

CHEMOTHERAPY EDUCATION: STANDARDIZING EDUCATION
AND IMPROVING KNOWLEDGE RETENTION
THROUGH MULTIMEDIA PLATFORM

by

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ABSTRACT

Patients with a new diagnosis of cancer undergoing chemotherapy treatment receive an overwhelming amount of information at the start of their journey. At a northcentral Montana healthcare agency, it was observed that patients were not retaining the chemotherapy education provided to them, which can negatively impact their timeliness of recognizing and reporting symptoms. The purpose of this project was to determine best practice, standardize the chemotherapy delivery process, and implement multimedia into chemotherapy education delivery in hopes of improving knowledge retention. A chemotherapy education checklist was developed to standardize the information delivered to patients during their chemotherapy education. Prior to their education, patients were asked to answer a seven-question pretest. Before their first day of treatment, patients followed a link to watch the *Chemotherapy Basics* video created by the Cleveland Clinic. On their first day of treatment, patients answered the same seven-question post-test and their scores were analyzed. Patients showed improvement in their post-test scores after the education intervention. The results of this project suggest that the addition of multimedia to the chemotherapy education process coupled with a standardized education checklist improves knowledge retention of patients.

INTRODUCTION

Background

Patient education is a mainstay of the nursing profession. Regardless of the setting, nurses are continually educating patients on disease processes, procedures, medications, and plans of care. When done effectively, education can increase medication compliance, improve patient safety, and improve patient satisfaction (Kean, Iverson, & Boylan, 2016). When a life-threatening illness occurs, delivering education to patients and their families can be difficult, but is exceedingly important. One disease that continues to affect Americans is cancer. An estimated 1,735,350 new cancer diagnoses occur annually from which 609,640 people will die (National Cancer Institute, 2018). It is projected that 5,920 new cancer diagnoses will be made in Montana in 2019 (American Cancer Society, 2019). Nationwide, the top three cancers diagnosed will be breast, lung, and prostate (American Cancer Society, 2019). At a Montana healthcare agency, yearly estimates of new cancer diagnoses and most prevalent types of cancer treated are not tracked. However, anecdotal observations suggest the top three cancers treated at the facility include lung, breast, and colorectal cancer.

Navigating a cancer diagnosis is complex and typically requires an entire healthcare team with multiple appointments, therapies, and complex treatment regimens. Recognized as an Oncology Nursing Society (ONS) standard of care, patient education is a crucial part of oncology care (Kee-Schroeder et al., 2013). Oncology nurses are well suited to provide patients and families with chemotherapy education, but often find the

patient and family so overwhelmed by the diagnosis that retention of the education can be variable.

At one local healthcare agency, chemotherapy education timing, instruction, and retention has great variability. Currently, no process is in place to determine when a patient will receive chemotherapy education. It may occur several days to a week before the planned treatment or, in other cases, on the day of treatment. In addition, many chemotherapy regimens require pre-medications that may alter a patient's ability to comprehend and retain information. Lastly, although the oncology nurses providing the education utilize the same basic handout for teaching, there is a lack of standardization in what education the patient receives. Delivering concise, consistent, and relevant patient education is crucial (Fee-Schroeder, 2013). Early recognition of symptoms and knowing when to call the provider or go to the Emergency Department (ED) are crucial pieces of patient education that can potentially prevent a fatal complication.

Problem

Best practice in the provision of chemotherapy patient education has not been established in the outpatient care setting of one local healthcare system. Continued lack of standardized best practice in the provision of chemotherapy patient education will negatively impact both patient safety and patient knowledge retention.

Purpose

The purpose of this quality-improvement project is to determine best practice, establish a standardized chemotherapy education process that includes the use of multimedia, and evaluate patient knowledge and patient satisfaction.

Assumptions and/or Definitions

Nurses strive to provide quality, accurate, and evidence-based chemotherapy education to all patients and their families. Patients are active participants in their care and want to understand how chemotherapy works and the expected side effects of treatment. Patients will have greater retention of information when given through verbal, written, and multimedia platforms.

Definitions

Chemotherapy: “treatment that uses drugs to stop the growth of cancer cells, either by killing the cells or by stopping them from dividing. Chemotherapy may be given by mouth, injection, or infusion, or on the skin, depending on the type and stage of the cancer being treated. It may be given alone or with other treatments, such as surgery, radiation therapy, or biologic therapy” (National Cancer Institute at National Institute for Health, 2018, para. 1).

