Review Article

# Barriers in Nursing Practice in Cancer Cachexia: A Scoping Review

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## ABSTRACT

This scoping review aims to identify the barriers in practice and clinical trials for oncology nurses in cancer cachexia. We used the framework proposed by Arksey and O'Malley and Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for scoping reviews. Studies written in English and published between 2008 and 2021 were retrieved from five databases: MEDLINE, Cochrane Library, CINAHL, PsycINFO, and EMBASE. A total of 1075 studies were identified, and 34 full-text studies were assessed for eligibility by three researchers. Seventeen studies met the inclusion criteria. This review revealed several barriers to nursing practice and clinical trials in cancer cachexia. First, health-care professionals, including nurses, faced individual barriers (insufficient understanding and skills for diagnosis and management) and environmental barriers (lack of standardized screening tools or treatment options, difficulties in collaboration with other professions, and limited human resources) in practice. Second, studies on nurse-led interventions for cancer cachexia were relatively few and different in objectives, making it challenging to integrate the outcomes. Finally, there were no established educational programs for nurses that explicitly focused on cancer cachexia. This scoping review revealed individual and environmental barriers in nursing practice. In addition, there have relatively few clinical trials involving oncology nurses in cancer cachexia. Continuing education for nurses should cover cancer cachexia to improve the quality of oncology care in the future. It is also necessary to standardize practical assessment tools that are easy to assess daily and lead to interventions and develop nurse-led multidisciplinary care.

**Key words:** Cancer cachexia, nurses' role, nursing care, scoping review

## Introduction

Cancer cachexia occurs in 50%–80% of cancer patients, especially in the advanced stage.[1] Cachexia negatively affects the efficacy and safety of anticancer treatment, physical function, and quality of life, and is related to 20% of cancer deaths.[1-3] Patients with cancer cachexia often experience psychosocial distress due to reduced oral intake, physical dysfunction, or changes in body image.[4] In addition, patients and their families seek understanding from health-care professionals (HCPs), and expect them to identify, explain, and help manage cachexia-related weight loss.[5]

According to the guidelines for cancer cachexia from the European Society for Medical Oncology, nurses must routinely screen at-risk patients for cancer cachexia as well as nutrition impact symptoms or altered gastrointestinal function in collaboration with other HCPs.[6] An additional

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international consensus recommends routine assessments for functional and psychosocial effects of cancer cachexia.[2] However, oncology nurses may not sufficiently recognize the importance of following these guidelines or consensus.[7-9] Furthermore, the nurse's role is often unclearly defined in a multidisciplinary care team,[10-12] and this is expected to worsen outcomes in cancer cachexia cases.[13-16] These circumstances may undermine the chances of early detection and intervention for cancer cachexia. Accordingly, the purpose of this review is to identify the barriers in nursing practice and clinical trials and to identify the potential roles of oncology nurses in treating patients with cancer cachexia.

# Methods

## *Search strategies*

This review followed the methodological framework developed by Arksey and O'Malley to conduct a scoping review mapping the key concepts underpinning a research area and the main sources and types of evidence available.[17] We have reported our findings according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for scoping reviews.[18] A literature search was conducted using MEDLINE, Cochrane Library, CINAHL, PsycINFO, and EMBASE in March 2020. The search keywords included nursing practice ("nursing care," "oncology nursing," "nurse 's role," "nurse," "nursing") and cancer cachexia ("cancer cachexia"). The keywords grouped together in parentheses were connected by "OR," and both the groups of keywords were connected with "AND." The inclusion criteria were as follows: (1) written in English; (2) focused on nursing practice of cancer cachexia for adult patients with cancer; and (3) published from 2008 to 2021 (cachexia was defined in 2008.)[19] Studies that focused on pediatrics, perioperative nursing, or survivorship were excluded. One researcher reviewed titles and abstracts according to the selection criteria. If the title and abstract met the inclusion criteria, three researchers read the full articles to decide whether they should be included in the review.

# Results

We identified 1,075 articles from the initial search [Figure 1]. After a title and abstract review, 34 studies were included, and 17 studies that met the inclusion criteria were confirmed after a full-text review.

