are effective in improving CRF among cancer patients during and after treatment.	I
Zou et al. (2014)	To determine the effectiveness of aerobic exercises on CRF among cancer patients	12 studies	Meta-analysis	CRF Exercise Functionality Ethnicity	Chemotherapy Breast cancer	The authors concluded that aerobic exercise was effective in improving CRF among patients with breast cancer. The improvement was more prevalent among Asians.	I
Barton et al. (2013)	To assess the effectiveness of American ginseng on CRF among patients during and after cancer treatment	364 patients	RCT	CRF Toxicity	All cancer apart from brain or lymphoma All treatment	American ginseng was effective in improving CRF among the patients and was not associated with any toxicities.	I
Janaki et al. (2010)	To evaluate and identify the magnitude of CRF and its impact on the quality of life of patients with cancer	90 patients	Prospective cohort study	CRF Quality of life	Radiotherapy All cancer type	Radiotherapy was associated with an increased level of CRF among the patients that resulted in impaired functionality (cognitive, emotional, role, social, health, and physical)	III
Baguley et al. (2017)	To determine the effectiveness of diet and nutrition in managing CRF and improving the quality of life of patients with prostate cancer	20 articles	A systematic review	CRF Quality of life	All treatment Prostrate cancer	The exercise was associated with improved CRF among the patients and their quality of life. However, a nutritious diet improved the quality of life of patients but was associated with increased CRF levels.	I
Hojan et al. (2016)	To evaluate the impact and influence of exercise on inflammatory blood markers in patients with cancer and its effect on fatigue and quality of life	54 men	RCT	Fatigue Quality of life Blood count	Radiotherapy Prostrate cancer	Exercise has a positive effect on the quality of life of the patients, improves functionality, and reduces fatigue levels and inflammatory markers.	I
Vulpen et al. (2016)	To determine the effect of physical activities on different dimensional factors (psychosocial and physical)	6 exercise programs (784 patients)	Meta-analysis	Physical fatigue Cognitive fatigue	All treatments Breast cancer	Physical activities during treatment had a positive impact on general fatigue and physical activity and their subscales of reduced motivation and activity. However, no impact was	I

