

# The Psychosocial Components of Multimodal Interventions Offered to People with Cancer Cachexia: A Scoping Review

Jane B Hopkinson

School of Healthcare Sciences, Cardiff University, Wales, UK

**Corresponding author:** Jane B Hopkinson, PhD, RGN. School of Healthcare Sciences, Cardiff University, Wales, UK. E-mail: hopkinsonjb@cardiff.ac.uk

Received: May 05, 2021; Accepted: May 14, 2021; Published: Jul 20, 2021

## ABSTRACT

The supportive care of people with cancer cachexia is a rapidly evolving field. In the past decade, multimodal treatments have been developed and new multidisciplinary cachexia clinics have been established across the world. This scoping review examines the extent to which psychosocial support has become part of the multimodal management of cancer cachexia. The review draws on a systematic search of Medline, Embase, CINAHL, PsycINFO, and the Cochrane Library for publications about people who have cancer cachexia and receive multimodal interventions. Search limits were the English language, date range January 2013 to March 2021, and adults 18 years and older. The search found 19 papers about multimodal interventions for either cancer cachexia or its defining feature involuntary weight loss that included a psychosocial component. This review found three different ways a psychosocial component of a multimodal intervention can help patients: (1) enable adherence to multimodal therapies;

(2) aid emotional adaptation and coping; and (3) treat comorbid anxiety and depression. Recognizing these three different functions of psychosocial support is important because they have different mechanisms of action. Behavioral change techniques are important for enabling adherence, education in coping methods is important to alleviate stress, and cognitive reframing for the treatment of anxiety and depression. The analysis reveals that multimodal interventions for cancer cachexia with a psychosocial component can either focus on physical health or have a more holistic focus. Holistic care is considered the best practice in cancer nursing. Thus multimodal interventions that can address not only physical health problems, but psychosocial issues are consistent with high-quality nursing care.

**Key words:** Adaptation, adherence, cachexia, cancer, distress, nursing, psychosocial, scoping review

## Introduction

Cancer cachexia is the wasting syndrome experienced by many people with cancer.<sup>[1,2]</sup> Its problematic characteristics include involuntary weight loss, muscle wasting, debilitation, anorexia, and fatigue.<sup>[2]</sup> These can cause a considerable negative impact on the quality of life of both cancer patients and their families.<sup>[3,4]</sup> The molecular basis of the syndrome is poorly understood but currently thought to be a complex

set of interactions between tumor and patient that include an inflammatory response and other metabolic changes.<sup>[2,5]</sup> In 2021, Cancer Research UK and the National Cancer Institute identified cancer cachexia as being a Cancer Grand Challenge.<sup>[6]</sup>

Over the past two decades, definitions of cachexia have been published, for example, the expert consensus authored by Fearon *et al.* in 2011.<sup>[7]</sup>

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

**For reprints contact:** WKHLRPMedknow\_reprints@wolterskluwer.com

**Cite this article as:** Hopkinson JB. The Psychosocial Components of Multimodal Interventions Offered to People with Cancer Cachexia: A Scoping Review. *Asia Pac J Oncol Nurs* 2021;8:450-61.

### Access this article online

#### Quick Response Code:



**Website:** www.apjon.org

**DOI:**  
10.4103/apjon.apjon-219

*Cancer cachexia is defined as a multifactorial syndrome characterised by an ongoing loss of skeletal muscle mass (with or without loss of fat mass) that cannot be fully reversed by conventional nutritional support and leads to progressive functional impairment. The pathophysiology is characterised by a negative protein and energy balance driven by a variable combination of reduced food intake and abnormal metabolism.*<sup>[7]</sup>

Science has progressed our understanding of cancer cachexia since 2011. A revision of the expert consensus statement is in progress.<sup>[8]</sup>

Although science is building our understanding of the cause and course of cancer cachexia, no pharmacological agent is licensed to treat the syndrome with the exception of Anamorelin, which is licensed for use in Japan.<sup>[5]</sup> Corticosteroids or progesterone analogs have side effects but can be of benefit if used for short periods in patients with loss of appetite or weight loss and advanced progressing cancer.<sup>[9]</sup> There is insufficient evidence of benefit from other agents tested in trials or they have been found to have side effects that outweigh benefits.

## Supportive Care in Cachexia

The symptoms of cancer cachexia (weight loss, poor appetite, weakness, and fatigue) can be troubling, even distressing for patients.<sup>[10-12]</sup> They have both emotional and social impacts.<sup>[13]</sup> They are also challenging to self-manage with clinicians lacking in knowledge and skills to offer an intervention that can help.<sup>[14]</sup> However, there is a growing community of clinicians who recognize not only cachexia-related suffering but the benefits of offering supportive care.

This paper is an overview of what is known about the psychosocial support of people with cancer cachexia who are receiving multimodal interventions. A multimodal intervention comprises components intended to work synergistically to treat cachexia and/or address cachexia-related problems.

## Context for the Research

This review follows on from a program of work to develop two nurse-led multicomponent toolkits for the support of people with advanced cancer with involuntary weight loss and eating problems.<sup>[15,16]</sup> Evaluation found benefits and no adverse consequences. Both the interventions were underpinned by a biopsychosocial understanding of health and illness<sup>[17]</sup> with components intended to alleviate weight- and eating-related distress by supporting adaptation and coping. They combined nutritional advice and psychoeducation. The first toolkit, the Macmillan Approach to Weight and Eating, focuses on the individual patient,<sup>[15]</sup> with the second, the Family Approach to Weight and Eating (FAWE), adding a component attending to

the relationship between the patient and their family members.<sup>[16]</sup> FAWE builds on the assumption that a system of interpersonal support can aid adaptation and coping. The two toolkits were developed to be complementary to any treatment for cancer cachexia. Their purpose was not to arrest or reverse progress of the syndrome but to alleviate distress and thus enhance the quality of life. When thinking about how a system of psychosocial support might not only improve outcomes for patients but also their family members, a new possibility emerged: the possibility of treatments for cachexia and psychosocial support acting synergistically.<sup>[13,18]</sup> Thus, psychosocial support might be important to the treatment of cachexia. For example, education in cachexia might help to alleviate eating-related distress and also motivate adherence to nutritional advice. After the proposal of this synergy in 2013, new multimodal treatments have been developed and new multidisciplinary cachexia clinics have been established. This scoping review examines the extent that psychosocial support has become part of the multimodal management of cancer cachexia and the nature of this support.