Multimedia: “a technique (such as the combining of sound, video, and text) for expressing ideas (as in communication, entertainment, or art) in which several media are employed” (Merriam-Webster, 2018, para. 2).

Oncology nurse: “a nurse who specializes in treating and caring for people who have cancer” (National Cancer Institute at National Institute for Health, 2018, para. 1).

Patient education: “teaching of the patient; process of assisting the patient to gain knowledge, skill, and a value or attitude related to a health problem or for health promotion” (Medical Dictionary for Health Professionals and Nursing, 2012, para. 1).

Retention: “an ability to retain things in mind” (Merriam-Webster, 2018, para. 2).

REVIEW OF LITERATURE

Introduction

The vast majority of chemotherapy treatment can now be done in the outpatient setting. Although this is more convenient for patients and families, adding provision of patient education can be difficult for nursing staff in a busy infusion suite. Often times, patients and their families are seen by the physician and brought back to the infusion suite to have their chemotherapy education. The majority of the time, the patient has already received a tremendous amount of information from the physician and now is being given more information regarding drugs they are going to receive and expected side effects. Unfortunately, this raises concern over the ability of the patient to retain vital information. The literature was searched to investigate how chemotherapy education should be delivered, the time at which it should be delivered, and what types of education materials should be used.

Data Sources and Searches

A literature review was conducted using the following databases: CINAHL (via EBSCO) 2008 to present, Cochrane Library 2008 to present, Joanna Briggs Institute 2008 to present, and Springer Link 2008 to present. The search terms included “chemotherapy” and “education,” “chemotherapy” and “teaching,” and “standardization” and “patient education.”

Effective Patient Education

The determination of best practice in the provision of chemotherapy patient education is a relevant and timely topic in oncology nursing literature. Patients and families experience high levels of anxiety during their cancer journey and education can help to reduce those fears (Valenti, 2014). Patients who experience anxiety often have difficulty retaining information, but giving adequate time to have questions answered throughout their treatment assists patients through this process (Valenti, 2014).

A literature review conducted by Garcia (2014) identified strategies to lessen anxiety in patients beginning chemotherapy. Several factors can lessen the anxiety according to Garcia (2014). Considerations related to chemotherapy patient education should include anticipated side effects, details of the treatment room, timing in relation to the initiation of therapy, the format of education materials, the use of a quiet environment, and the expertise of educated oncology nurses (Garcia, 2014).

Fee-Schroeder et al. (2013) identified variation in teaching styles of nurses providing chemotherapy education. This led a team at a large healthcare facility to develop an evidence-based curriculum for nurses providing chemotherapy education (Fee-Schroeder et al., 2013). An eleven-minute video was created to address common chemotherapy concerns such as blood counts, bowel changes, hair loss, and emotional changes (Fee-Schroeder, 2013). The video, *Managing Chemotherapy Side Effects*, was used as a foundation for the chemotherapy course. At an eight-week follow-up, the majority of participants reported using strategies gained during the course to manage side effects. Fee-Schroeder et al. (2013) report, through the use of the DVD-facilitated

discussions between patients and nursing staff, nurses conducting the course were viewed as content experts and the DVD allowed consistent information to be presented.

Expected side effects of chemotherapy make up a large portion of the education given to cancer patients. By knowing what to expect ahead of time, it is anticipated that patients will be able to recognize symptoms early and seek intervention if necessary. Olver et al. (2018) conducted a study at six clinics in Australia to determine which action a patient would take with normal chemotherapy side effects as well as actions for life-threatening side effects. The life-threatening side effects asked about in the study included high fever and unusual bleeding or bruising. The study found that 67% of patients reported they would go to the hospital for high fever, but only 41% reported seeking medical attention for bleeding or bruising (Olver et al., 2018), which suggests patients may require more information on side effects of chemotherapy as well as when to seek medical attention.

In a qualitative study conducted by Lambourne et al. (2018), the authors sought to determine the experiences of patients receiving oncology and chemotherapy education at a Canadian health facility. Twenty-one oncology patients were included in the qualitative review and four major themes resulted from the study. These themes included: preparing for what lies ahead, bridging the information gaps, understanding the education needs of patients, and experience within the healthcare system (Lambourne et al., 2018). Specifically, patients reported difficulty with retention when too much information was provided at once, appreciation for reiteration of education material in a variety of methods, and a desire for active participant in their care (Lambourne et al., 2018). Based

on this information, the healthcare agency learned how to optimize the oncology education provided to patients.