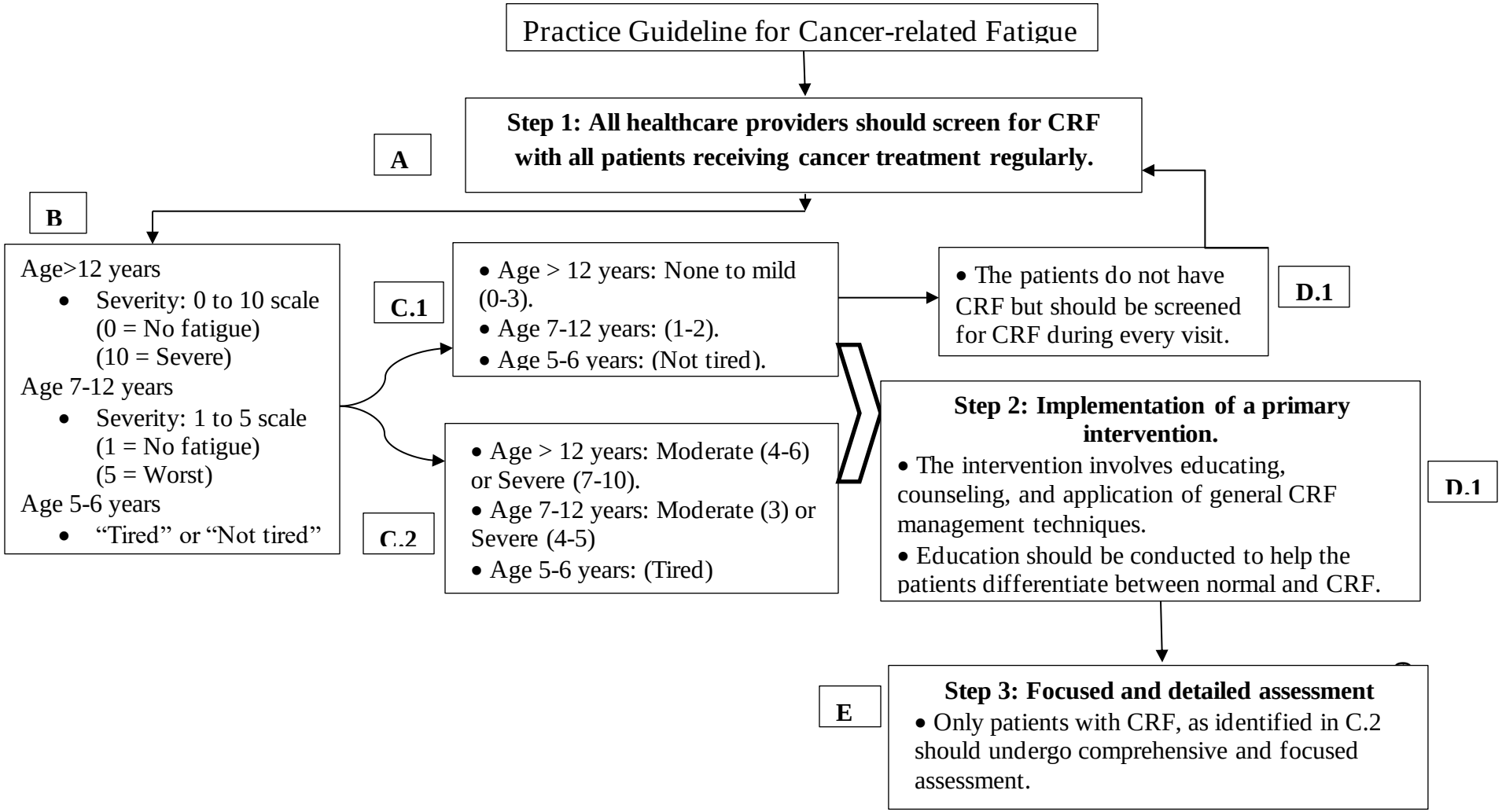
	of CRF among patients with cancer			Affective fatigue Exercise		identified on affective and cognitive fatigue	
Wang et al. (2022)	To evaluate the safety and efficacy of botanical drugs in managing CRF among patients with cancer	13 studies 986 patients	Meta-analysis	CRF Quality of life Performance Behaviors Adverse effects	All treatments Gastric cancer	The botanical drugs had a positive effect on the CRF of patients and were associated with mild adverse effects.	I
Kathikeyan et al. (2012)	To determine the prevalence of and compare CRF in varied cancer treatments.	121patients	Cross-sectional observational study	Prevalence of CRF	All treatments and cancer	The prevalence of CRF was higher in chemotherapy (98.0%) as opposed to radiotherapy (45%).	IV
Karagozglu and Kahve (2013)	To assess the impact of massage among patients with cancer during and after chemotherapy treatment	40 patients	A quasi-experimental and cross-sectional design	Anxiety Fatigue Massage	Chemotherapy Not specified	Massage provided during chemotherapy is important in reducing the level of fatigue and anxiety among patients.	II
Poort et al. (2020)	To examine and compare the impact of cognitive behavioral therapy, graded exercise therapy on CRF on patients with advanced cancer with palliative intention during treatment	134 patients	RCT	Quality of life Fatigue Emotional functioning Physical functioning Functional impairments	All types of cancer and treatment	The implementation of cognitive behavioral therapy was effective in reducing fatigue and improving the quality of life and physical functioning of patients with advanced cancer and experiencing severe fatigue.	I
Zhang et al. (2018)	To examine the feasibility of cognitive behavioral therapy and home-based exercise in managing CRF during and after cancer treatment	72 women	RCT	CRF Sleep disturbance Depression Exercise	Chemotherapy Ovarian cancer	The intervention implemented was effective in reducing CRF and depressive symptoms and enhanced the sleep quality of the patients	I
Mustian et al. (2017)	To compare the most effective treatment for CRF	113 studies	Meta-analysis	Pharmaceutical Psychological	All cancer and treatment types	Psychological and exercise therapies were the most effective treatments for mitigating CRF among patients	I