## Review Question

What is known about the psychosocial component of multimodal interventions for patients with cancer cachexia?

## Methods

The search was of Embase, Medline, CINAHL, PsycINFO, and the Cochrane Library for publications about the psychosocial support of people with cancer cachexia or its defining characteristic, involuntary weight loss. Limits were the English language, January 2013 to March 2021, and adults. The search strategy was developed for Medline and then translated into other databases. It combined selected MeSH terms and free text terms seeking hits for (cancer) AND (cachexia), (cancer) AND (anorexia) AND (nutrition), (cancer) AND (weight loss) AND (nutrition), (cancer) AND (eat OR food OR diet) AND (distress OR conflict OR self-assessment OR perception), (cancer) AND (weight loss) AND (distress OR conflict OR self-assessment OR perception), (cachexia) AND (emotion OR psychosocial OR multimodal OR psychoeducation OR adaptation), (cachexia) AND (compliance OR adherence), and (cachexia) AND (anxiety OR depression OR distress). It comprised multiple searches with the findings of early searches informing the search strategy [Appendix 1 for search strategy], as the study was a scoping review to map the breadth and depth of literature in the field of interest.<sup>[19]</sup> The criteria were broad, allowing inclusion irrespective of research design, methodology, or method. Titles and abstracts were screened and 177 full-text

publications were selected for further examination. The preliminary inclusion/exclusion criteria were refined, as the search progressed. For example, inclusion was narrowed to academic peer-reviewed papers. The full text of the 121 eligible papers was read and data about multimodal interventions extracted using a data extraction form devised for the study. Contrasts between study designs, methodology, and methods were expected and considered to be a strength, as the review's purpose was to capture an overview of what is known about multimodal interventions in cancer cachexia paying particular attention to any psychosocial support component. The data extraction and narrative synthesis reported here used an approach informed by the methods of ethnography.<sup>[20,21]</sup> The NHS Centre for Reviews and Dissemination guidance for undertaking reviews in health care informed the search methodology and methods.<sup>[22]</sup>

For the purpose of the review, a psychosocial intervention was defined as any clinician-led activity intended to have beneficial emotional, psychological, or social effects on health and well-being, in other words, any intervention that affects how the person with cachexia feels, thinks and behaves, or interacts with others in their home, family, and environment.

## Results

This review found 19 publications<sup>[16,23-40]</sup> reporting a multimodal intervention for cancer cachexia with a psychosocial component and published from January 2013 to March 2021. They included complex interventions used in practice ( $n = 3$ ),<sup>[27,28,38]</sup> tested in the context of a feasibility study ( $n = 6$ )<sup>[16,24,29,32,36,40]</sup> or pilot/early phase trial ( $n = 5$ ),<sup>[23,24,31,33,39]</sup> and theorized approaches drawing on existing literature and expert opinion ( $n = 6$ ).<sup>[25,26,30,34,35,37]</sup> The interventions tested were found to be feasible and safe (when adverse events and safety issues were reported [ $n = 8$ ]).<sup>[16,24,29,31-33,36,39]</sup> However, adherence to some components was poor. The predominance of feasibility, efficacy, and pilot studies of small sample size reflects an emerging field of study with evolving, and thus, heterogeneous multimodal interventions and outcome measures. This makes comparison and comment on effect inappropriate, other than to note that all trials reported benefit in one or more health outcomes in those patients exposed to a multimodal intervention with a psychosocial component. The 19 identified interventions all combined a psychosocial component with one or more of the following: pharmaceutical treatment of cachexia, pharmacological treatment of nutritional impact symptoms, nutrition, nonpharmacological management of nutritional impact symptoms, exercise, and physical activity [Table 1]. Eight were described as delivered by a multi- or interdisciplinary

team and nine described as individualized or personalized with two requiring the patient to self-monitor. The patient's family or carer was actively involved in ten of the interventions, three requiring them to promote the intervention and monitor the patient's behavior.

The findings of this review will commence with a brief overview of the pharmacological, exercise/physical activity and nutritional components of the 19 identified multimodal interventions. It will then describe the psychosocial components of the interventions paying attention to an analysis of commonality that identifies three complementary uses of psychosocial support in the context of cachexia care.

## Multimodal Approaches for the Management of Cancer Cachexia

The components of the 19 multimodal interventions were categorized as pharmaceutical (treatment of cachexia and/or treatment of nutritional impact symptoms), nutritional support (nonpharmacological treatment of nutritional impact symptoms and/or nutritional counseling), exercise/physical activity, and psychosocial support (for the patient and/or family). Six papers described interventions comprising all of these component parts. The most common component combined with psychosocial support was nutritional support, which was part of 17 interventions. Sixteen included exercise and/or physical activity in combination with nutritional support [Table 2].

## Pharmacological Treatment

Two papers described inclusion of a pharmaceutical agent intended to arrest the cachectic process by dampening the inflammatory response.<sup>[29,30]</sup> Both were about the development and testing of MENAC, a complex intervention that includes a nonsteroidal anti-inflammatory. A Phase III trial of MENAC is now in progress.

## Pharmacological Management of Nutritional Impact Symptoms

Six interventions included the management of nutritional impact symptoms,<sup>[26,27,30,32,34,36]</sup> such as constipation, pain, or poor appetite, with pharmaceutical agents. Anxiety and low mood (depression) can be considered nutritional impact symptoms, as they can affect oral intake. Pharmacological treatment of anxiety and depression was discussed by two authors based on clinical experience.<sup>[25,28]</sup> Del Fabbro *et al.*<sup>[28]</sup> explain the treatment of mental health conditions as being important because of the potential for then seeing improvement in other symptoms, in particular appetite.

