

Mobile Nutrition Dietary Care: Nutrition Support for Cancer Patients: An Integrated Review

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Abstract

Background: The risk of malnutrition in cancer patients is higher than in patients suffering from other diseases. The effect of therapy is the cause of malnutrition problems. The current situation of the COVID-19 pandemic is increasing issues in health systems in various countries, so that the fulfillment of patient needs, especially the need for dietary therapy for chronic diseases such as cancer, is hampered.

Objective: This study aims to review the potential of Mobile Nutrition Dietary Care as a nursing model in providing nutritional support for cancer patients during the COVID-19 pandemic to prevent malnutrition based on home care.

Method: The method used is an integrative review by searching for study selection results on six databases of 2,697 articles from PubMed, SpringerLink, Cambridge core, NCBI, EBSCO, and Garuda. **Results:** It found several interventions, such as mobile health, dietary patterns in cancer patients, and the provision of additional nutrition. These interventions are proven to improve the nutritional status of cancer patients.

Recommendation: Mobile Nutrition Dietary Care is a nursing model that can support the nutritional status of cancer patients.

Keywords: Cancer, COVID-19, Malnutrition, Nutrition Therapy

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INTRODUCTION

Cancer is one of the biggest causes of death globally (1). Based on data from the World Health Organization (WHO), in 2020, there were almost 10 million deaths due to cancer (2). It is estimated that cancer deaths will grow to more than 13.1 million by 2030. Until 2020, the most common types of cancer are lung, breast, colorectal, and stomach cancer. The prevalence of cancer in Indonesia has increased from year to year. The prevalence of cancer in 2013, according to Riskesdas data, was 1.4% which then increased to 1.49% in 2018 (3). Based on the prevalence data above, two of the four most common types of cancer found are related to the gastrointestinal system or stomach and intestines, which will undoubtedly impact the process of nutrient absorption.

The nutritional problem commonly faced in cancer patients is the fulfillment of daily nutrition because it is challenging to receive food. The risk level of cancer patients is higher than patients suffering from other diseases, which is 1,509 times higher (4). The presence of oncogenes in the body and the therapeutic effects of treatment cause cancer sufferers to experience various nutritional problems. Cancer can affect the body's metabolic processes, such as changes in energy, carbohydrates, fats, proteins, and various other micronutrients (5). Changes in this metabolic process will undoubtedly affect the patient's nutritional status. Besides that, it can lead to dietary disturbances in the patient due to the malignancy of cancer cells, lack of food intake, psychological effects, and medical treatment (6). Giving chemotherapy as a treatment for cancer patients can have side effects on the gastrointestinal system, such as nausea, vomiting, stomatitis, anorexia, and changes in the taste of the food consumed. These side effects result in a decrease in nutritional intake in patients; besides that, the pathophysiology also triggers the inhibition of the digestive system (7,8). So, nutrition for the body's needs is needed to reduce the possibility of weight loss and further infection in cancer patients, which triggers the risk of malnutrition (5).

Malnutrition in patients with chronic disease or cancer is a complex clinical manifestation characterized by anorexia, drastic

weight loss, atrophy of skeletal muscles, immune system dysfunction, and various other metabolic problems (9). Malnutrition is when a person experiences nutritional deficiencies, inadequate vitamins or minerals, overweight, and non-communicable diseases related to diet (10). The prevalence of malnutrition in cancer patients depends on the type of tumor, the organ involved, the stage of the disease, the response to therapy, and the comorbidities (11). It is estimated that approximately 30-78% of cancer patients are malnourished in advance of treatment. Nearly 85% of patients with pancreatic and gastric cancers are underweight, 66% are lung cancer, and 35% are breast cancer patients (10). Thus, cancer patients are proven to have a high risk of malnutrition, so nutritional support is needed.

During the COVID-19 pandemic, nutritional support for cancer patients is ineffective. Newly diagnosed patients with malnutrition-related diseases, including cancer, should be prescribed on time and should receive proper dietary support from nutritionists and doctors, as this will affect the quality of life of these patients (12,13). The spread of the severe acute respiratory syndrome Coronavirus (CoV) 2 (SARS-CoV-2) since late 2019 has resulted in the global pandemic of Coronavirus disease 2019 (COVID-19) (14). The care of cancer patients during the COVID-19 pandemic is one of the main concerns, and this is because cancer patients have a high risk of contracting the infection. Health professionals must be aware of this. Therefore changing the treatment plan by suggesting home care services can prevent the spread of COVID-19 in cancer patients (15).

