Critically Appraised Topic Template

Title: Energy conservation techniques are effective when integrated into traditional OT treatment protocols for cancer-related fatigue management.

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CLINICAL SCENARIO

Conditions/Problems:

- Cancer is characterized by the development of cells that divide uncontrollably and have the ability to aggressively expand and metastasize (What is Cancer?, n.d.). As the cells grow and divide, they clump together to form a mass, which is called a tumor. Cancer can occur anywhere in the body. The treatment of cancer depends on the specific type of cancer, its stage, if the cancer has metastasized and an individual's overall health (What is Cancer?, n.d.). One of the main cancer treatments is chemotherapy.
- Chemotherapy is the use of chemicals to kill cancer cells or slow their growth. Some chemo may be given via IV and others involve swallowing a pill (American Cancer Society, 2017). Chemotherapy drugs are useful for cancer that has metastasized because of the fact that chemotherapy drugs travel to nearly all parts of the body (American Cancer Society, 2017).
- Chemotherapy works by targeting rapidly dividing cells, which includes cancerous and healthy cells (Mayo Clinic, 2014). The mechanism of action of chemotherapy is the reason for many of its side effects. For example, low blood cell counts and nausea are caused, because bone marrow cells and stomach/intestinal cells are both rapidly dividing, respectively (Mayo Clinic, 2014). Some other side effects of chemotherapy include: nausea, vomiting, hair loss, fatigue and mouth sores (What is Cancer?, n.d.).

Incidence/Prevalence

- "In 2016, an estimated 1,685,210 new cases of cancer will be diagnosed in the United States and 595,690 people will die from the disease" (Cancer Statistics, n.d.).
- The incidence of new cancer cases among men and women is 454.8 per 100,000 each year (based on 2008-2012 cases) (Cancer Statistics, n.d.).
- The number of cancer related deaths is 171.2 per 100,000 men and women each year based on the 2008-2012 cases (Cancer Statistics, n.d.).
- The number of individuals who have survived a cancer diagnosis reached approximately 14.5 million in 2014 and is estimated to rise to almost 19 million by the year 2024 (Cancer Statistics, n.d.).
- Based on 2010-2012 data, approximately 39.6% of men and women at some point during their life will be diagnosed with cancer (Cancer Statistics, n.d.).

Impact of the Problem on Occupational Performance

- Household chores such as vacuuming, sweeping, mopping, dishes, and laundry due to fatigue and lack of endurance
- Grocery shopping due to fatigue and lack of endurance
- Financial management such as paying bills due to lack of concentration and chemo brain
- Work, depending on occupation could be affected by low immune system, lack of concentration, chemo brain, fatigue and lack of endurance.
- Reading a book or watching television due to lack of concentration

- Exercise due to fatigue and lack of endurance
- Socializing with friends due to feelings of depression
- Meal preparation and feeding due to nausea and loss of appetite

Intervention

- The intervention is fatigue management. One of the main interventions of fatigue management is energy conservation, which includes strategies such as priority setting, delegation, pacing oneself, and planning activities that require high energy at peak energy times throughout the day. The main objective of energy conservation is to balance rest and activity so that goals and activities can still be accomplished (Barsevick, Dudley, Beck. Sweeney, Whitner, Nail, 2004).
- The intervention schedule was composed of three different stages. In the first stage information was provided to aid in the formation of an accurate representation of the symptom of fatigue. The second stage included formulating and implementing a plan for energy conservation and then the effectiveness of symptom management techniques was appraised as the final step. These stages were completed via telephone conversations, and homework where the participants recorded in a journal their symptoms and plans (Barsevick et. al., 2004).

OT Theoretical Basis

- The theoretical model that best supports fatigue-management as an intervention is the rehabilitation frame of reference. Through this frame of reference, the client is performing physical occupations, coupled with appropriate rest periods in order to improve overall endurance levels. By grading the intensity and duration of activity during the day, and teaching a client how to recognize activities that are more strenuous, a client receiving chemotherapy can develop more tolerance to physical activity/occupations that impact and decrease energy levels. Finally, this frame of reference helps to describe the intervention, because it theorizes that a body must have period of rest in order to facilitate effective occupational performance (Reed, 2002). A second theory that helps establish the fatigue-management intervention, is the self-regulation theory. This nursing based theory, as the name implies, involves the client monitoring and evaluating how certain behaviors affect their health- in this case, their energy levels. This theory also posits that a client will develop and plan ways to distribute available energy throughout the day, will appraise their plans, and will change the action plan to accommodate a need for a different distribution of energy (Reuille, 2002).