	among patients during and after treatment	11525 participants		Exercise therapies			
Hilfiker et al. (2017)	To examine the effectiveness of varied treatment modalities in managing CRF among patients with cancer	245 studies	Systematic review with meta-analysis	Non-pharmacological interventions Exercise CRF	All types of cancer and treatments	The findings revealed that during the cancer treatment, the most effective treatment for CRF is relaxation-based exercises, while after the treatment, yoga had the greatest impact.	I
Jones et al. (2015)	To determine the effects of CRF on post-treatment among patients with cancer	1,294 individuals	Quasi-experimental design	CRF Disability	Breast cancer Prostate cancer Colorectal cancer All treatment types	One in three cancer survivors experienced CRF for up to six years after treatment. The CRF post-treatment was associated with disability, such as physical burden, comorbidities, and depression.	II
Crosswell et al. (2014)	To assess the impact of CRF on heart rate variability among cancer survivors	84 women	Quasi-experimental designs	Heart rate variability CRF IL-6 C-reactive protein Parasympathetic activity	Breast cancer All types of treatment	Among patients who survived breast cancer, heart rate variability was a common side effect of CRF and was persistent for several years after the completion of treatment.	II
Goldstein et al. (2012)	To examine the epidemiology of CRF in patients and its association between cancer, treatment, and surgery.	218 women	Prospective cohort study	Physical health Psychological health outcome Disability	Breast cancer Adjuvant therapy	Persistent cases of CRF were determined by the size of the tumor. Also, CRF was attributed to significant disability in patients	III
Spratt et al. (2012)	To examine CRF among patients with oropharyngeal cancer and received radiotherapy	87 patients	Cohort study	CRF	Radiotherapy Oropharyngeal cancer	Radiotherapy was associated with deteriorating CRF. 50% of the patients experienced persistent CRF up to two years after treatment completion.	III

Iwase et al. (2015)	To examine the relationship between fatigue, quality of life, and pain.	183 Patients	Observational study	Pain CRF Quality of life	All cancer and treatment types	Patients who experienced fatigue preferred palliative care.	IV
Nugusse et al. (2022)	To investigate the prevalence of CRF and its associated factors	278 patients	Cross-sectional study	CRF	All types of cancer and treatments	The risk factors for CRF include age, cancer type, type of treatment, cancer stage, and presence of infections.	IV
Schellekens et al. (2022)	To determine the factors that moderate the relationship between chronic CRF and interventions for fatigue	167 participants	RCT	Fatigue severity Moderators Demographic traits Clinical factors	All cancer and treatment types	The factors that moderated the relationship between CRF and intervention effectiveness included fatigue severity and catastrophizing. Cognitive mindfulness therapy was more effective compared to psychoeducation intervention.	I
Oh and Seo (2011)	To investigate the relationship between CRF and psychological distress and symptoms	30 primary studies	Systematic review with meta-analysis	CRF Psychological distress	All cancer types and treatments	The findings obtained revealed that CRF was associated with psychological distress, such as anxiety and depression.	I
Yasin and Al-Hamad (2015)	To examine the prevalence of CRF and determine if psychological disorders, anxiety, and depression are predictors of fatigue among patients with cancer receiving chemotherapy	78 participants	Quasi-experimental design	Depression Anxiety CRF	All cancer types Chemotherapy	Anxiety and depression have a positive association with CRF among patients with chemotherapy	II

Appendix B: Clinical Practice Guideline

Clinical Purpose: Treatment of Cancer-related Fatigue.
Complexity: No fatigue to severe.
Format: Flow chart and free text.
Intended users: Oncology practitioners**.**
Target population: Patients experiencing cancer-related fatigue during active treatment, survivorship, and end of life phase.