Bates (2016) discusses the high levels of anxiety cancer patients experience and the impact of chemotherapy education on anxiety. At the University of Washington, chemotherapy education timing is unstructured and may occur in the oncology office or the infusion suite (Bates, 2016). In hopes of minimizing anxiety and to provide structure for new patients and nursing staff, one-hour pretreatment education sessions were scheduled. Patients who attended the scheduled sessions reported higher knowledge of chemotherapy, side effects, and healthcare support (Bates, 2016). In addition, 6% of participants who completed the pre- and post-test surveys reported an overwhelming anxiety prior to education and 0% reported overwhelming anxiety following the intervention (Bates, 2016). It was concluded that scheduled and structured pre-chemotherapy education sessions have an impact on patient knowledge and anxiety (Bates, 2016).

Retention

In addition to identifying the needs of patients receiving chemotherapy education, Kinnane, Stuart, Thompson, Evans, and Schneider-Kolsky (2008) evaluated whether retention rates of education related to side effects and management of chemotherapy side effects was improved after providing a video as part of chemotherapy education. Treatment groups were randomized to either receive standardized chemotherapy education or standardized chemotherapy education with the addition of the *Staying Well*

During Chemotherapy video. The ten-minute video was created by the authors with the aim to assist patients in understanding chemotherapy side effects and how to manage symptoms at home (Kinnane et al., 2008). The study concluded that patients who received standard chemotherapy education plus the addition of the video had higher rates of retention and had more timely reporting of side effects.

A pilot study conducted by Thompson, Silliman, and Clifford (2013) discovered similar results in regard to improving knowledge retention through use of video supplementation. The authors investigated the use of a DVD to help increase knowledge about nutrition for patients undergoing chemotherapy. Participants in the study were asked to fill out a short survey regarding current knowledge, demographic, and health-belief information. They were then asked to watch the DVD *Supportive Care: Managing Nutrition Related Side Effects During Chemotherapy*, which described side effects and helpful tips. Patients were then asked to complete a follow-up survey. The study found that there was a significant increase in the knowledge of participants following the video intervention.

Chemotherapy education and retention can vary from patient to patient based on their personal experiences, previous knowledge, willingness to learn, and the nurse providing them education. Because there is no way for each patient to have the same knowledge base, standardizing chemotherapy education and eliminating variation can be implemented to minimize gaps. In the article by Dalby et al. (2013), chemotherapy education was standardized at oncology clinics in order to improve patient satisfaction scores. Oncology nurses provided chemotherapy education to patients prior to treatment

using a chemotherapy education checklist and then patients were asked to complete a survey regarding their education experience at their third infusion visit. The study found that patient satisfaction scores, as well as staff satisfaction, increased following implementation of the checklist.

Theoretical Framework

The project utilizes two theoretical frameworks to guide the project. The first is the health-promotion nursing model created by Nola Pender. The health-promotion model is based upon the assumptions that 1) individuals can regulate their behavior, 2) individuals continually interact and transform their environment, 3) healthcare professionals influence an individual's environment, and 4) individuals are motivated to engage in behaviors that will benefit them (Nursing theory, 2016). Pender's theory assumes that patients diagnosed with cancer will be active participants in their education and care, are motivated to retain the information presented during their education session, and that nurses play a key role in producing an environment that is conducive to learning.

The project is further guided by the cognitive theory of multimedia learning (Mayer, 2014). Suggesting that people learn better through words and pictures than with words alone, Mayer's theory illustrates information can be processed through auditory and visual channels, each having a finite capacity, and that learning is a process of actively filtering incoming information and then integrating that information based on preexisting knowledge (Mayer, 2014; David, 2015). This project utilizes the cognitive theory of multimedia learning by evaluating a patient's current knowledge base prior to

education and then implementing education provided by auditory and visual means. It is assumed that, by providing information through both auditory and visual channels, patients will have greater knowledge retention as well as be able to build upon their current knowledge base of how chemotherapy works and common side effects.

METHODS FOR PROJECT IMPLEMENTATION

Design/Approach

A nonexperimental, mixed-methods approach was used for this quality-improvement project based upon concepts associated with Pender's health-promotion model and Mayer's (2014) cognitive theory of multimedia learning and the use of visual and written materials. Standardization of chemotherapy education material for nursing staff was developed by adapting, with permission, the chemotherapy education checklist from Dana-Farber Cancer Institute (2018). The checklist, evaluated by agency staff nurses prior to implementation, was used in this project. The standardized chemotherapy education included both verbal and written formats followed by a video that covers signs and symptoms, what to watch for, and when to seek medical attention.