Science Behind the Intervention

- The muscles are experiencing fatigue more rapidly with the chemotherapy treatment due to oxidative stress. This is an imbalance in the body between its production of free radicals and antioxidant defenses (Betteridge, 2000). Chemotherapy targets and destroys cells that are rapid in division. It is successful in killing off cancer cells but it also kills healthy cells. RBC's are targeted because they divide rapidly. With a decreasing RBC count the tissues aren't receiving as much oxygen from the lungs (Mayo Clinic, 2016). Oxygen is used to break down glucose and create fuel for your muscles, called ATP. With limited ATP, the muscle isn't able to function properly causing overall fatigue of the muscles (Mayo Clinic, 2016).
- Cancer patients with active treatment of chemotherapy complain about the severity of fatigue and its symptom distress was associated with strongly decreased quality of life and functional status. The intervention of fatigue management focuses on managing fatigue through planning, pacing oneself, prioritizing and delegating activities to that activities can be

accomplished. The science behind fatigue management is to balance rest and activity so that main goals can be completed.

Why is this intervention appropriate for OT?

- The energy conservation techniques for patients with cancer-related fatigue aims at improving occupational performance in activities of daily living and instrumental activities of daily living located in the Occupational Therapy Framework (2014). The focus for the intervention is to participate in meaningful occupations by distributing energy for activities and being aware of signs and symptoms of fatigue.

FOCUSED CLINICAL QUESTION:
In patients receiving cancer treatments (chemotherapy, radiation, or a combination), how do energy conservation techniques compared with exercise affect energy levels within two weeks?

SEARCH SUMMARY:
Fatigue management OR energy conservation, cancer patients OR oncology patients OR patients with cancer, quality of life OR well being OR well-being, occupational therapy OR occupational therapist OR OT, cancer-related fatigue using EBSCOhost CINAHL and MEDLINE.

CLINICAL BOTTOM LINE:
Evidence supports the use of energy conservation techniques as an adjunctive treatment approach. The techniques and education are shown to be more beneficial when integrated into traditional OT treatment protocols for cancer-related fatigue management. Overall, due to a minimal amount of literature and support about the use of energy conservation techniques as a primary treatment- as well as limited studies, in which the researchers control for the use of other clinical-based treatment intervention- energy conservation techniques should be a supplemental portion of the entire treatment session/duration.

Limitation of this CAT: This critically appraised paper (or topic) has been reviewed by occupational therapy graduate students and the course instructor. There are limited number of articles that specifically address cancer related fatigue. Cancer related fatigue is a complex symptom which appears to also be highly correlated to psychosocial factors such as depression, anxiety and level of exercise. Due to the multifaceted nature, it does appear that providing interventions which address them also improves quality of life and reports of fatigue. Lastly, the articles included participants that were predominantly female, which could have impacted the results.

TABLE 1: SEARCH STRATEGY

Search Terms	Inclusion and Exclusion Criteria
“Fatigue management" "energy conservation" "cancer patients" "oncology patients" "patients with cancer" "quality of life" "well being" "well-being" "occupational therapy" "occupational therapist" "OT" "cancer-related fatigue"	Inclusion criteria: Free full text English only Peer reviewed

TABLE 2: SUMMARY OF STUDY DESIGNS OF ARTICLES RETRIEVED

Level	Study Design/ Methodology of Articles Retrieved	Total Number Located	Citation (Name, Year)
1a	Systematic Reviews or Metanalysis of Randomized Control Trials		
1b	Individualized Randomized Control Trials		-Barsevick, A., Dudley, W., Beck, S., Sweeney, C., Whitmer, K., & Nail, L. (2004) -Sadeghi, E., Gozali, N., & Moghaddam Tabrizi, F. (2016).
2a	Systematic reviews of cohort studies		
2b	Individualized cohort studies and low quality RCT’s (PEDro ≤4)		
3a	Systematic review of case-control studies		
3b	Case-control studies and non-randomized controlled trials (quasi experimental or clinical trials)		-Reif, K., de Vries, U., Petermann, F., & Görres, S. (2013).
4	Case-series and poor quality cohort and case-control studies		