Table 1: Reported components of multimodal interventions

	Pharma				Nutrition								
	Nonsteroidal anti-inflammatory	Pharma treatment of	Pharma for nutritional impact	Nutritional counseling +/- target	Prescribed diet	Energy and/or protein foods to	Tailoring to preference and eating	Meal plan/suggested meals	Frequent meals/snacks	Modification of usual diet	Diet advice tailored for	Supplement	
Focan <i>et al.</i> <sup>[23]</sup>													✓
Xu <i>et al.</i> <sup>[24]</sup>				✓								✓	
Hopkinson and Richardson <sup>[6]</sup>		✓				✓	✓		✓				
Hui <sup>[25]</sup>													
Maddocks <i>et al.</i> <sup>[26]</sup>			✓			✓				✓			
Portman <i>et al.</i> <sup>[27]</sup>			✓				✓			✓			
Del Fabbro <sup>[28]</sup>		✓											✓
Solheim <i>et al.</i> <sup>[29]</sup>	✓					✓			✓				
Solheim <i>et al.</i> <sup>[30]</sup>	✓		✓			✓			✓				✓
Uster <i>et al.</i> <sup>[31]</sup>				✓		✓	✓		✓			✓	✓
Mouri <i>et al.</i> <sup>[32]</sup>			✓										✓
Total	2	2	4	7		5	3		5	5	2		5

Table 2: Categories of multimodal intervention components

	Psychosocial support			Nutritional counseling		Exercise/physical activity		Pharmaceutical to treat cachexia		Pharmaceuticals for nutritional impact symptoms		Family/carer involvement		Self-monitoring/family monitoring
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Maddocks <i>et al.</i> <sup>[26]</sup>	✓	✓	✓	✓	✓	✓				✓		✓		✓
Del Fabbro <sup>[23]</sup>	✓	✓	✓	✓	✓	✓				✓		✓		✓
Mouri <i>et al.</i> <sup>[32]</sup>	✓	✓	✓	✓	✓	✓				✓		✓		✓
Naito <i>et al.</i> <sup>[36]</sup>	✓	✓	✓	✓	✓	✓				✓		✓		✓
Portman <i>et al.</i> <sup>[27]</sup>	✓	✓	✓	✓	✓	✓				✓		✓		✓
Amano <i>et al.</i> <sup>[34]</sup>	✓	✓	✓	✓	✓	✓				✓		✓		✓
Solheim <i>et al.</i> <sup>[30]</sup>	✓	✓	✓	✓	✓	✓		✓		✓		✓		✓
Solheim <i>et al.</i> <sup>[29]</sup>	✓	✓	✓	✓	✓	✓		✓		✓		✓		✓
Tobberup <i>et al.</i> <sup>[40]</sup>	✓	✓	✓	✓	✓	✓							✓	
Xu <i>et al.</i> <sup>[24]</sup>	✓	✓	✓	✓	✓	✓								
Uster <i>et al.</i> <sup>[31]</sup>	✓	✓	✓	✓	✓	✓								
Schink <i>et al.</i> <sup>[33]</sup>	✓	✓	✓	✓	✓	✓								
Del Fabbro <sup>[35]</sup>	✓	✓	✓	✓	✓	✓								
Avancini <i>et al.</i> <sup>[38]</sup>	✓	✓	✓	✓	✓	✓								
Storck <i>et al.</i> <sup>[39]</sup>	✓	✓	✓	✓	✓	✓								
Hopkinson and Richardson <sup>[6]</sup>	✓	✓	✓	✓	✓	✓						✓		
Stubbins <i>et al.</i> <sup>[37]</sup>	✓	✓	✓	✓	✓	✓						✓		
Hui <sup>[25]</sup>	✓	✓	✓	✓	✓	✓						✓		
Focan <i>et al.</i> <sup>[23]</sup>	✓	✓	✓	✓	✓	✓						✓		
Total	19	19	17	16	2	8		10		4		4		4

## Nonpharmacological Management of Nutritional Impact Symptoms

Two studies included consideration of nonpharmacological management of nutritional impact symptoms.<sup>[24,36]</sup> Esophageal cancer patients receiving radiotherapy were advised to engage in oral care before and after treatment.<sup>[24]</sup> Elderly patients with non-small cell lung cancer or pancreatic cancer were given advice on the dietary management of nutritional impact symptoms.<sup>[36]</sup> The dietary advice in another study took account of medical conditions but did not specify if this related to nutritional impact symptoms such as difficulty swallowing because of cancer treatment or unrelated medical conditions that can be managed with oral intake, such as diabetes.<sup>[31]</sup> The purpose of all three studies was to improve nutritional intake, the primary objective of Uster *et al.*<sup>[31]</sup> being to increase protein intake to 1.2 g of protein/kg body mass/day.

## Exercise and Physical Activity

Fourteen interventions included exercise.<sup>[26,28-40]</sup> A distinction was made between exercise and physical activity in five of these interventions, with support provided for both.<sup>[26,29,32,33,36]</sup> Exercise typically included resistance training (e.g., stand to sit exercises in the home) and aerobic exercise (e.g., walking) tailored to the individual's capability with goals set to support engagement and to inform personalization of the program. Physical activity alone (e.g., encouragement to continue daily chores or achieve a daily step count) was part of two interventions.<sup>[24,27]</sup> The purpose of exercise and physical activity was to treat inflammatory response, increase muscle mass, increase or maintain physical function, strength, or endurance, reduce fatigue, and/or increase physical activity. The majority of authors argued that nutrition was also important to achieving these ends.