## *Study characteristics*

The studies reviewed were conducted in the United Kingdom ($n$ = 5), China ($n$ = 3), Portugal ($n$ = 2), the United States ($n$ = 2), Japan ($n$ = 2), Australia ($n$ = 1), Hong Kong ($n$ = 1), and Jordan ($n$ = 1). Of the 17 studies

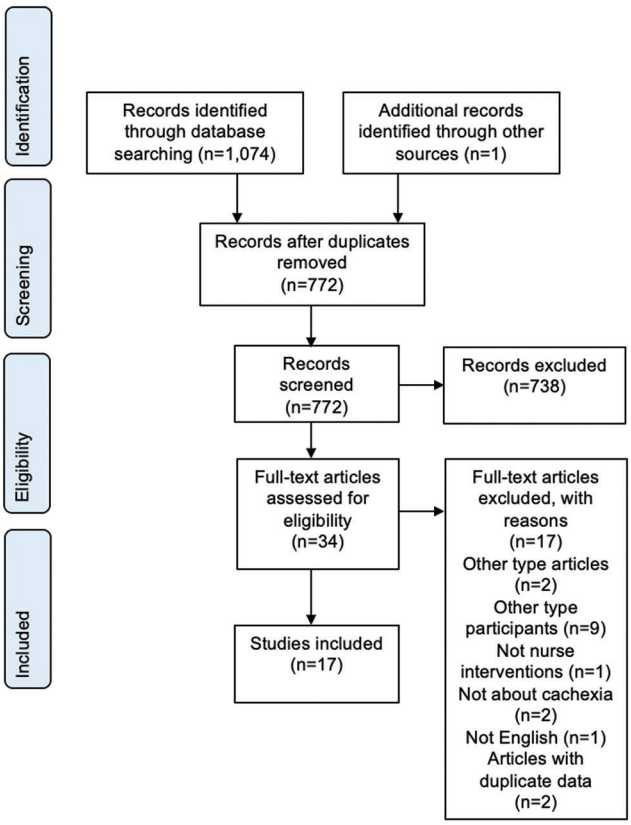


**Figure 1:** Preferred Reporting Items for Systematic Reviews and Meta-Analyses flow diagram for the scoping review process

reviewed, quantitative research using questionnaires was the most common method employed ($n$ = 6), while others included qualitative research using focus group interviews or semi-structured interviews ($n$ = 4), randomized controlled studies ($n$ = 2), quasi-experimental studies ($n$ = 2), pilot studies ($n$ = 2), and single-arm studies ($n$ = 1).

Participants were nurses, doctors, dietitians, other medical staff, patients, and caregivers. The sample sizes ranged from 5 to 497 participants. HCP's average age ranged from 27 to 29 years in two studies, and 6.5 years of experience in one study. The average age of the patients ranged from 52 to 75 years. The most common type of cancer was lung cancer.

## *Barriers in nursing practice in cancer cachexia*

Nine studies were deemed to identify barriers to nurses' implementation of cachexia care in a multidisciplinary setting. Barriers were classified into three subcategories: understanding, assessment, and management of cancer cachexia [Table 1].

## *Understanding barriers*

Six of the nine studies reported about HCP's knowledge and awareness of cancer cachexia. Many HCPs have realized the importance of nutritional management in patients with cancer.[8,22,25,26] However, few nurses and HCPs understood the