5	Expert Opinion		-Curt, G., Breitbart, W., Cella, D., Groopman, J., Horning, S., Itri, L., Johnson, D., Miaskowski, C., Sherr, S., Portenoy, R., & Vogelzang, N. (2000). -Saarik, J., & Hartley, J. (2010)

Studies Include: Although we had five studies that were relevant, we chose to include two randomized control studies and one qualitative study. The qualitative study was selected due to the value of understanding how cancer related fatigue affects all aspects of an individual's life.

	Effects of Energy Conservation Strategies on Cancer Related Fatigue and Health Promotion Lifestyle in Breast Cancer Survivors: A Randomized Control Trial	A Randomized Clinical Trial of Energy Conservation for Patients with Cancer-Related Fatigue.	Impact of Cancer-Related Fatigue on the Lives of Patients: New Findings from the Fatigue Coalition
Design	RCT	RCT	Descriptive Study (Survey)
Level of Evidence	1b (moderate)	1b (moderate)	5
Rigor Score	PEDro Scale – 11/11	PEDro Scale – 6/11	CASP 9/10 quality indicators were selected as "yes"
Population	135 women were selected and met inclusion criteria	396 Participants receiving chemotherapy, radiation therapy, or a combination therapy treatment	379 patients with cancer who received chemotherapy alone or with radiotherapy. 53% of patients only received chemotherapy, 47% had a combination of chemotherapy and radiotherapy. 40% had chemotherapy in the last two years, the remainder had chemotherapy at least two years ago. Median age of 62 years old.
Inclusion/Exclusion	Inclusion Criteria: (1) diagnosis of primary,	Inclusion criteria: Currently beginning	Inclusion:

	biopsy-proven breast cancer, Stage I through IIIA (2) normal blood pressure (BP less than 130/90 mmHg) and hemoglobin level was at least 11.6 g/mL (3) not having any other major medical complications likely to limit life expectancy to less than 10 years (4) without a history of major psychiatric illness for which the patient was hospitalized or medicated (5) no treatment for anemia or depression during the previous 3 weeks. Participants were randomized to be in intervention group IG (n=69) or in control group CG (n=66). Intervention group received energy conservation whereas control group received routine care.	treatment for breast, colorectal, lung advanced prostate, gynecologic, or testicular cancer and planned to receive at least 3 cycles of chemotherapy treatment, 6 weeks of radiation therapy, or both treatments. Exclusion criteria: If treatment plans included stem cell transplantation, interleukins, interferon, or tumor necrosis factor, and could not have initiated treatment for anemia/depression during the 3 weeks prior to the study. Participants were also excluded if they had chronic fatigue syndrome, were receiving psychoeducational interventions, or had overt evidence of a psychiatric disorder	Had to have cancer and undergone either chemotherapy alone or in combination with radiotherapy
Intervention Investigated	Energy conservation consisting of five weekly sessions for 90 minutes each. Participants were guided to have an accurate representation of the symptom of fatigue, lead the development and implementation of a plan to conserve energy and evaluate the effectiveness of the new efforts.	Energy Conservation and Activity Management (ECAM)- Through 15-30-minute phone consultations, this intervention guided participant through 3 stages of information processing; Forming an accurate representation of the symptom of fatigue, guide the formation and implementation of a plan for energy conservation, and	The intervention included a 25-minute interview, which included approximately 50 questions. Patients were asked background questions on their current condition, medical history, and how often they experienced fatigue. The fatigue questions examined the impact of fatigue on daily functioning, which included factors like physical, mental/emotional,