## Nutritional Support

Nutritional counseling was a core component of 14 interventions.<sup>[24,27,28-36,38-40]</sup> Its aim was to increase energy, protein, and/or overall nutrient intake so as to maintain or increase body weight. Counseling supported protein, energy, and nutrient intake according to need ( $n = 9$ ),<sup>[16,26,29-31,33,36,38,40]</sup> with the nature of interventions indicating an underpinning assumption of need to increase oral intake. A target intake might be set ( $n = 5$ ),<sup>[30,31,33,39,40]</sup> meal plan and education provided in food or meal preparation ( $n = 1$ ),<sup>[38]</sup> or diet prescribed ( $n = 2$ ).<sup>[36,38]</sup> The most common elements of nutritional counseling were to encourage frequent meals or snacking ( $n = 9$ )<sup>[16,28-31,35,36,38,40]</sup> and increase the nutritional density of intake by modifying what could be eaten

( $n = 7$ ).<sup>[16,26,27,29,31,36,40]</sup> Tailoring to food preferences and eating habits was also described ( $n = 6$ ).<sup>[16,27,31,36,38,40]</sup>

## Psychosocial Support

Emotional, psychological, or social support was a component of 19 multimodal interventions. Hypothesized or data-based benefits were alleviations of cachexia-related distress in patients and their family member, enabling stress management and coping in individual patients or patient–family member dyads, improving body image, improving quality of life, treating depression, supporting adherence to exercise, physical activity, and nutritional care components of multimodal interventions [Table 3].

### *Psychosocial Support and Adherence to Multimodal Interventions*

Adherence or compliance to components of the multimodal interventions was raised as an issue in 15 of the included publications.<sup>[23,24,26-29,31-33,35-40]</sup> The concepts of compliance and adherence reflect differing positioning of the clinician and patient, although some authors used the concepts interchangeably. Compliance best describes uptake of an intervention where the clinician takes control and makes a plan for the patient to follow. Adherence is the term consistent with a clinician–patient model where decision-making is shared and a plan is negotiated.

Four publications were about trials where data capture included adherence (or compliance) with intervention components. Adherence to the different components of interventions was variable. In a trial that included mindfulness, only 12% of patients approached agreed to take part of whom fewer than half completed the course.<sup>[23]</sup> In a trial that included an exercise component, the dropout was 59% with authors concluding burden to be an important consideration for adherence.<sup>[33]</sup> Participants attended all required nutritional counseling sessions in a trial of a multimodal intervention but completed only 79% of all expected training and 71% of the prescribed oral nutritional supplements.<sup>[39]</sup> In the Phase II MENAC trial, there was 76% compliance for the anti-inflammatory celecoxib, 60% for exercise, and 48% for oral nutritional supplements.<sup>[29]</sup>

Seven publications described a psychosocial component for the support of adherence. The NEXTAC Program<sup>[32]</sup> included the use of behavioral change techniques, such as goal setting with the patient, which were argued to contribute to high compliance. In the follow-on second feasibility and safety study of NEXTAC, additional psychosocial components were added to further improve compliance with the intervention, for example, involvement of the family in monitoring behavior.<sup>[36]</sup> The pilot trial of an exercise and nutrition intervention conducted by Xu

Table 3: Reported purpose of multimodal interventions with a psychosocial component

	Improve nutritional status			Improve muscle mass and physical function				
	Increase energy/protein/nutrition +/-target	Manage nutritional impact symptoms		Increase physical activity/performance	Increase muscle mass	Increase/maintain physical function, strength or endurance	Promote weight gain/maintain weight	Reduce fatigue
Focan <i>et al.</i> <sup>[23]</sup>	✓							
Xu <i>et al.</i> <sup>[24]</sup>	✓	✓						
Hopkinson and Richardson <sup>[6]</sup>	✓	✓						
Hui <sup>[25]</sup>	✓	✓						
Maddocks <i>et al.</i> <sup>[26]</sup>	✓	✓		✓	✓			
Portman <i>et al.</i> <sup>[27]</sup>	✓	✓				✓		
Del Fabbro <sup>[28]</sup>	✓	✓						✓
Solheim <i>et al.</i> <sup>[29]</sup>	✓	✓		✓	✓		✓	✓
Soldheim <i>et al.</i> <sup>[30]</sup>	✓	✓		✓	✓		✓	✓
Uster <i>et al.</i> <sup>[31]</sup>	✓							
Mouri <i>et al.</i> <sup>[32]</sup>	✓	✓			✓			
Schink <i>et al.</i> <sup>[33]</sup>	✓	✓						
Amano <i>et al.</i> <sup>[34]</sup>	✓	✓		✓				
Del Fabbro <sup>[35]</sup>	✓	✓				✓		
Naito <i>et al.</i> <sup>[36]</sup>	✓	✓		✓				
Stubbins <i>et al.</i> <sup>[37]</sup>	✓	✓		✓	✓			
Avancini <i>et al.</i> <sup>[38]</sup>	✓	✓		✓	✓		✓	
Storck <i>et al.</i> <sup>[39]</sup>	✓	✓		✓	✓			
Tobberup <i>et al.</i> <sup>[40]</sup>	✓							
Total	17	13		7	7	5	3	2

*et al.*<sup>[24]</sup> included “easy access” to the walking activity with a nurse accompanying the patient on the walk and talking with them about any eating difficulties to provide positive reinforcement for adherence to dietary advice. Eighty percent of the planned walking sessions were completed. Portman *et al.*<sup>[27]</sup> described the role of the nurse in a multidisciplinary team approach to be the assessment of adherence to inform patient teaching and care planning by the whole team. Uster *et al.*<sup>[31]</sup> offered extra visits to patients who were not attaining their energy and protein targets but do not comment on the impact/effect. Stubbins *et al.*<sup>[37]</sup> describe the use of motivational interviewing to encourage improved nutritional intake. In a trial of exercise and nutrition by Tobberup *et al.*,<sup>[40]</sup> adherence to the intervention was encouraged by a follow-up phone call from a dietitian. There was 60% compliance with the intervention, those being noncompliant having more advanced disease and weight loss. However, the authors argue the need for further research because of potential for the achievement of a higher compliance rate. In line with this, three expert opinion pieces recommend psychosocial support to enhance adherence to all multimodal components of an intervention.<sup>[26,35,38]</sup> Maddocks *et al.*<sup>[26]</sup> focus on nutrition and argue that a dietitian has a role to normalize experience and support problem solving to improve adherence to nutritional advice. Similarly, Del Fabbro *et al.*<sup>[28]</sup> argued that education and counseling can motivate attainment of nutrition goals.

In summary, the review found compliance and adherence to multimodal interventions an issue with some studies reporting rates that evidence variability across different intervention components. Psychosocial support had been built into some interventions with the intention of addressing this issue.