Description of the Steps in the CPG

	Meaning
A	Screening of patients for CRF
B	Screening criteria based on age
C	Scoring and diagnosis of CRF
	C.1 = Patients with non-to-mild CRF
	C.2 = Patients with moderate to severe CRF
D	Actions after diagnosis of CRF
	D.1 = No CRF was diagnosed, but patients will receive frequent screening
	D.2 = Implementing the intervention
E	Patient assessment to initiate treatment

Purpose of Guideline

The focused and detailed assessment should emphasize on:

1. The patients' history and physical (1)
    - An evaluation of the status of the disease
2. The treatable factors. The treatable factors include:
    - Pain
    - Emotional distress, such as anxiety and depression
    - Sleep disturbance that includes restless leg syndrome, insomnia, narcolepsy, and obstructive sleep apnea

Note 1: Collaboration is indispensable in the CRF treatment process. Treating CRF is a shared responsibility among the clinical team that must decide whether a patient should be referred to a trained professional. Some of the trained professionals that patients could be referred to include cardiologists, mental health care providers, internists, or endocrinologists.

Note 2: Practitioners should consider performing laboratory evaluations based on the severity of CRF and the presence of other symptoms.

Step 4: Recommendation and Application of Treatment Options

The treatment options are classified based on whether the patient is on active treatment, survivorship stage, or end of life phase.

Treatment for Patients on Active Treatment and at the Survivorship Stage

1. Educating the patients and their families about the pattern of CRF during and after treatment.

Also, reassure the patients and their families is not necessarily an indicator that the illness is progressing.

2. The general strategies that practitioners can recommend to patients to facilitate in management CRF include:

   a. Self-monitoring of CRF levels.
   b. Using distractions such as reading, socializing, and reading.
   c. Energy conservation such as delegating, performing one activity at a time, scheduling activities at periods of peak energy, using labor-saving devices, and postponing nonessential activities.

3. The specific interventions include non-pharmacologic and pharmacologic.

Non-pharmacologic include:

   a. Physical activities for enhancing resistance and endurance. Patients should be encouraged to participate in moderate-level physical activities such as 150 minutes of aerobic exercise, including cycling, fast walking, or swimming

per week. Consider referring patients at the peril of injury for physical or occupational therapy.

b. Walking programs.

c. Mind-body interventions such as yoga and acupuncture.

d. Psychosocial interventions include mindfulness-based stress reduction, cognitive behavioral therapy (CBT), and supportive-expressive therapies.

e. Nutrition consultation.

f. CBT for sleep hygiene, restriction, and stimulus control.

Pharmacologic strategies include:

a. Psycho-stimulants such as modafinil or methylphenidate after eliminating other causes of fatigue.

b. Treat emotional pain, anemia, and emotional distress.

c. Optimize treatment for nutritional deficit, sleep dysfunction, and comorbidities.

Note 3: Repeat Steps 1 to 3 during every visit.

Treatment for Patients at End of Life

1. Educating the patient and their family about CRF during and after treatment. The practitioners should inform the patients and their families about end-of-life symptoms that may in intensity.
2. The general strategies that practitioners can recommend to patients to facilitate in managing CRF include:

a. Self-monitoring of CRF levels.

b. Using distractions such as reading, socializing, and reading.

c. Energy conservation such as delegating, performing one activity at a time, scheduling activities at periods of peak energy, using labor-saving devices, and postponing nonessential activities.

3. Non-pharmacologic interventions include:

a. Physical activity that optimizes the level of activity with consideration of anemia, bone metastases, thrombocytopenia, fever or active infection, the peril of falls.

b. Psychosocial interventions.

4. Pharmacologic strategies include:

a. Psycho-stimulants such as modafinil or methylphenidate after eliminating other causes of fatigue. Practitioners can consider prednisone or dexamethasone.

b. Treat pain, anemia, and emotional distress.

c. Optimize treatment for the nutritional deficit, sleep dysfunction, and comorbidities.