		appraise the effectiveness of symptom-management efforts. Comparison Intervention: Control population received information about nutrition and a healthy diet. Amount of time spent during phone consultations was similar to that of experimental group.	behavioral/social, and occupational/economic effects. Additionally, they were asked questions about how fatigue and treatment affected primary caregiver's occupational/economic stability.
Dependent Variables	Cancer-related fatigue and health promotion behavior	Perception of fatigue and functional performance	Cancer-related fatigue
Outcome Measures	General Health Questionnaire (GHQ 28) Cancer Fatigue Scale (CFS) Health promoting lifestyle Scale	Profile of Mood States- short form (POMS-SF), Schwartz Cancer Fatigue Scale (SCFS), General Fatigue Scale (GFS)	N/A
Results	Some participants missed at least one session for different reasons. In the intervention group cancer related fatigue was reduced from pre- to post- intervention and then continued to reduce over the 8-week follow-up period. The control group received a slight increase but not significant in Cancer fatigue scales (CFS) levels over time. Changes in health promotion life style questionnaire indicate a significant promotion from pre-to post-intervention, and then continued to rise over the 8 week follow up	Some participants missed at least one session for different reasons. In the intervention group cancer related fatigue was reduced from pre- to post-intervention and then continued to reduce over the 8-week follow-up period. The control group received a slight increase but not significant in Cancer fatigue scales (CFS) levels over time. Changes in health promotion life style questionnaire indicate a significant promotion from pre-	Of the 301 patients who reported fatigue, 275 (91%) of them said it prevented them from leading a "normal" life and 266 (88%) participants noted fatigue affected their daily routine. The activities affected by fatigue include walking distances, general household chores, cleaning, social activities, exercise, and food preparation. On average, when fatigue was present, participants reported only being able to complete 55% of normal activities

	period. The largest effect was seen in the interpersonal relations subscale. Scores in the control group did not change.	to post- intervention, and then continued to rise over the 8 week follow up period. The largest effect was seen in the interpersonal relations subscale. Scores in the control group did not change.	Of the 177 participants who were employed, 75% changed their employment status due to fatigue Fatigue led to an average of 4.2 sick/vacation days per month Forty-five percent of participants believed there was no treatment available to decrease or relieve fatigue Of the participants that asked about fatigue relief, 40% reported no options were offered
Effect Size	Partial eta-squared .2 indicated a large effect for cancer related fatigue reducing from pre- to post- intervention.	N/A	N/A
Conclusion	The study showed that the administering of energy conservation strategies had effectiveness in reducing the statues of cancer related fatigue and health promotion in patients with breast cancer following intervention versus the control group of routine care.	The ECAM intervention demonstrated a significant decrease in cancer-related symptoms and an increase in energy-conservation tactics used following chemotherapy, radiation therapy, or a combination of the two treatments. The current study did not find a significant result with respect to the primary measure of functional performance, and further research is needed to analyze the change in	Cancer-related fatigue is a common symptom seen, regardless of treatment type. Fatigue can be pervasive, which affects individuals' physical and psychosocial wellbeing, as well as their ability to work.

		functional performance that could result from ECAM interventions. In future studies, it is important to address and manage the other symptoms associated with cancer treatments.	

Synthesis Section:

PICO Question: In patients receiving cancer treatments (chemotherapy, radiation, or a combination), how do energy conservation techniques compared with exercise affect energy levels within two weeks?

Overall Conclusions:

Results: Similar Findings:

- All three studies analyzed and described the effects of cancer-related fatigue. The Barsevick et al. and Sadeghi, Gozali, & Moghaddam Tabrizi studies specifically looked at the effects of providing energy conservation techniques to clients experiencing cancer-related fatigue. Randomized control trials performed by Barsevick *et al*. and Sadeghi, Gozali, & Moghaddam Tabrizi, determined that energy conservation techniques showed significant improvements in cancer-related fatigue by the end of their treatment sessions. For the study performed by Barsevick *et al.*, results were modest, but significant, resulting in an effect size of d= 0.273 and d= 0.078, for follow up evaluations 1 and 2. The study performed by Sadeghi, Gozali, & Moghaddam Tabrizi, resulted in a partial eta-squared of 0.2, which indicated a large effect size and stronger clinical and statistical significance. Additionally, these studies determined that the energy conservation strategies helped to reduce the overall disruption of normal, everyday activities, and promoted healthy participation in occupations.