**Table 1: Barriers in nursing practice in cancer cachexia**

| Reference | Primary objective | Design and method (location) | Participants (sample size) | Major barriers in understanding, assessment, and management |
|---|---|---|---|---|
| Dewey and Dean 2008[20] | To investigate nurse's current practices for weight loss* | Semi-structured interviews (hospital or community, UK) | Nurses ($n=14$ including 9 certified nurses) | Understanding<br>N/A<br>Assessment<br>N/A<br>Management<br>71% of nurses never or rarely referred patients to the dietetic service<br>Communication barriers in collaborating with other professionals<br>Limited options for nutritional supplements |
| Churm *et al*., 2009[8] | To investigate HCP's understanding and current practice for cancer cachexia | Questionnaire survey (elderly care, general medical and surgical wards, and chemotherapy unit in general hospitals, UK) | Nurses ($n=70$) doctors ($n=30$) | Understanding<br>79% knew that weight loss was a characteristic sign<br>49% knew that reduced appetite was a typical symptom <40% knew that cancer cachexia affected daily living<br>29% did not recognize or treat early satiety<br>10% did not understand what cachexia was<br>Assessment<br>83% of nurses and only 3% of doctors evaluated nutritional status<br>The assessment tools were not standardized >60% routinely assessed appetite, food intake, nausea/vomiting, constipation, diarrhea, swallowing difficulties, and activity of daily living<br>Small population assessed mouth problems, altered taste, early satiety, and hiccups<br>Management<br>Inconsistent management of key symptoms (dry mouth, early satiety, and poor appetite) |
| Chen *et al*., 2012[21] | To improve the compliance of the nutritional screening practice† | Pilot study (oncological and hematological malignancy in an acute care hospital, China) | Nurses ($n=5$) | Understanding<br>N/A<br>Assessment<br>The nurse did not have the authority to refer to dietitians<br>The nutritional screening tool was too complex<br>The language barrier between nurses and patients<br>The technical barrier in using tools<br>Management<br>N/A |
| Ferreira *et al*., 2012[22] | To investigate caregiver and HCP's current practice for malnutrition† | Questionnaire survey (oncological departments, Portugal) | Nurses ($n=51$)<br>Doctors ($n=52$)<br>Caregivers ($n=394$) | Understanding<br>79% of HCPs concerned with undernutrition related to cancer (95%), deficient intake (88%), and psychiatric diseases (86%)<br>85% of HCPs concerned undernutrition increased the severity of cancer, leading to complications (91%), decreased responsiveness of the body (85%), treatment discontinuation (75%), and increased risk of death (61%)<br>20% HCPs lack of information on nutritional supplements<br>65% of caregivers defined undernutrition as an inadequate food intake<br>57% of caregivers considered cancer patients at a higher undernutrition risk<br>35% of caregivers were not satisfied with the nutrition information received<br>14% of caregivers understood nutritional supplements<br>Assessment<br>49% of nurses and 42% of doctors assessed nutritional status<br>Management<br>Limited use of nutritional supplements |
| Porter *et al*., 2012[23] | To investigate patients, caregivers, and HCP's perspectives and current practice for cancer cachexia | Focus group interviews (regional cancer center, UK) | Oncology HCPs: Nurses ($n=6$), doctors ($n=1$), and dietitians ($n=2$)<br>Advanced cancer patients with weight loss >10% ($n=15$) and caregivers ($n=12$) | Understanding<br>Lack of education for HCPs on the etiology and management in pre- and post-registration educations<br>Patients and caregivers worried about appetite loss, changing appearance, prognosis, and social interaction with little support from HCPs<br>Lack of acknowledgement in patients and caregivers regarding cancer cachexia<br>Assessment<br>Lack of guidelines of assessment and diagnosis of cancer cachexia<br>The technical difficulty in distinguishing weight loss from cachexia and secondary causes<br>Management<br>Communication barrier between HCPs, patients and caregivers<br>HCP reluctance in talking about weight loss, poor prognosis, and the end-of-life |