Protection of Human Subjects

Institutional Review Board (IRB) approval from Montana State University and agency authorization was obtained in January, 2019, prior to project implementation. Registered Nurses (RNs) participating in the standardization of chemotherapy teaching were included in IRB approval. Minimal risk of this project to participants was identified and their information was protected. Study information and an informed consent was reviewed and signed by the patient prior to participating in the project.

Sampling Plan

Patients eighteen years or older, new to the agency, with a new diagnosis of cancer or a cancer recurrence were eligible for the project. Patients were included if they were receiving cytotoxic chemotherapy. Patients were evaluated for their ability to follow instructions to a web link, have a device with access to the internet, and have internet speed of at least two megabits per second. New diagnosis is defined as a diagnosis of cancer within one month. Patients were excluded from the project if they were receiving immunotherapy, oral chemotherapy only, received chemotherapy on the day of their chemotherapy education, or were considered an emergent case.

Instrumentation

Teaching materials and retention of material were evaluated through a short pre- and post-test of seven questions and a post-test evaluation (Appendix A). The standardized chemotherapy education checklist (Appendix B) was developed prior to implementation in order to decrease variability in education among nursing staff. The standardized chemotherapy checklist was evaluated by two experienced oncology RNs prior to its implementation. The RNs reviewed the symptoms that constitute medical attention and the flow of the education checklist. Patient demographic data was not collected during implementation of the project.

Data Collection Procedures

Eligible patients received chemotherapy teaching by an agency infusion RN. If patients were not brought back to the infusion suite for chemotherapy education, nursing staff called the patient to set up a time for their education prior to coming in for treatment. Prior to their education, patients were asked to fill out a seven-question questionnaire to determine their current knowledge base. Following completion of the questionnaire, chemotherapy education was provided by an oncology RN and included handouts regarding how chemotherapy works, specific chemotherapy drug information, and follow-up contact information. Following the teaching, the patient was asked to follow a web link to YouTube to watch the *Chemotherapy Basics* video (Chemocare, 2018). The *Chemotherapy Basics* video was created by the Cleveland Clinic and reviewed by a multidisciplinary team at Cleveland Clinic (Chemocare, 2018). Its use was granted for this project. Patients were asked to watch the *Chemotherapy Basics* video before returning to the clinic for their first day of treatment. When the patient returned to the clinic for treatment, they completed the same, seven-question post-test regarding basic chemotherapy education topics covered by the video and face-to-face teaching. In addition, patients completed a Likert-scale evaluation tool regarding their satisfaction with the chemotherapy education they received.

The project was implemented at a local healthcare agency in February and March of 2019. Analysis of the project was conducted in March of 2019.

Evaluation Methods

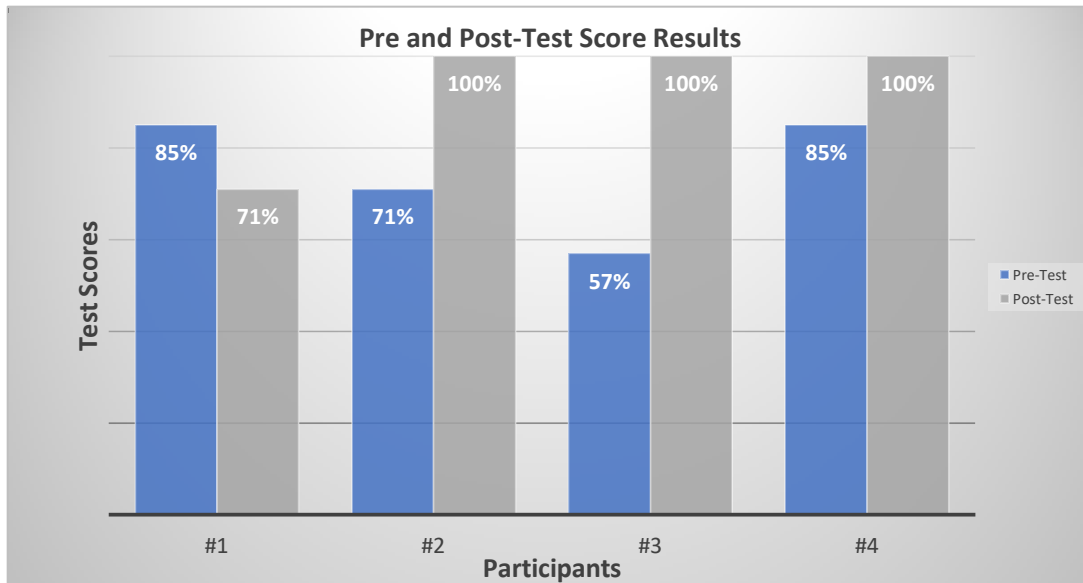
The project was evaluated for retention of chemotherapy education using two learning methods: auditory and visual materials. Analysis included pre- and post-test scores, days between initial chemotherapy teaching and first day of treatment, patient satisfaction regarding their chemotherapy education, and the use of the video supplement.