Continuity of care at home is one of the essential tasks of nurses, which can be done directly or indirectly (16). Indirect methods such as remote care through technology provide necessary care services to patients at home who do not have access to certain services (17). Home care management can be easier with current technological advances, namely telehealth, including telemonitoring, teleconsultation, telecare, and Tele-education. Telenursing involves using technological tools and facilities to provide remote healthcare (18).

However, telehealth, especially telenursing, is still rarely used in practice.

OBJECTIVE

To review the potential of Mobile Nutrition Dietary Care as a nursing model in providing nutritional support to cancer patients during the COVID-19 pandemic.

METHODS

Design

The design used in this literature is an integrative review. This integrative review reviews experimental and non-experimental research simultaneously to define concepts, review theories, review evidence or point out gaps in the literature, and analyze problems, according to Whitemore et al. (2005) (19).

Eligibility Criteria

The criteria in this study were studies in English and Indonesian with full text, randomized control trial research design, and intervention studies within the last eight years of publication from 2014 - to 2021 in adult patients with cancer.

Selection Process and Item Data

All authors completed the study selection process using the PRISMA Flow Diagram 2020

guide. The results of the journal selection obtain through keywords, then screened by looking at the inclusion criteria, title, and assessed for eligibility through JBI so they will get a decent journal.

Data Extraction and Analysis

Data extraction was used to extract data from the study results manually. The primary data taken from the articles obtained are the author and the year of research, research design, research location, number and characteristics of the sample, the intervention given, and the study results. The analysis was carried out using a qualitative descriptive approach with content analysis methods. This analysis activity includes reading, recording, rereading, identifying, classifying, discussing, presenting, and drawing inference.

RESULTS

Study Selection Result

The search results obtained six articles on Garuda, 2,083 articles on NCBI, 314 articles on Springerlink, 223 articles on Cambridge Core, 56 articles on EBSCO, and 138 articles on PubMed. The PRISMA 2020 diagram in Figure 1 displays the literature search results and the study selection process. 7 studies were suitable and worthy of further research.

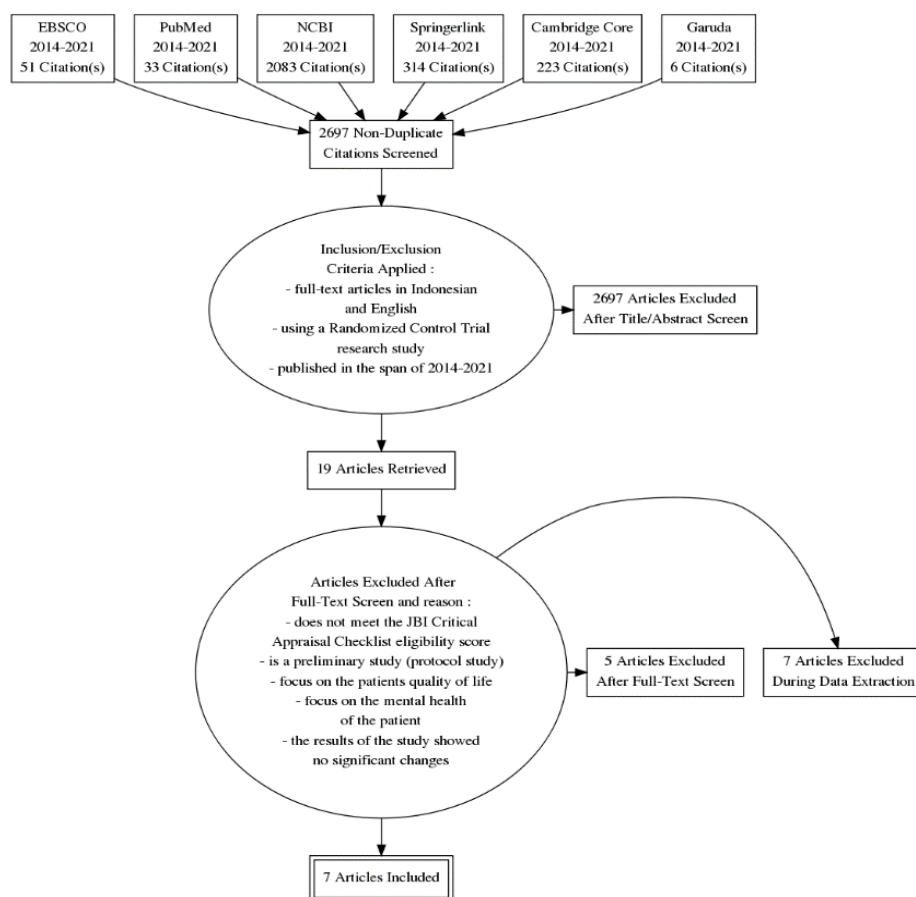


Figure 1. Feasibility & Inclusion Assessment Flowchart

Study Characteristics

The detailed study characteristics are taken in Table 1.