### **Psychosocial Support to Aid Adaptation and Coping**

Education was offered in most interventions with a psychosocial component. This education was about the cause of cancer cachexia and the management of its symptoms and related problems ( $n = 9$ ).<sup>[16,24-28,32,34,36]</sup> Its purpose was to promote understanding to help the patient cope (emotionally and practically with the impact of cachexia) and thus to alleviate distress. Five of the nine interventions included education in self-management,<sup>[16,26,28,32,36]</sup> with guidance on self-monitoring in one, the NEXTAC Program.<sup>[32]</sup> This self-monitoring was also intended to enhance adherence to the program.

Emotional support was described as emotional counseling in six studies,<sup>[16,25,27,28,34,36]</sup> presumably to differentiate it from nutritional counseling and/or physical activity counseling. The methods used to provide this support for the alleviation of cachexia-related distress were cognitive behavioral therapy/cognitive reframing, motivational

interviewing, mindfulness, therapeutic storytelling, a solution-focused strengths approach, supervised exercise, and relaxation techniques. The motivational interviewing and the supervision of exercise also served the purpose of supporting adherence to the exercise component of an intervention.

Family members or informal carers were involved in ten of the interventions.<sup>[16,25-28,32,34,36,37,40]</sup> They were encouraged to learn about cancer cachexia alongside the patient,<sup>[16,25-28,32,34]</sup> engage in self-management education and training,<sup>[16,28,36]</sup> or were enlisted as a co-worker to promote the intervention and monitor the patient’s behavior at home.<sup>[26,28,36]</sup> Family members could also be involved to help motivate the achievement of nutrition goals,<sup>[28,37]</sup> support health behavior change,<sup>[26,36]</sup> and to coproduce a cachexia care plan with patient and clinicians.<sup>[27]</sup> Patient’s involvement in self-management education and training was focused on the support of adaptation and coping for the alleviation of stress and distress. In contrast, the involvement of family members in motivating behavior change and providing feedback on achievement of goals also served the purpose of supporting patient adherence to the multimodal intervention.

### **Psychosocial Support to Treat Anxiety and Depression**

In one study, the practice of mindfulness was used to manage anxiety and depression in a patient with cachexia.<sup>[23]</sup>

## **The Purpose of Psychosocial Support**

The analysis revealed psychosocial support to have three different purposes,

1. Enablement of adherence to multimodal therapies, for example, use of behavioral change techniques to support exercise adherence
2. Aid of emotional adaptation and coping, for example, education in coping skills to alleviate stress
3. Treatment of comorbid anxiety and depression, for example, mindfulness meditation for depression.

Some interventions used psychosocial support to serve at least two of these purposes. However, the purpose of psychosocial support was not always specified. For example, the behavioral change technique of goal setting could support adherence to nutritional advice and at the same time alleviate stress by supporting a sense of control.

## **Mechanism of Action**

Four of the reports identified how the described psychosocial support was designed to achieve the intended outcome(s). A theory of adaptation and coping<sup>[41]</sup> underpinned psychosocial support devised to alleviate distress in patients and their family members.<sup>[15,16]</sup> Behavioral

change theory<sup>[42,43]</sup> informed techniques of goal setting, action planning, and self-monitoring to support adherence to the physical activity in the NEXTAC Program.<sup>[32]</sup> Focan's Buddhist informed practice of mindfulness was positioned as underpinned by cognitive behavioral theory.<sup>[23]</sup> An interdisciplinary approach to cancer cachexia informed by the team mental model conceptualized the management of cachexia as meeting family system needs.<sup>[27]</sup>

## Discussion

This review found that multimodal interventions for cancer cachexia include psychosocial components to encourage adherence, to alleviate cachexia-related distress, and/or to treat anxiety and depression.

### *The Functions of Psychosocial Support*

The three identified functions of psychosocial support have not previously been differentiated in relation to the treatment and care of people with cancer cachexia,

- Enablement of adherence to multimodal therapies
- Aid of emotional adaptation and coping
- Treatment of comorbid anxiety and depression.

It is useful to recognize the different ways psychosocial support can help a person with cancer cachexia. Recognizing the three possible ways psychosocial support can help is useful, as it reveals the importance of attending to different mechanisms in pursuit of health and well-being outcomes. Behavioral change techniques<sup>[42,43]</sup> are important for the support of adherence to multimodal intervention components, such as nutritional advice and prescribed exercise. Educational methods that support learning can alleviate stress and distress and are important for adaptation and coping.<sup>[41]</sup> Therapies that support cognitive reframing and the management of emotion are important for the treatment of comorbid anxiety and depression.<sup>[44]</sup>

### *Physical Function vs. Holistic Focused Support*

Multimodal therapies for cancer cachexia comprise components intended to work synergistically. Each intervention typically includes nutrition, exercise, management of nutritional impact symptoms, and increasingly, consideration of related psychosocial support needs. The underlying principle is that physical activity/exercise alone cannot maintain or improve muscle mass and function. Appropriate nutrition is also needed, which, in turn, is dependent on education in oral intake and successful management of symptoms such as nausea and constipation. The symptoms of cachexia can be distressing for patients, so it makes sense to also address distress, anxiety, and depression, particularly as they have a known negative effect on appetite – they can be understood as nutritional impact symptoms.<sup>[27]</sup> However, this is to address

the problems of cancer cachexia using the biomedical model of cancer treatment.<sup>[45]</sup> It turns our attention to the body and fixing the body. The focus is on how exercise can maintain a body part, i.e., muscle and muscle function. Nutrition is the fuel to maintain muscle with nutritional impact symptoms obstacles to the fuelling process. Anxiety and depression are also framed as obstacles to refueling to be overcome with medication or the new talking therapies, cognitive behavioral therapy, motivational interviewing, relaxation therapy, mindfulness meditation, and more. All may be helpful, as there is an evidence base for the beneficial effect of exercise, nutrition, and talking therapies used as unimodal interventions, if not in cachexia, then in other cancer patient groups.<sup>[46-49]</sup> However, something is missed when simply focusing on the restoration of the physical body. The social implications of cancer cachexia are underplayed. As a result, the context in which cancer patients live with cachexia can be invisible.