Step 5: Ongoing Monitoring and Follow-up

Practitioners should promote continuous self-monitoring of CRF

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Appendix C: Quality Assessment Outcomes

AMSTAR 2 Checklist for Systematic Reviews and Meta-analysis										
	Baguley et al. (2017)	Saligan & Kim (2017)	Mustian et al. (2017)	Puetz & Herring (2012)	Wang et al. (2022)	Zou et al. (2014)	Hilfiker et al. (2017)	Minton et al. (2011)	Oh & Seo (2011)	Vulpen et al. (2016)
Did the research questions and inclusion criteria for the review include the components of PICO?	yes	no	yes	yes	yes	no	no	no	no	No
Did the report of the review contain an explicit statement that the review methods were established prior to the conduct of the review, and did the report justify any significant deviations from the protocol?	yes	yes	yes	no	yes	no	yes	no	No	Yes
Did the review authors explain their selection of the study designs for inclusion in the review?	yes	yes	yes	yes	yes	yes	yes	yes	PY	Yes
Did the review authors use a comprehensive literature search strategy?	yes	yes	PY	PY	yes	yes	yes	yes	Yes	Yes
Did the review authors perform study selection in duplicate?	yes	UN	yes	UN	yes	UN	yes	yes	UN	No
Did the review authors perform data extraction in duplicate?	yes	UN	yes	UN	yes	yes	yes	yes	UN	No
Did the review authors provide a list of excluded studies and justify the exclusions?	no	no	no	no	no	no	no	no	No	No
Did the review authors describe the included studies in adequate detail?	yes	yes	yes	no	yes	yes	yes	yes	Yes	Yes
Did the review authors use a satisfactory technique for assessing the risk of bias (RoB) in individual studies that were included in the review?	yes	no	yes	yes	yes	yes	yes	no	Yes	Yes
Did the review authors report on the sources of funding for the studies included in the review?	no	no	yes	no	yes	no	no	no	No	No
If meta-analysis was performed, did the review authors use appropriate methods for the statistical combination of results?	NM	NM	yes	yes	yes	yes	yes	yes	Yes	Yes
If meta-analysis was performed, did the review authors assess the potential impact of RoB in individual studies on the results of the meta-analysis or other evidence synthesis?	NM	NM	yes	yes	yes	yes	yes	no	No	Yes
Did the review authors account for RoB in individual studies when interpreting/ discussing the results of the review?	NM	NM	yes	yes	yes	yes	yes	no	No	Yes
Did the review authors provide a satisfactory explanation for, and discussion of, any heterogeneity observed in the results of the review?	NM	NM	yes	yes	yes	yes	yes	yes	Yes	Yes

If they performed quantitative synthesis did the review authors carry out an adequate investigation of publication bias (small study bias) and discuss its likely impact on the results of the review?	NM	NM	yes	yes	yes	yes	yes	no	Yes	Yes
Did the review authors report any potential sources of conflict of interest, including any funding they received for conducting the review?	yes	yes	yes	no	yes	yes	yes	yes	no	Yes
Overall quality										

Note: PY = partial yes, NM= no meta-analysis conducted, UN = unclear, red represents poor quality, orange represents fair quality, and green represents good quality