Table 1. Characteristics of included studies.

Author	Critical Appraisal Score	Study Design	Location	Sample	Aim	Results
Mobile Health						
Hou et al., 2020	100% (13/13)	RCT	Taiwan	One hundred twelve female breast cancer patients.	To evaluate the impact of using the BC SMS application on the quality of life of Taiwanese women after the initial diagnosis of breast cancer	Health status in the intervention group improved more significantly than in the control group.
Diet						
Britton et al., 2019	100% (13/13)	RCT	Australia	307 head and neck cancer patients.	To test the effectiveness of the EAT intervention.	Nutritional status in the intervention group was better than in the control group.

Leedo et al., 2017	84,6% (11/13)	RCT	Denmark	40 lung cancer patients.	To measure the effects of main meal and snack delivery versus dietary habits in malnourished lung cancer patients	The patient's nutritional intake improves, and lower body strength and performance improve.
Supplementary nutrition						
Oblong et al., 2019	92,3% (12/13)	RCT	Denmark	47 gastrointestinal cancer patients.	To evaluate the effect of home-added parenteral nutrition	There was an increase in fat-free mass and quality of life in the intervention group compared to the control group.
Kabata et al., 2015	76,9% 10/13	Prospective RCT	Poland	102 gastrointestinal cancer patients.	To assess needs and introduce preoperative nutritional support in cancer patients.	Supplementary nutrition is helpful to maintain a balanced nutritional status in patients.
Feijó et al., 2019	92,3% (12/13)	RCT	Brazil	68 gastric cancer patients.	To determine the effect of omega-3 supplementation on nutritional status, immune profile, and inflammation of gastric cancer patients	Supplementary nutrition has been shown to increase body weight and maintain a balanced dietary status.
Gavazzi et al., 2016	84,6% (11/13)	A Multicentre Randomised Clinical Trial	Italy	79 gastrointestinal cancer patients.	To evaluate the impact of home enteral nutrition on nutritional status	The results showed that the intervention group maintained stable body weight two months after surgery.

Result

Thema 1: Model and Effectiveness of Mobile Health in Cancer Patients

There is only one RCT study discussing the effect of mobile health support on nutrition in cancer patients. This application is used in breast cancer patients in Taiwan (20). The application developed is Breast Cancer Self-Management Support (BCSMS), which includes diet and nutrition features for breast cancer patients. The aspects assessed were the patient's functional scale, symptom scale, and global

health status. Overall, the results showed that intervention patients had more significant changes than control patients (8.98 for the intervention group and 3.93 for the control group).

Thema 2: Diet Pattern in Cancer Patients

Two RCT studies evaluate the impact of dietary interventions on the nutritional status of cancer patients. In the first study, the dietary intervention given was EAT (Eating as Treatment), by reshaping the patient's diet as

part of the treatment received by cancer patients with radiation treatment. This therapy applies cognitive behavior therapy (CBT) and interviews consultations conducted by nutrition experts. The results showed that patients receiving the EAT intervention had better nutritional status in critical end care compared to patients receiving only usual care ($\beta = -1.53$ [-2.93 to -0.13] = .03) (21). In a subsequent study, dietary patterns were provided with a collaborative delivery service to lung cancer patients with an NRS score of 3. Patients choose heavy meals (average energy 1,730 kJ (413 kcal)/serving, protein 17.4-18.0 g/serving) and light meals (average energy 701 kJ (168 kcal)/serving, protein 5.6-10.2 g/serving), which will be served and delivered to the house every day for 12 weeks. The results showed that the patient's nutritional intake improved, and the strength and performance of the patient's lower body increased.