The offer of cancer cachexia care that takes a holistic approach sets an expectation of outcomes not only in physical health but also in the domains of emotional, psychological, and social well-being.<sup>[13,28]</sup> Through the intertwining of interventions for physical health problems with those that seek improvement in a sense of well-being through the alleviation of stress, distress, and improvement in health-related quality of life, the multimodal approach becomes holistic. It is underpinned by a biopsychosocial understanding of health and illness,<sup>[17]</sup> which attends not only to restoring or sustaining the physical body but also to the support of a valued sense of self and connectedness with others, which are important psychological and social aspects of quality of life. The intended outcomes of cancer cachexia care can be either physical health or psychosocial outcomes, or a combination of the two. With this insight, it becomes apparent that multimodal interventions with a psychosocial component may or may not be holistic in intent. A question arises. Should multimodal interventions aim to maintain the physical body, support patients to live as well as possible, or both? From a nursing perspective, with professional focus on holistic care,<sup>[50-52]</sup> the development of multimodal interventions that can address psychosocial issues in addition to physical health problems is important. Attention to psychosocial factors affecting cachexia-related quality of life is the key to understanding how to improve nursing care.

### Limitations

This rapid scoping review was conducted by a single researcher, a nurse academic with interest in identifying supportive care that can be offered by oncology nurses. A multidisciplinary research team may have paid attention to different aspects of the data in the analytic process,



such as the education and training needs of oncology staff for the delivery of the interventions. The review used a limited search strategy, for example, no forward or backward chaining. Thus, a more robust search may identify additional studies about multimodal interventions for cancer cachexia. The psychosocial focus and lens when developing the search strategy have excluded multimodal pharmaceutical, exercise, and nutrition interventions without a psychosocial component. Furthermore, the scope of the review was confined to information reported in the publications. Contacting authors may have enabled a more detailed description of the multimodal interventions, such as educational components.

## Conclusions

This review found that multimodal interventions for cancer cachexia can focus on physical health or have a holistic focus. Psychosocial components of multimodal interventions with the holistic focus can enable adherence, alleviate cachexia-related stress and distress in patients and their family members, and/or treat comorbid mental health problems. Holistic care is considered the best practice in cancer nursing. Thus, multimodal interventions that can address not only physical health problems but psychosocial issues are consistent with high-quality oncology nursing care.

## Acknowledgments

The author would like to thank Martin Hopkinson for proofreading the manuscript.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

## References

- Vagnildhaug OM, Balstad TR, Almberg SS, Brunelli C, Knudsen AK, Kaasa S, *et al.* A cross-sectional study examining the prevalence of cachexia and areas of unmet need in patients with cancer. *Support Care Cancer* 2018;26:1871-80.
- Aapro M, Arends J, Bozzetti F, Fearon K, Grunberg SM, Herrstedt J, *et al.* Early recognition of malnutrition and cachexia in the cancer patient: A position paper of a European School of Oncology Task Force. *Ann Oncol* 2014;25:1492-9.
- Kasvis P, Vigano M, Vigano A. Health-related quality of life across cancer cachexia stages. *Ann Palliat Med* 2019;8:33-42.
- Wheelwright S, Darlington AS, Hopkinson JB, Fitzsimmons D, Johnson C. A systematic review and thematic synthesis of quality of life in the informal carers of cancer patients with cachexia. *Palliat Med* 2016;30:149-60.
- Wakabayashi H, Arai H, Inui A. The regulatory approval of anamorelin for treatment of cachexia in patients with non-small cell lung cancer, gastric cancer, pancreatic cancer, and colorectal cancer in Japan: facts and numbers. *J Cachexia Sarcopenia Muscle* 2021;12:14-6.
- Cancer Research UK and National Cancer Institute. Cancer Grand Challenges; 2021. Available from: <https://cancergrandchallenges.org/challenges/cachexia>. [Last accessed on 2021 May 04].
- Fearon K, Strasser F, Anker SD, Bosaeus I, Bruera E, Fainsinger RL, *et al.* Definition and classification of cancer cachexia: An international consensus. *Lancet Oncol* 2011;12:489-95.
- Baracos V, Fallon M, Kaasa S. Personal communication. Definition and classification of cancer cachexia: An international consensus. In: Description of the Work Plan for the Updated DELPHI Consensus. Ver. 2.0. Available from the author: Unpublished Letter; 2021.
- Roeland EJ, Bohlke K, Baracos VE, Bruera E, Del Fabbro E, Dixon S, *et al.* Management of cancer cachexia: ASCO guideline. *J Clin Oncol* 2020;38:2438-53.
- Amano K, Maeda I, Morita T, Okajima Y, Hama T, Aoyama M, *et al.* Eating-related distress and need for nutritional support of families of advanced cancer patients: A nationwide survey of bereaved family members. *J Cachexia Sarcopenia Muscle* 2016;7:527-34.
- Hopkinson JB, Wright DN, Corner JL. The experience of weight loss in people with advanced cancer. *J Adv Nurs* 2006;54:304-12.
- Hopkinson JB. Food connections: A qualitative exploratory study of weight- and eating-related distress in families affected by advanced cancer. *Eur J Oncol Nurs* 2016;20:87-96.
- Hopkinson JB. Psychosocial impact of cancer cachexia. *J Cachexia Sarcopenia Muscle* 2014;5:89-94.
- Scott D, Reid J, Hudson P, Martin P, Porter S. Health care professionals' experience, understanding and perception of need of advanced cancer patients with cachexia and their families: The benefits of a dedicated clinic. *BMC Palliat Care* 2016;15:100.
- Hopkinson JB, Fenlon D, Wright DN, Okamoto I, Scott I, Addington-Hall JM, *et al.* The deliverability, acceptability and perceived effect of the Macmillan Approach to Weight loss and Eating difficulties (MAWE): Phase II cluster randomised exploratory trial of a psychosocial intervention for weight- and eating-related distress in people with advanced cancer. *J Pain Symptom Manage* 2010;40:684-95.
- Hopkinson J, Richardson A. A mixed-methods qualitative research study to develop a complex intervention for weight loss and anorexia in advanced cancer: The Family Approach to Weight and Eating (FAWE). *Palliat Med* 2016;29:164-76.
- Engel GL. The need for a new medical model: A challenge for biomedicine. *Science* 1977;196:129-36.
- Hopkinson JB. Psychosocial effect of cachexia. In: Opening Session. Kobe, Japan: 7<sup>th</sup> Cachexia Conference; 2013.
- Arksey H, O'Mally L. Scoping studies: Towards a methodological framework. *Int J Soc Res Methodol* 2005;8:19-32.
- Britten N, Campbell R, Pope C, Donovan J, Morgan M, Pill R. Using meta ethnography to synthesise qualitative research: A worked example. *J Health Serv Res Policy* 2002;7:209-15.
- Pope C, Mays N. Synthesising qualitative research. In: Pope C, Mays N, editors. *Qualitative Research in Healthcare*. 3<sup>rd</sup> ed. Oxford Blackwell Publishing; 2006. p. 142-54.