ANALYSIS

During the two-month project period, four participants were determined to be eligible for the project. Data were collected from pretest and post-test scores as well as on the number of days between receiving education and starting their treatment. Data were also collected on patient satisfaction through an evaluation completed after their post-test.

Participant pretest scores ranged from 57% to 85%. This resulted in a mean pretest score of 74.5%. Of the participants, one participant had a decreased post-test score, while 75% scored 100%. The mean score of the post-test was 92.75%. This resulted in an 18.25% increase in the mean score between patients' pre- and post-test scores.

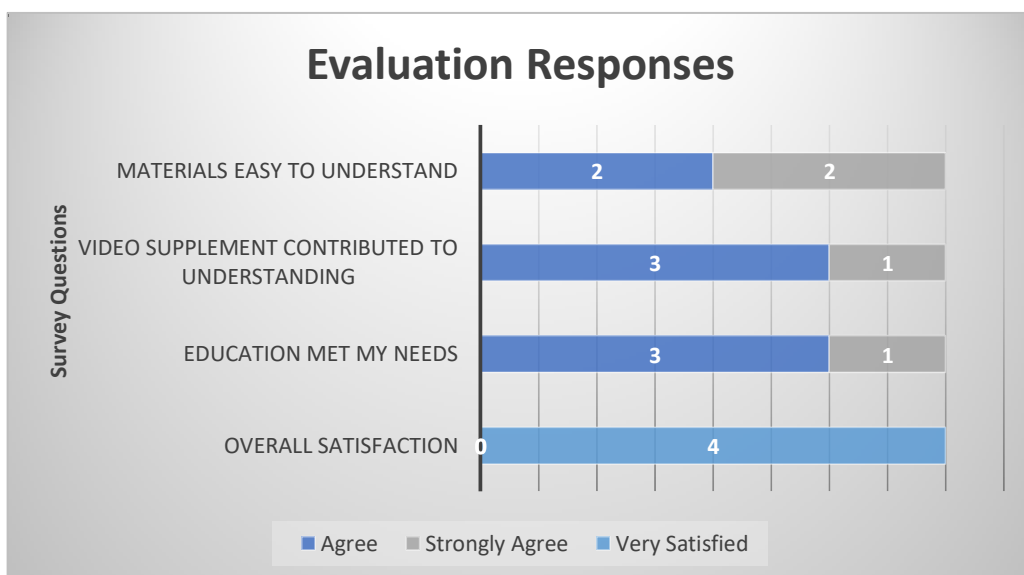
Figure 1. Pre- and Post-Test Score Results



Reducing the length of time between education and treatment would likely be beneficial; however, there were unforeseen circumstances that prolonged that interval. The average

time between education and treatment was 15.3 days. A Likert-type evaluation was provided to patients following their post-test regarding their chemotherapy education. Likert scales are rating scales of five to seven items that measure attitudes or opinions (Glen, 2015). Patients were asked if their chemotherapy education materials were easy to understand, if the video supplement contributed to their understanding of chemotherapy side effects, if the chemotherapy education met their needs, and how satisfied they were with their teaching. Ratings to each question ranged from strongly disagree to strongly agree and very dissatisfied to very satisfied. Responses to Likert scales are typically evaluated using either the median, mode, or range (Glen, 2015). Results of the evaluation were positive, with patients either agreeing or strongly agreeing with each of the statements. All participants reported being very satisfied with their chemotherapy education and one patient commented, “The education was helpful and being able to bring questions and get some answers. Everyone is very caring and put you at ease.”

Figure 2. Evaluation Responses



DISCUSSION

Introduction

Based on feedback from participants, the addition of the video intervention was helpful and the majority of the retention scores improved. The improvement in the post-test scores supports the theory of multimedia learning through the use of words and pictures (Mayer, 2014). In addition, by having patients watch the video intervention at home, they became active participants in their care and were motivated to watch the video because it benefited them. Both of these aspects are closely aligned with Nola Pender's health-promotion model.