*Contd...*

**Table 1: Contd...**

| Reference | Primary objective | Design and method (location) | Participants (sample size) | Major barriers in understanding, assessment, and management |
|---|---|---|---|---|
| Millar *et al*., 2013[24] | To investigate HCP's experience, understanding, perception, and current practice for cancer cachexia | Semi-structured interviews (palliative care, oncology, and hematology unit in a regional cancer center, UK) | Nurses ($n$=15 including 5 certified nurses), doctors ($n$=7), dietitians ($n$=3) | Understanding<br>Lack of knowledge in the etiology of cancer cachexia among nurses<br>Nonpalliative care nurses and dietitians were reluctant to talk about weight loss due to concerns about distressing the patients<br>Assessment<br>N/A<br>Management<br>Low priority in cachexia management among nonpalliative care HCPs<br>Lack of time, staffs, and distinct management approach |
| Del Fabbro *et al*., 2015[25] | To investigate HCP's current practice for cancer cachexia | Questionnaire survey (self-identified oncology HCPs in 30 states, US) | Nurses ($n$=50), doctors ($n$=101) Doctors had medical experiences for cancer cachexia of lung cancer | Understanding<br>60% of doctors knew that the risk for cachexia in lung cancer was high<br>4% of doctors underestimated the risk for cachexia in patients receiving the first course of chemotherapy with good performance status<br>Assessment<br>10% of doctors used tools to assess symptoms<br>72% of nurses and 67% of doctors identified weight loss as the criterion for diagnosing cancer cachexia with other criteria including muscle loss, poor appetite<br>Management<br>64% of doctors used nutritional interventions and pharmacological appetite stimulants<br>24% of doctors combined exercise with nutritional and pharmacological interventions |
| Kiss *et al*., 2020[26] | To investigate HCP's awareness, perceptions, and current practice for malnutrition and sarcopenia‡ | Questionnaire survey (81% public hospitals, 76% hospitals in metropolitan areas, 67% working >75% of working time in oncology, Australia) | Dietitians ($n$=42), nurses ($n$=38), doctors ($n$=16), physiotherapists ($n$=7), and others ($n$=8) | Understanding<br>86%-88% HCPs knew how to diagnose malnutrition and sarcopenia<br>89% of HCPs realized malnutrition and sarcopenia as essential in the overall management<br>74% of HCPs were confident in identifying malnutrition<br>53% of HCPs were confident in identifying sarcopenia<br>Assessment<br>Lack of access to assessment tools or skills required<br>Lack of HCP's confidence and time for the assessment<br>Management<br>Lack of services to manage the condition, knowledge/skills to provide appropriate care |
| Suo *et al*., 2020[27] | To investigate patients, caregivers, and HCP's difference in current practice for malnutrition† | Questionnaire survey (thoracic oncology unit in the University Hospital, China) | Nurses ($n$=74), doctors ($n$=89), patients ($n$=94), caregivers ($n$=93) | Understanding<br>N/A<br>Assessment<br>70% of nurses and 55% of doctors correctly identified the malnutrition risk<br>33% of patients and 39% of family members correctly identified the malnutrition risk<br>Management<br>N/A |

*This study investigated weight loss, †These studies investigated malnutrition, ‡This study investigated malnutrition and sarcopenia. N/A: Not applicable, UK: United Kingdom of Great Britain and Northern Ireland, US: United States of America, HCPs: Health-care professionals

etiology and management of cancer cachexia, possibly due to a lack of pre-and post-registration education.[8,23,24] Some reports indicated that HCPs did not realize the unfavorable impact of cancer cachexia on patients' activities of daily living or sarcopenic status.[8,26] In addition, one survey in the US reported that few doctors knew that cancer cachexia was often present even in patients with good performance status who were indicated for active cancer treatment.[25] Cachectic patients and their caregivers reported worrying about appetite loss, change in appearance, and reduced social activity, and also expressed that they received little information concerning cancer cachexia from HCPs.[22,23]

## *Assessment barriers*

Seven of the nine studies identified issues regarding the assessment of cancer cachexia. In some surveys, nurses routinely assessed vital symptoms of cancer cachexia (e.g. appetite, food intake, nausea, and vomiting) in regular practice[8,22,25] and actively screened at-risk patients for malnutrition or cancer cachexia.[25-27] However, the assessment tools employed were often inconsistent and not standardized.[8,21,23,26] In addition, doctors were more reluctant to use assessment tools than nurses.[8,25] In general, barriers to screening cancer cachexia include the limited time allotted for HCPs, the complexity of tools, language barriers, and a wide variation in the causes of weight loss.[21,23,26] A further complication in assessment was that nurses might not have the authority to refer patients to dietitians in certain settings.[21] Finally, one survey reported that patients or caregivers were more indifferent than HCPs in recognizing malnutrition risk.[27]