22. Centre for Reviews and Dissemination. Systematic Reviews: CRD's Guidance for Undertaking Reviews in Health Care. York: University of York; 2009.
23. Focan C, Houbiers G, Gilles L, Van Steeland T, Georges N, Maniglia A, *et al*. Dietetic and psychological mindfulness workshops for the management of cachectic cancer patients. A randomized study. *Anticancer Res* 2015;35:6311-5.
24. Xu YJ, Cheng JC, Lee JM, Huang PM, Hhang GH, Chen CH. A walk and eat intervention improves outcomes for patients with esophageal cancer undergoing neoadjuvant chemoradiotherapy. *Oncologist* 2015;20:1216-22.
25. Hui D. Cancer cachexia: It takes a team to fix the complex machinery. *J Oncol Pract* 2016;12:1172-3.
26. Maddocks M, Hopkinson J, Conibear J, Reeves A, Shaw C, Fearon KC. Practical multimodal care for cancer cachexia. *Curr Opin Support Palliat Care* 2016;10:298-305.
27. Portman DG, Thirlwell S, Donovan KA, Alvero C, Gray JE, Holloway R, *et al*. Leveraging a team mental model to develop a cancer anorexia-cachexia syndrome team. *J Oncol Pract* 2016;12:1046-52.
28. Del Fabbro E, Orr TA, Stella SM. Practical approaches to managing cancer patients with weight loss. *Curr Opin Support Palliat Care* 2017;11:272-7.
29. Solheim TS, Laird BJ, Balstad TR, Stene GB, Bye A, Johns N, *et al*. A randomized phase II feasibility trial of a multimodal intervention for the management of cachexia in lung and pancreatic cancer. *J Cachexia Sarcopenia Muscle* 2017;8:778-88.
30. Solheim TS, Laird BJ, Balstad TR, Bye A, Stene G, Baracos V, *et al*. Cancer cachexia: Rationale for the MENAC (multimodal- exercise, nutrition and anti- inflammatory medication for Cachexia) trial. *BMJ Support Palliat Care* 2018;8:258-65.
31. Uster A, Ruehlin M, Mey S, Gisi D, Knols R, Imoberdorf R, *et al*. Effects of nutrition and physical exercise intervention in palliative cancer patients: A randomized controlled trial. *Clin Nutr* 2018;37:1202-9.
32. Mouri T, Naito T, Morikawa A, Tatematsu N, Miura S, Okayama T, *et al*. Promotion of behavioral change and the impact on quality of life in elderly patients with advanced cancer: A physical activity intervention of the multimodal nutrition and exercise treatment for advanced cancer program. *Asia Pac J Oncol Nurs* 2018;5:383-90.
33. Schink K, Reljic D, Herrmann HJ, Meyer J, Mackensen A, Neurath MF, *et al*. Whole-body electromyostimulation combined with individualized nutritional support improves body composition in patients with hematological malignancies – A pilot study. *Front Physiol* 2018;9:1808.
34. Amano K, Baracos V, Hopkinson J. Integration of palliative, supportive, and nutritional care to alleviate eating-related distress among advanced cancer patients with cachexia and their family members. *Crit Rev Oncol Hematol* 2019;143:117-23.
35. Del Fabbro E. Combination therapy in cachexia. *Ann Palliat Med* 2019;8:59-66.
36. Naito T, Mitsunaga S, Miura S, Tatematsu N, Inano T, Mouri T, *et al*. Feasibility of early multimodal interventions for elderly patients with advanced pancreatic and non-small-cell lung cancer. *J Cachexia Sarcopenia Muscle* 2019;10:73-83.
37. Stubbins R, Bernicker EH, Quigley EM. Cancer cachexia: A multifactorial disease that needs a multimodal approach. *Curr Opin Gastroenterol* 2020;36:141-6.
38. Avancini A, Trestini I, Tregnago D, Cavallo A, Bragato M, Bonaiuto C, *et al*. Multidisciplinary lifestyle intervention to manage pancreatic cancer-related cachexia: A case report. *Future Sci OA* 2020;7:FSO659.
39. Storck LJ, Ruehlin M, Gaeumann S, Gisi D, Schmocker M, Meffert PJ, *et al*. Effect of a leucine-rich supplement in combination with nutrition and physical exercise in advanced cancer patients: A randomized controlled intervention trial. *Clin Nutr* 2020;39:3637-44.
40. Tobberup R, Carus A, Rasmussen HH, Falkmer UG, Jorgensen MG, Schmidt EB, *et al*. Feasibility of a multimodal intervention on malnutrition in patients with lung cancer during primary anti-neoplastic treatment. *Clin Nutr* 2021;40:525-33.
41. Lazarus R. Emotion and Adaptation. Oxford: Oxford University Press; 1991.
42. Michie S, Atkins L, West R. The Behaviour Change Wheel: A Guide to Designing Interventions. UK: Silverback Publishing; 2014.
43. Behavioural Change Project; 2020. Available from: <https://theoryandtechniquetool.humanbehaviourchange.org/tool>. [Last accessed on 2021 May 04].
44. NICE. Depression in adults: Recognition and management. In: National Institute for Health and Care Excellence. UK: NICE; 2009. Available from: <https://www.nice.org.uk/guidance/cg90>. [Last accessed on 2021 May 04].
45. Jennings D. The confusion between disease and illness in clinical medicine. *CMAJ* 1986;135:865-70.
46. Stout NL, Baima J, Swisher A, Winters-Stone KM, Welsh J. A systematic review of exercise systematic reviews in the cancer literature (2005-2017). *Phys Med Rehabil* 2017;99 Suppl 2:S347-84.
47. de van der Schueren MA, Laviano A, Blanchard H, Jourdan M, Arends J, Baracos VE. Systematic review and meta-analysis of the evidence for oral nutritional intervention on nutritional and clinical outcomes during chemo(radio)therapy: Current evidence and guidance for design of future trials. *Ann Oncol* 2018;29:1141-53.
48. Corbett TK, Groarke A, Devane D, Carr E, Walsh JC, McGuire BE. The effectiveness of psychological interventions for fatigue in cancer survivors: Systematic review of randomised controlled trials. *Syst Rev* 2019;8:324.
49. Wang Y, Lin Y, Chen J, Wang C, Hu R, Wu Y. Effects of Internet-based psycho-educational interventions on mental health and quality of life among cancer patients: A systematic review and meta-analysis. *Support Care Cancer* 2020;28:2541-52.
50. Lubejko B, Wilson B. Oncology nursing: Scope and standards of practice. *Oncol Nurs Soc* 2019;41-64.
51. Nursing and Midwifery Council. Future Nurse: Standards of Proficiency for Registered Nurses; 2018. Available from: <https://www.nmc.org.uk/globalassets/sitedocuments/standards-of-proficiency/nurses/future-nurse-proficiencies.pdf>. [Last accessed on 2021 May 04].
52. International Society of Nurses in Cancer Care. 2017-2021 Strategic Plan. About ISNCC – International Society of Nurses in Cancer Care; 2021. [https://cdn.ymaws.com/www.isncc.org/resource/resmgr/about\\_isncc/ISNCCStrategicPlan\\_FINAL.pdf](https://cdn.ymaws.com/www.isncc.org/resource/resmgr/about_isncc/ISNCCStrategicPlan_FINAL.pdf). [Last accessed on 2021 May 04].