Quality Assessment Checklist for Randomized Controlled Trials								
Questions	Barton et al. (2013)	Charkrabarty et al. (2015)	Dodd et al. (2010)	Hojan et al. (2016)	Poort et al. (2020)	Schellekens et al. (2022)	Steindorf et al. (2014)	Zhang et al. (2018)
Was true randomization used for the assignment of participants to treatment groups?	yes	yes	yes	yes	yes	no	yes	yes
Was allocation to treatment groups concealed?	yes	yes	yes	yes	yes	UN	yes	yes
Were treatment groups similar at the baseline?	yes	yes	yes	yes	yes	UN	yes	yes
Were participants blind to treatment assignment?	yes	yes	yes	yes	yes	yes	yes	no
Were those delivering treatment blind to treatment assignment?	yes	yes	no	no	yes	UN	yes	yes
Were outcomes assessors blind to treatment assignment?	yes	yes	no	yes	yes	UN	yes	yes
Were treatment groups treated identically other than the intervention of interest?	yes	yes	yes	yes	yes	yes	yes	yes
Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analyzed?	UN	yes	yes	UN	yes	yes	un	yes
Were participants analyzed in the groups to which they were randomized?	yes	yes	yes	yes	yes	yes	yes	yes
Were outcomes measured in the same way for treatment groups?	yes	yes	yes	yes	yes	yes	yes	yes
Were outcomes measured in a reliable way?	yes	yes	yes	yes	yes	yes	yes	yes
Was appropriate statistical analysis used?	yes	yes	yes	yes	yes	yes	yes	yes
Was the trial design appropriate, and any deviations from the standard RCT design (individual randomization, parallel groups) accounted for in the conduct and analysis of the trial?	yes	yes	yes	yes	yes	yes	yes	yes
Overall quality								

Note: Un = unclear, green represents good quality, red represents bad quality, and orange represents a fair quality

Quality Assessment Cross-sectional Studies			
	Banipal et al. (2017)	Nugusse et al. (2022)	Kathikeyan et al. (2012)
Were the criteria for inclusion in the sample clearly defined?	Yes	Yes	Yes
Were the study subjects and the setting described in detail?	Yes	Yes	Yes
Was the exposure measured in a valid and reliable way?	Yes	Yes	Yes
Were objective, standard criteria used for the measurement of the condition?	Yes	Yes	Yes
Were confounding factors identified?	No	Yes	Yes
Were strategies to deal with confounding factors stated?	No	Yes	No
Were the outcomes measured in a valid and reliable way?	Yes	Yes	yes
Overall quality			

Note: Green represents good quality, red represents bad quality, and orange represents a fair quality

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Quality Assessment for Quasi-experimental Design				
	Crosswell et al. (2014)	Jones et al. (2015)	Karagozglu et al. (2013)	Yasin & Al-Hamad (2015)
Is it clear in the study what is the 'cause' and what is the 'effect' (i.e., there is no confusion about which variable comes first)?	yes	yes	yes	yes
Were the participants included in any comparisons similar?	no	UN	yes	yes
Were the participants included in any comparisons receiving similar treatment/care other than the exposure or intervention of interest?	no	no	no	no
Was there a control group?	no	no	yes	no
Were there multiple measurements of the outcome, both pre and post-intervention/exposure?	yes	yes	yes	yes
Was follow-up complete, and if not, were differences between groups in terms of their follow-up adequately described and analyzed?	no	yes	no	no
Were the outcomes of participants included in any comparisons measured in the same way?	yes	yes	yes	yes
Were outcomes measured in a reliable way?	yes	yes	yes	yes
Was appropriate statistical analysis used?	yes	yes	yes	yes
Overall quality				

Note: Un = unclear, green represents good quality, red represents bad quality, and orange represents a fair quality

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Quality Assessment for Cohort Studies			
	Janaki et al. (2010)	Goldstein et al. (2013)	Spratt et al. (2012)
Were the two groups similar and recruited from the same population?	Yes	Yes	Yes
Were the exposures measured similarly to assign people to both exposed and unexposed groups?	Yes	Yes	Yes
Was the exposure measured in a valid and reliable way?	Yes	Yes	Yes
Were confounding factors identified?	No	No	Yes
Were strategies to deal with confounding factors stated?	No	No	No
Were the groups/participants free of the outcome at the start of the study (or at the moment of exposure)?	No	No	No
Were the outcomes measured in a valid and reliable way?	Yes	Yes	yes
Was the follow up time reported and sufficient to be long enough for outcomes to occur?	Yes	Yes	Yes
Was follow up complete, and if not, were the reasons to loss to follow up described and explored?	Yes	Yes	Yes
Were strategies to address incomplete follow-up utilized?	Yes	Yes	Yes
Overall quality			