## *Management barriers*

Seven of the nine studies reported the management of cancer cachexia. Some reports suggested that

nonpalliative care HCPs, including nurses, assigned low priority to cancer cachexia management,[24] and rarely consulted dieticians or other professionals.[20] Other reports[8,25] showed that nutritional or pharmacological interventions were often prescribed individually, and were seldom combined with other treatment modalities (e.g., exercise therapy). This poor collaboration among HCPs may be due to the lack of standardized treatment recommendations[8,22,24] or specific services to manage cachexia,[26] shortage of staff,[24] communication barriers between HCPs,[20,23] and lack of skills training.[20,26] Finally, some reports suggested that nurses and dietitians were reluctant to discuss weight loss, especially in nonpalliative care settings, because they feared distressing the patients.[24] This hesitation potentially obstructed early diagnosis of cancer cachexia and advanced care planning for end-of-life care.[23]

### *Barriers for clinical trials in the nurse-led intervention*

There have been four studies on nurse-led interventions for cancer cachexia [Table 2]. One psychosocial, two nutritional, and one physical activity interventions were included for review.[28-31] The comparability of study outcomes was limited because the study populations (cancer type or stage), objectives, and outcome measures were inconsistent among these studies.

However, these interventions were generally well tolerated,[28,30,31] with few dropouts and good compliance. Few adverse events were reported during physical activity intervention.[31] One study reported the effectiveness of psychological intervention in preventing eating- or weight-related distress.[28] Another study reported that nutritional intervention improved serum albumin and prealbumin levels[29] and promoted patient and family engagement in nutrition care.[30] One nurse-based physical activity intervention successfully increased or maintained outdoor and indoor physical activities.[31]

### *Nursing education programs to break down barriers*

Currently, there are no established educational programs for nurses that focus specifically on cancer cachexia. However, there have been four studies on educational programs for nurses on nutrition for cancer patients [Table 3]. Some programs have focused on how to use a specific assessment tool (e.g., MUST).[33,35] Other programs cover artificial hydration therapy and general nutrition management in cancer patients.[32,34] Education effectively increased knowledge and confidence[32,34] but did not improve compliance with nutritional assessment after the intervention.[33,35] Heterogeneity in types of interventions or outcomes existed, and the participants' age and background varied among studies.

## Discussion

This review revealed several barriers to nursing practice and clinical trials in cancer cachexia. First, HCPs, including nurses, faced individual barriers (insufficient understanding and skills for diagnosis and management) and environmental barriers (lack of standardized screening tools or treatment options, difficulties in collaboration with other professions, and limited human resources) in practice. Second, there were few studies on nurse-led interventions for cancer cachexia, each with different objectives, making it challenging to integrate the outcomes. Finally, there were no established educational programs for nurses that focused explicitly on cancer cachexia.

Education about cancer cachexia and having care skills before certification is rare. Although both the U.S. and U.K. registered nurse examination guidelines include nutrition knowledge, there is insufficient material concerning the assessment and management of cancer cachexia to adequately prepare nurses for caring for these patients.[36,37] Therefore, it is unsurprising that there is insufficient understanding and practice of cancer cachexia nursing among nurses.

Meanwhile, some HCPs who have attended the training program in cancer cachexia clinics in continuing education realized the importance of cancer cachexia in their practice. They reported that their experiential learning led to a better understanding and recognition of the importance of recognizing and treating cancer cachexia, and led to a more consistent approach.[38] Despite this, there have been few attempts to provide opportunities for systematic learning about cancer cachexia in any country. Considering that insufficient knowledge and skills may lead to delays in cancer cachexia interventions,[39] it is necessary to provide more educational opportunities for continuing education in the future.

HCPs need to understand the complexity of psychosocial and physical distress associated with cancer cachexia to provide patients and caregivers with the necessary information and effective coping strategies.[40] In addition to typical symptoms associated with cancer cachexia (e.g., "loss of appetite," "inability to eat," and " loss of weight"), patients reported feelings of "hopelessness," "fretting," and " a shortage of information" which exacerbated eating-related distress.[41] Patients and caregivers were reluctant to report weight loss to HCPs, and did not receive information about cancer cachexia from HCPs.[42,43] On the medical side, there is a lack of awareness of psychosocial and physical distress experienced by patients and caregivers.[24] In addition, the methodology of communication and educational interventions concerning cancer cachexia is not well developed.[40] Therefore, HCPs,