Thema 3: Supplementary Nutrition for Cancer Patients

Four RCT studies examine the effect of supplemental nutrition or supplements on the nutritional status of cancer patients. The supplement contains 56.9 g of protein, 1070 kcal/4477 kJ of energy, and 40 g of fat per thousand ml. The study results showed that fat-free mass and overall quality of life improved in patients who received additional supplements compared to patients who did not receive supplements. Furthermore, the increase in physical function between groups was not much different in $p < 0.01$ values (22). In the second study (23), the intervention provided was dietary counseling and omega-three supplements in gastrointestinal cancer patients. There was an increase in weight gain in the

intervention group compared to the control group (1.2kg (0.9-9.0) vs. 0.7kg (0.4-1.3); $p=0.03$) and maintenance of nutritional status after supplementation 0.7kg (0.4-1.3); $p=0.03$) and maintenance of nutritional status after supplementation.

Subsequent studies (22) in malnourished gastrointestinal cancer patients were given supplementary nutrition with a standard polymer formulation providing 1-1.5 kcal/ml with 50-60% carbohydrates, 25-35% fat and 12-20% protein. After two months of the administration, the intervention group maintained their average body weight, while the control group lost 3.6 kg. A recent study (24) provided oral nutritional support for cancer patients in two bottles of Nutridrink Protein (200 ml) with a formula of 1.5 kcal/ml daily for 14 days before surgery. The results showed that albumin and total protein levels in the intervention group were stable. Transferrin and absolute lymphocyte count increased, unlike the control group, which experienced a significant decrease in each laboratory parameter.

DISCUSSION

Based on an integrative review of 7 related studies, we found three broad categories of interventions, namely mobile health for cancer patients, diet patterns for cancer patients, and providing additional nutrition (supplements) for cancer patients. These three findings can be collaborated and combined into Mobile Nutrition Dietary Care, a nursing model that can provide nutritional support to patients with cancer. The components identified in the findings section are used to build a conceptual framework, as shown in Figure 2.