Note: Green represents good quality, red represents bad quality, and orange represents a fair quality

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Appendix D: AGREE II Evaluation Tool

Domains	**Score**						
Scope and purpose	**1**	**2**	**3**	**4**	**5**	**6**	**7**
1. The overall objective(s) of the guideline is (are) specifically described							
2. The clinical question(s) covered by the guideline is (are) specifically described. AGREE II: The health question(s) covered by the guideline is (are) specifically described.							
3. The patients to whom the guideline is meant to apply are specifically described. AGREE II: The population (patients, public, etc.) to whom the guideline is meant to apply is specifically described.							
Stakeholder involvement							
4. The guideline development group includes individuals from all the relevant professional groups.							
5. The patients' views and preferences have been sought. AGREE II: The views and preferences of the target population (patients, public, etc.) have been sought.							
6. The target users of the guideline are clearly defined.							
The guideline has been piloted among target users. AGREE II: Deleted item. Incorporated into user guide description of item 19.							
Rigor of development							
8. Systematic methods were used to search for evidence. AGREE II: No change. Renumber to 7.							
9. The criteria for selecting the evidence are clearly described. AGREE II: No change. Renumber to 8.							
10. The methods used for formulating the recommendations are clearly described.							
11. The health benefits, side effects, and risks have been considered in formulating the recommendations.							
12. There is an explicit link between recommendations and the supporting evidence.							
13. The guideline has been externally reviewed by experts prior to its publication.							
14. A procedure for updating the guideline is provided.							
Clarity and presentation							
15. The recommendations are specific and unambiguous.							
16. The different options for management of the condition are clearly presented. AGREE II: The different options for management of the condition or health issue are clearly presented.							

17. Key recommendations are easily identifiable.							
18. The guideline is supported with tools for application. AGREE II: The guideline provides advice and/or tools on how the recommendations can be put into practice. Domain changes from clarity of presentation to applicability, and renumbered to 19.							
Applicability							
19. The potential organizational barriers in applying the recommendations have been discussed. AGREE II: The guideline describes facilitators and barriers to its implementation. Change in order from 19 to 18							
20. The potential cost implications of applying the recommendations have been considered. AGREE II: The potential resource implications of applying the recommendations have been considered.							
21. The guideline presents key review criteria for monitoring and/or audit purposes. AGREE II: The guideline presents monitoring and/or auditing criteria.							
Editorial independence							
22. The guideline is editorially independent from the funding body. AGREE II: The views of the functioning body have not influenced the content of the guideline.							
23. Conflicts of interest of guideline development members have been recorded. AGREE II: Competing interests of guideline development group members have been recorded and addressed.							
Total							

Overall Guideline Assessment	1. Rate the overall quality of this guideline.	**1** *Lowest possible quality*	**2**	**3**	**4**	**5**	**6**	**7** *Highest possible quality*
Overall Guideline Assessment	2. I would recommend this guideline for use.	*Yes*	*Yes, with modifications*					*No*

Appendix E: Mathematical Formula

For example, for Domain One, the formula used was;

	Domain 1			
	Item 1	Item 2	Item 3	Total
A	6	5	7	18
B	6	5	7	18
C	7	6	7	20
D	7	5	4	16
Total	26	21	25	72
Maximum score				84
Minimum score				12
% Score				83%

$$\frac{Obtained\ score - minimum\ possible\ score}{Maximum\ possible\ score - Minimum\ possible\ score} = \frac{72-12}{84-12} = \frac{60}{72} = 0.83$$

$$= 83\%$$

Maximum possible score = 7(strongly agree) X 3(items) X 4(panelists) = 84

Minimum possible score = 1(strongly disagree) X 3(items) X 4(panelists) = 12