**Table 2: Barriers for clinical trials in nurse-led intervention in cancer cachexia**

| Reference | Primary objective | Design and setting (location) | Participants (sample size) | Interventions or assessment tools | Major findings | Limitations or potential barriers for implementation |
|---|---|---|---|---|---|---|
| Hopkinson *et al*., 2010[28] | Feasibility and effectiveness of psychosocial intervention for WRD and ERD (MAWE) | Cluster RCT (two community palliative care teams, UK) | Patients with incurable advanced cancer concerning weight and eating ($n$=50, MAWE: control, 1:1) | Intervention group<br>MAWE trained nurses visited patient's home and counseled patients and caregivers<br>Tool: Leaflets<br>Control group<br>Usual care | MAWE was<br>Deliverable and acceptable to patients<br>Potentially preventive for WRD and ERD worsening | Selection bias: the population was limited to people first referred to special palliative care services and born in the UK |
| Lin *et al*., 2017[29] | Effectiveness of a multidisciplinary nutritional intervention led by nurses | RCT (General ward of the medical oncology in a single University Hospital, China) | Patients with advanced colorectal cancer (stage III/IV) receiving chemotherapy with NRS-2002 scores ≥3 ($n$=110, intervention: control, 1:1) | Intervention group<br>Individual recipes and nutritional education by a team of nurses, doctors, dietitian<br>Control group<br>Usual care | Significant improvement in<br>Albumin<br>Prealbumin<br>in the intervention group | Selection bias: The population was limited in cancer type<br>Efficacy: No effect on weight and patient survival |
| Marshall *et al*., 2020[30] | Effectiveness of nutritional intervention of larger pilot study (PIcNIC) | Semi-structured interviews (tertiary teaching hospital and a local hospital, Australia and Hong Kong) | Patients with mostly breast or lung cancer ($n$=20, Australia: Hong Kong, 13:7)<br>Caregivesrs ($n$=15, Australia: Hong Kong, 4:11) | Face-to-face nutritional education by a team of nurses, doctors, and dietitians<br>Tool: Food diary, booklet | PIcNIC<br>Increased patient and family knowledge of nutrition and confidence in food selection<br>Could be delivered by a nurse | Selection bias: The population was limited in cancer type and nutrition risk<br>Efficacy: An interpretive approach was undertaken for analysis<br>Generalizability: Fidelity of interventions may vary across sites |
| Mouri *et al*., 2018[31] | Feasibility and effectiveness of physical activity intervention for elderly patients with advanced cancer by HCPs | Single-arm study (single cancer center, Japan) | Patients with chemotherapy-naïve nonsmall lung cancer and pancreatic cancer (stage III/IV, aged ≥70 years, 40% were cancer cachexia) ($n$=30) | Trained nurses, physiotherapists, or medical doctors counseled patients to increase daily activity in an 8 weeks educational intervention | 93% attended all sessions<br>21% increased indoor activity<br>52% increased outdoor activity<br>76% maintained social activity<br>55% increased daily steps | Selection bias: The population was limited in cancer type and treatment regimen<br>Efficacy: An interview or questionnaire was undertaken for behavioral change analysis |

UK: United Kingdom of Great Britain and Northern Ireland, RCT: Randomized control trial, MAWE: Macmillan Approach to Weight and Eating, WRD: Weight-related distress, ERD: Eating-related distress, NRS-2002: The 2002 Nutrition risk screening, PIcNIC: Partnering with families to promote nutrition in cancer care, HCPs: Health-care professionals

including nurses, are responsible for raising awareness of psychosocial and physical distress and communicating about cancer cachexia to alleviate patients' suffering.