## Appendix

### Appendix 1: MEDLINE searches

#### *Ovid MEDLINE(R) SEARCH ONE <2013 to March 31, 2021>*

- 1 (cancer or tumor or tumor or neoplasm or neoplasms or malignancy).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating subheading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
  - 2 (nutritional status or anorexia).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating subheading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
  - 3 exp Weight Loss/
  - 4 cachexia.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating subheading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
  - 5 (nutritional supplement or nutritional supplements or nutritional supplementation).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating subheading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
  - 6 (dietary supplement or dietary supplements or dietary supplementation).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating subheading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
  - 7 (nutritional assessment or nutritional or assessment).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating subheading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
  - 8 ((dietary assessment or dietary) and assessment).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating subheading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
  - 9 nutritional advice.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating subheading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
  - 10 dietary advice.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating subheading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
  - 11 (nutritional counselling or nutritional counseling or (nutrition and counseling) or (nutrition and counseling)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating subheading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
  - 12 (dietary counseling or dietary counseling or (dietary and counseling) or (dietary and counseling)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating subheading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
  - 13 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12
  - 14 1 and 2 and 13
  - 15 limit 14 to (English language and humans and year="2013 -Current") = 2717
  - 16 1 and 3 and 13
  - 17 limit 16 to (English language and humans and year="2013 -Current") = 687
  - 18 1 and 4
  - 19 limit 18 to (English language and humans and year="2013 -Current") = 1447
- All hits for the highlighted searches (15,17 & 19) were screened

**Ovid MEDLINE(R) SEARCH TWO <2013 to March 31, 2021>**

- 1 (cancer or tumor or tumor or neoplasm or neoplasms or malignancy).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating subheading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
  - 2 (eat or food or diet).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating subheading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
  - 3 exp Weight Loss/
  - 4 distress.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating subheading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
  - 5 (conflict or disagreement or disharmony).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating subheading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
  - 6 (self-assessment or self-assessment or self-evaluation or self-evaluation).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating subheading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
  - 7 (self-perception or perception or self-perception).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating subheading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
  - 8 4 or 5 or 6 or 7
  - 9 1 and 2 and 8
  - 10 limit 9 to (English language and humans and year="2013 -Current") = 264
  - 11 1 and 3 and 8
  - 12 limit 1 to (English language and humans and year="2013 -Current") = 42
- All hits for the highlighted searches (10 & 11) were screened

**Ovid MEDLINE(R) SEARCH THREE <2013 to March 31, 2021>**

- 1 Cachexia.mp. or Cachexia/
  - 2 emotion.mp. or Emotions/ or Positive Emotions/ or Negative Emotions/
  - 3 Multimodal Treatment Approach/ or multimodal.mp.
  - 4 psychosocial.mp. or Psychosocial Development/ or Psychosocial Readjustment/ or Psychosocial Assessment/ or Psychosocial Outcomes/ or Psychosocial Factors/ or Psychosocial Rehabilitation/
  - 5 psychoeducation.mp. or Psychoeducation/
  - 6 adaptation.mp. or Adaptation/
  - 7 2 or 3 or 4 or 5 or 6
  - 8 1 and 7
  - 9 limit 8 to (English language and yr="2013 -Current") = 148
  - 10 Treatment Compliance/ or adherence.mp. or Health Behavior/
  - 11 1 and 10 = 52
  - 12 Anxiety/ or Health Anxiety/ or anxiety.mp.
  - 13 "Depression (Emotion)"/ or Reactive Depression/ or depression.mp.
  - 14 Distress/ or distress.mp.
  - 15 12 or 13 or 14
  - 16 1 and 15
  - 17 limit 16 to (English language and yr="2013 -Current") = 114
- All hits for the highlighted searches (9, 11 & 17) were screened