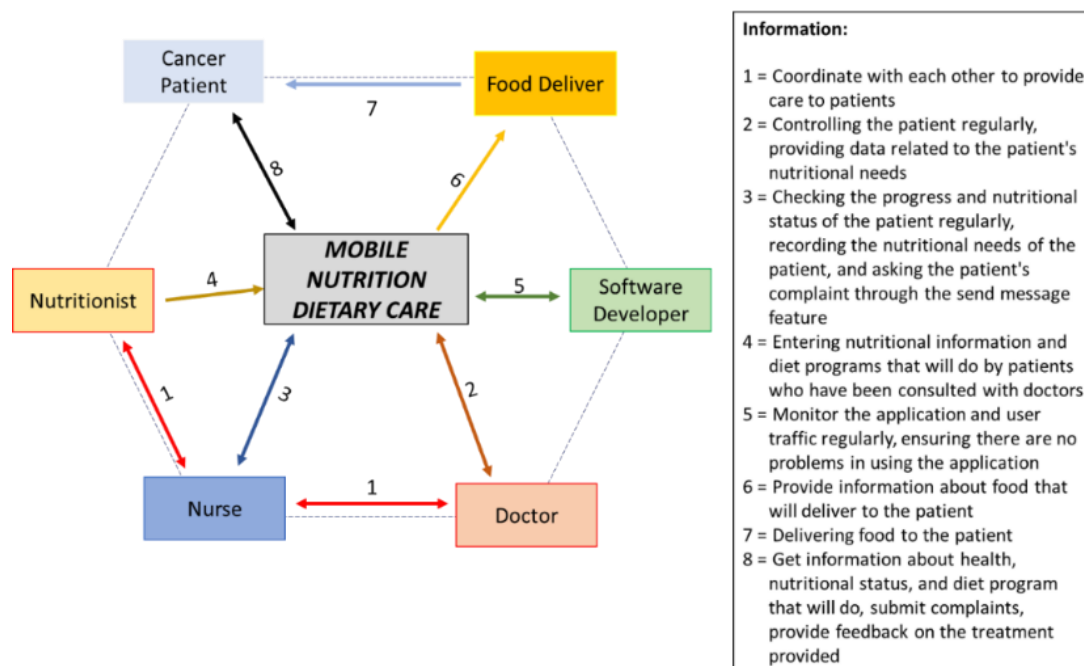


Figure 2. Mobile Nutrition Dietary Care Model

Our findings indicate that mobile health can effectively support patients with self-management of cancer that patients experience (20). This application contains several features such as (1) information about breast cancer, (2) diet and nutrition for breast cancer patients, (3) emotional support to prevent anxiety and depression, (5) personal health records for tracking treatment and side effects and sharing experiences, and (8) expert consultation. This will have a significant impact on improving the patient's status because patients diagnosed with cancer for the first time need knowledge about the disease and need to learn about self-management in cancer to live well (20). Using mobile health can facilitate the handling of nutrition for cancer patients, supported a Taiwanese study (20). Overall, the results showed that intervention patients had more significant changes than control patients (8.98 for the intervention group and 3.93 for the control group). Studies suggest that telehealth is an effective method of providing malnutrition-related interventions in older adults living at home and is likely to result in clinical improvement compared to usual care or no intervention (25). The telehealth method is considered adequate because it can save costs and be done anywhere and anytime.

Subsequent findings (26,27) suggest that dietary intervention has a positive effect on the nutritional status of patients. The intervention

(26) provides patients with motivation and CBT, which aims to reshape the patient's mindset to be more enthusiastic about living life by eating regularly. Furthermore, the patient changed his behavior according to the behavioral guidelines developed by the researcher. Those in the intervention group had significantly better nutrition than the control group. Intervention (27) presents a dietary intervention through a food delivery service rich in energy and protein. This intervention makes patients no longer confused in choosing and processing food ingredients that suit their energy needs. Giving the proper diet will help provide the patient with a positive response to the therapy given during treatment (28) because malnourished cancer patients must balance their diet. In practice, the dietary intervention allows it to apply in all health care settings. Through the settings provided, patients can easily adjust the standard diet. However, it is still necessary to regularly monitor the patient's condition evaluation by experts.

It is necessary to have optimal nutritional support by considering dietary needs and providing nutrients to cancer patients to support cancer treatment success (10). In his study (23), the addition of omega-three supplements could attenuate the inflammatory response in gastric cancer patients. Compared with gastric cancer patients who only received

regular nutritional interventions, they would not experience more severe cases of inflammation. Omega-3s are used for weight gain, reduction of inflammatory profiles, and maintenance of healthy and immune profiles of patients (23). Supplementary nutrition (29),(30) given according to expert advice can positively affect the nutritional status of cancer patients. In the study, Pawel Kabata (21) stated that nutritional status reduced the number of postoperative complications. According to international guidelines, it should be given 10-14 days before surgery. These guidelines apply to malnourished patients who require intensive nutritional support from a dietitian specialist, often in a hospital setting. According to the ESPEN guidelines, weight loss >10% in 6 months is a risk factor for postoperative complications and is a limiting value for malnutrition. Therefore, supplementation (21) in an additional nutritional drink with a formula of 1.5 kcal/ml every day for 14 days can positively affect the patient's condition after surgery.

This study found that mobile health is a feasible and cost-effective method for cancer patients to overcome their nutritional problems. Diet patterns and additional nutrition did not harm the food of cancer patients. Therefore, Mobile Nutrition Dietary Care can be a new nursing model for providing nutritional support to cancer patients. *Mobile Nutrition Dietary Care* is a mobile health application with a diet plan and information on the choice of additional dietary supplements, also equipped with features for food delivery services and consultations with experts. It is hoped that the nutritional status of patients can improve by utilizing internet facilities during the COVID-19 pandemic when conditions do not allow patients to come to the hospital directly. Although services can be provided online, nurses still have to directly ensure the patient's condition through regular home visits so that the patient's disease can also be known regularly.

LIMITATIONS

The limitations of this study are the short research time and the limited number of articles with RCT study designs that discuss interventions to improve nutrition in cancer patients, especially studies that examine the

effectiveness of using mobile health to improve nutritional status in cancer patients. These deficiencies may make our literature possible to miss some studies with other relevant research designs.

CONCLUSION

Overall, three interventions can improve nutritional status and prevent malnutrition in cancer patients that could apply at home during the pandemic, summarized into complementary therapy-based management by mobile health. Some therapies that can be done at home through mobile health include setting a diet pattern and adding supplements or additional nutrients. The nutritional status of cancer patients showed improvement after being given therapy. In this case, we have a model that can use as nutritional support to prevent malnutrition in cancer patients called Mobile Nutrition Dietary Care. Due to the COVID-19 pandemic and technological advances. Most Indonesian cities can already access the internet, such as mobile health, which includes providing diet menus that can customize to the type of cancer, blood type, and gender of the patient.

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