Interventions by nurses may also influence changes in the behavior of patients and their caregivers. Hopkinson conducted a scoping review to evaluate nurse-delivered dietary or nutritional advice.[10] They suggested an essential role of nurses in psychoeducational interventions for behavioral changes.[10,44] Other reports have also suggested a positive effect of incorporating behavioral change techniques in improving or maintaining physical, psychological, and social functioning in cancer patients.[45,46] In multidisciplinary interventions for cancer cachexia, nurses play an essential role in supporting self-care and instilling motivation in their patients, encouraging them to endure interventions. Buonaccorso *et al*. recently reported the ongoing study protocol of a psychoeducational intervention lead by nurses combined with exercise intervention for patients with cancer cachexia.[47] In the study, a trained nurse interviewed the patient and the patient's family weekly for a period of 3 weeks. The nurse explained the nature, course, and biological mechanisms of cachexia, and taught patients how to recognize its effects (e.g., weight loss, loss of appetite, and early satiety). In addition, nurses facilitated discussion of the patient and family's perspectives, feelings, and diets, as well as suggestions on how to support each other in managing weight-and eating-related problems. This intervention was combined with at least 24 home exercise sessions conducted by a physical therapist three times a week for 8 weeks. The primary objective was to determine the completion rate of each intervention. Interventions were considered feasible if there was a completion rate of ≥50% for both the components. Such advanced trials may improve nursing care for cancer cachexia.

Although the psychosocial impact of cancer cachexia is clear,[4,48] there are no standard tools to identify it in clinical practice. Several evaluation methods have been used to estimate the effects of cancer cachexia on physical functioning, including the Karnofsky score, activity meters, and specific activity checklists.[2] However, for psychosocial effects, a method for the routine assessment by asking questions about eating-and weight-related distress has been recommended.[2] Additional tools to evaluate the psychosocial impact of cancer cachexia, such as the Functional Assessment of Anorexia/Cachexia Treatment[49] and the European Organization

**Table 3: Nursing educational programs of cancer patients' nutrition**

| Reference | Primary objective | Design and setting (location) | Participants (sample size) | Educational program | Major outcomes | Barriers for practice |
|---|---|---|---|---|---|---|
| Yamagishi *et al*., 2009[32] | To assess the effectiveness of a nutritional education program about artificial hydration therapy for terminally ill cancer patients | Questionnaire survey (general hospitals, cancer centers, academic hospitals, palliative care services, outpatient clinics, and home care in Japan) | Nurses ($n$=76) including 6.6% certified nurses 13% graduated university | The workshop was based on the guidelines published by the Japanese Society of Palliative Medicine<br>Contents: The content covered the guidelines, recommendations for physical symptoms, psychosocial support, and ethical decisions<br>Methods: A lecture, an interactive seminar, and an interactive discussion<br>Duration: 5 h in 1 day | Significant improvement in knowledge and confidence after the intervention<br>More than 80% reported that they would more or much more frequently perform recommended practices | Selection bias: Participants were nurses with interest in nutrition who voluntarily participated in the workshop<br>Efficacy: Outcomes were analyzed based on the nurse-reported. No tests have been performed to assess the reliability and validity of the outcome measurements<br>Selection bias: This study did not focus on cachexia |
| Boléo-Tomé *et al*., 2011[33] | To assess the effectiveness of a nutritional education program about nutritional screening (MUST) for cancer patients | A quasi-experimental study (RT department in the university hospital, Portugal) | Doctors ($n$=12)<br>Nurses ($n$=3)<br>RT technicians ($n$=20) | Contents: Teach how to use MUST screening according to BAPEN guidelines<br>Methods: Interactive sessions with PowerPoint<br>Duration: 2 h at 2 points | Significant improvement in compliance in RT technicians (78%-85%), nurses (19%-36%), and doctors (10%-12%) after the intervention<br>Doctors increasingly assessed weight loss (75%-84%) | Efficacy: Nurse and doctor's compliances are low even after the intervention<br>Selection bias: This study did not focus on cachexia which requires a more in-depth type of assessment and intervention |
| Sharour 2019[34] | To assess the effectiveness of a nutritional education program for cancer patients | A quasi-experimental design (oncology units, surgical, medical, bone marrow transplantation, pediatric, and adult outpatient clinics, Jordan) | Nurses ($n$=60, intervention: control, 1:1) | Intervention group<br>Contents: The content covered nutritional assessment methods, the impact of cancer treatment on nutritional status, complications of treatment, energy and protein diet, oral supplements, and preventive measures for anorexia<br>Method: Role play, lectures, handouts, videos, and open discussion<br>Duration: 20 h in 2 weeks<br>Control group<br>N/A | Significant improvement in knowledge and self-confidence in the intervention group<br>The self-efficacy score improved after attending the educational program | Selection bias: The program was focused on the HCPs with a few years of experience. This study did not focus on cachexia |
| Schneider and Bressler 2020[35] | To improve the compliance of nutritional screening (MUST) practice using an electronic reminder | Pilot trial (cancer centers, US) | Nurses working in three outpatient cancer centers (precise number unknown) | Contents: Use an electronic reminder, malnutrition education, an informational tip sheet about the MUST, flyers to support the electronic screening process, ongoing education<br>Tools: Reminder, tip sheets, flyers | The compliance after using the reminder was 30%-81% | Generalizability: Electronic medical records with alert function needs to be implemented<br>Selection bias: Most patients assessed in this trial were outpatients with a low risk for malnutrition<br>Selection bias: This study did not focus on cachexia |