Results: Differences:

- Demographics: The Barsevick et al. study had 396 participants of both genders that were receiving chemotherapy, radiation, or a combination of the two, for a variety of different types of cancer. The study completed by Sadeghi, Gozali, & Moghaddam Tabrizi had 135 women participants that were diagnosed with breast cancer and currently undergoing chemotherapy treatment. The Curt et al. study had 379 participants received either chemotherapy or a combination of chemotherapy and radiation with over half of the participants receiving treatment more than two years previously.
- Treatment dosage: Each of the studies varied in the amount the experimental group received treatment. The participants in the Sadeghi, Gozali, & Moghaddam Tabrizi study received energy conservation training for 5 weekly sessions each consisting of 90 minutes. The treatment sessions were in group discussions and required homework between meetings (Sadeghi et al., 2016). The Barsevick et al study consisted of 3 phone sessions with the first two lasting 30 minutes and the last one lasting 15 minutes. The Curt et al. study consisted of a one-time, twenty-five-minute phone interview with approximately 50 questions.

- Outcome Measures: The Sadeghi, Gozali, & Moghaddam Tabrizi study used the General Health Questionnaire, the Cancer Fatigue Scale, and the Health Promoting Lifestyle Scale. The Health Promoting Lifestyle Scale was used to determine if energy conservation techniques impacted health related lifestyle. The Barsevick et al. Study used the Profile of Mood States-short form, Schwartz Cancer Fatigue Scale, General Fatigue Scale, and Functional Performance Inventory. The Functional Performance Inventory was used to measure much CRF limited functioning in valued activities. The Curt et al. Study did not utilize an outcome measure, because it was a one-time interview.
- Blinding: The study completed by Sadeghi, Gozali, and Moghaddam was double-blinded; however, the therapist, that was providing the intervention, was not blinded. The Barsevick et al study never disclosed if the research was double-blinded or not.
- Qualitative Information:
  The Curt et al. found the following:
  - Of the 301 patients who reported fatigue, 275 (91%) of them said it prevented them from leading a "normal" life and 266 (88%) participants noted fatigue affected their daily routine.
  - The activities affected by fatigue include walking distances, general household chores, cleaning, social activities, exercise, and food preparation.
  - On average, when fatigue was present, participants reported only being able to complete 55% of normal activities
  - Of the 177 participants who were employed, 75% changed their employment status due to fatigue
  - Fatigue led to an average of 4.2 sick/vacation days per month
  - Forty-five percent of participants believed there was no treatment available to decrease or relieve fatigue
  - Of the participants that asked about fatigue relief, 40% reported no options were offered
- Statistical analysis: Sadeghi, Gozali, and Moghaddam reported an effect size of 0.2 using partial eta squared indicating a large effect for reducing cancer related fatigue from pre to post intervention. The study performed by Barsevick *et al.*, showed a large effect size at both follow-up points (d= 0.27: Follow-up 1, d= 0.08: Follow-up 2), based on the results that were obtained. This indicates that the treatment had a large effect on reducing the symptoms of cancer related fatigue, as the participants progressed through the study from the pre-test to each of the follow-up points. Finally, the qualitative study performed by Curt *et al.* only reported nominal data and descriptive statistics on demographic variables. For this reason, we are unable to evaluate or report on the effectiveness of the study and how the protocol affects cancer-related fatigue.

Boundaries: The studies that were analyzed incorporated patients receiving all types of cancer treatment (chemotherapy, radiation therapy or a combination). Additionally, the current analysis did not differentiate between the specific types of cancer, and included patients who received treatment for a majority of cancer diagnoses (breast, colon, liver, etc.).

Implications for Practice: Energy conservation as an intervention focuses primarily on implementing a plan to prioritize and manage energy to participate in meaningful occupations. This plan consists of analyzing daily routines and structuring activities based on energy demands. The individual is educated on the biological signs and symptoms of fatigue and is provided with ways to manage these symptoms and adapt the more fatiguing tasks to help maximize participation.

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Critiqued Articles

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Related Articles (Not Individually Appraised)

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