US: The United States of America, MUST: Malnutrition universal screening tool, RT: Radiotherapy, HCPs: Health-care professionals, BAPEN: British Association for Parenteral and Enteral Nutrition

for Research and Treatment of Cancer QLQ Module for Cancer Cachexia (QLQ-CAX24),[50] have been developed. However, such tools are primarily used for research purposes at present. An assessment tool that can be used clinically and in research could create new opportunities for nurses to study cancer cachexia and help them consider how to develop multidisciplinary interventions to meet the needs of cancer cachexia patients.[51,52] To address the unmet needs of patients and caregivers, HCPs, including nurses, are responsible for recognizing cancer cachexia early, communicating well with patients and caregivers, and promoting clinical trials to standardize screening and assessment tools.

## *Limitations*

First, since the articles included in this review were English only, and most countries were limited to developed countries, we could not apply our results to other medical situations or language areas. It is expected that the recognition of HCPs, patients, and caregivers toward

cancer cachexia will differ depending on the nationality, environment, and culture, and more detailed studies are needed. Second, we must also consider the context and culture of the country and institution regarding differences in health-care systems, roles of HCPs, and the nature of the health-care team. Finally, there are limitations in generalizing the results of this review as the current practices and barriers of cancer cachexia nursing because it includes studies that focus not only on cancer cachexia but also on the general nutritional management of cancer patients.

### *Nursing implications*

HCPs should routinely assess cancer patients' physical and nutritional changes based on established guidelines and consensus.[2,6] It is also essential for HCPs to be aware of the signs, symptoms, and effects of cancer cachexia as early as possible in the treatment courses.[2,6,53] However, awareness of cancer cachexia among HCPs, including nurses, is currently limited. More continuing education opportunities should be provided for HCPs to learn about cancer cachexia. The routine use of assessment tools for cachexia can help HCPs recognize early signs and symptoms and provide early, tailored interventions for cancer cachexia in cooperation with multidisciplinary teams. Nurses who are in close contact with patients can make a difference in the worsening trajectory of cachectic patients if they recognize the patient's condition and integrate multidisciplinary care early.

Finally, psychoeducational interventions by nurses are essential. Simply asking a patient about eating-related distress may help them cope with the situation in palliative care settings.[54] HCPs should provide patients and their caregivers with information appropriate to the stage of cachexia so that they can recognize the nature, course, and adverse effects of cancer cachexia, thereby increasing caregiver and patient awareness of the clinical condition and the need for early multidisciplinary intervention.[4,6] The clinical framework for quality care in cancer cachexia presents assessments and management for each stage of cancer cachexia and may help oncology nurses to determine what knowledge and skills are needed to provide cancer cachexia care in practice.[55] Further research is required on this topic.

## Conclusions

This scoping review revealed individual and environmental barriers to nursing practice; however, there have been relatively few clinical trials for oncology nurses in cancer cachexia. In the future, it is necessary to introduce the content on cancer cachexia into continuing education programs for nurses and to standardize tools that are easy to assess in daily practice and lead to interventions. There is also a need to develop nurse-led interventions for multidisciplinary interventions. Further studies are needed to establish a practical guide for the nursing management of cancer cachexia.

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### *Conflicts of interest*

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