This project developed and implemented a standardized teaching checklist for all nursing staff to use during patient education in order to reduce variation. It also required nursing staff to be more prepared for patient education by having the materials available ahead of time and having the patient come in for education prior to their chemotherapy, rather than combining everything in one day. This allowed for standardization of processes within the unit.

The results of the project show similar outcomes to those in the Kinnane et al. (2008) and Thompson, Silliman, and Clifford (2013) studies in which patients receiving the addition of a video supplement have greater knowledge retention than control groups. In addition, the development of the standardized teaching checklist was well received by patients and staff as indicated by their satisfaction scores. This is closely aligned to the results of the Dalby et al. (2013) study. Some of the unforeseen variables to the project

included prolonged time between education and day of treatment. These included pending insurance authorizations and postoperative infections.

Strengths and Limitations

One of the greatest limitations of the project was the small sample size. Although the number of new patients is unpredictable, the amount of time for implementation could have been extended and eligibility for the project expanded. To improve participation, eligibility could have been expanded to include patients who do not have access to the internet by showing the video intervention on the same day as they receive their education. For patients with internet access, allowing them the option to watch the video at the clinic or at home would allow for more flexibility. Lastly, patients who had been treated at another facility previously could have been included.

CNL Competencies

The development and implementation of this process-improvement project focuses on the design, delivery, and evaluation of an intervention to improve chemotherapy education delivery in a local healthcare agency, and demonstrates key competencies for the Clinical Nurse Leader (American Association of Colleges of Nursing [AACN], 2013). It is recognized that oncology patients are a unique population that requires education in order to recognize and manage symptoms and know when to seek medical attention. Through an extensive literature review, best practice in chemotherapy education delivery was identified and a standardized education checklist

was developed to eliminate inconsistencies in education topics between nursing staff. A video supplement was used to augment patient knowledge retention and its effectiveness was evaluated.

This project engaged key stakeholders in the chemotherapy education process to identify areas for improvement, develop an evidence-based change in practice, and evaluate outcomes. Through this project, chemotherapy education processes were standardized to decrease variability and improve patient knowledge retention. Although the sample for this project was small, the results and participants evaluations were positive. Moving forward, the implementation of the video supplement for all patients receiving chemotherapy should be considered in the oncology department at a local healthcare agency.

The world of oncology is changing, however, and more and more focus is on immunotherapy. In fact, many new patients were ineligible for the project because they were receiving immunotherapy. There is still a lot to learn from this new therapy, but moving forward it would be beneficial to provide patients receiving immunotherapy with a video supplement that focuses on their treatment and side effects as well, since they are vastly different from chemotherapy.

Summary

This masters of nursing professional project focused on knowledge retention regarding cytotoxic chemotherapy, expected side effects, symptom management, and decision-making regarding appropriate follow-up medical attention using current

evidence for oncology patient education. Although process change can be difficult in the healthcare setting, standardizing through the use of checklists and multiple learning platforms based on current best evidence provides opportunity for effective change at the microsystem level.

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APPENDICES

APPENDIX A

CHEMOTHERAPY EDUCATION PRE/POST-TEST

Chemotherapy Education Pre/Post-Test

Prior to your chemotherapy education, please answer each of the following questions based on your current knowledge.

1. At which temperature should you notify your healthcare team?
 - a) 100.0
 - b) 100.5
 - c) 105.0
 - d) 99.0

2. What symptoms require a phone call to your physician?
 - a) Uncontrollable diarrhea and vomiting
 - b) Dizziness
 - c) Feeling tired
 - d) Hair loss

3. What steps can you take to minimize nausea?
 - a) Eat one large meal per day
 - b) Eat spicy foods
 - c) Eat small, frequent meals throughout the day
 - d) Drink hot liquids

4. If you have questions about chemotherapy related questions, who should you call?
 - a) Your physician
 - b) The Emergency Department
 - c) The infusion suite
 - d) Don't call anyone

5. True or False: I should drink at least 2 liters of water per day while receiving chemotherapy.

6. True or False: Chemotherapy affects both good and bad cells.

7. When is the best time to take your anti-nausea medications at home?
 - a) First sign of feeling sick to your stomach
 - b) After you have been throwing up

- c) When you feel fine
- d) Don't take anti-nausea medications at home

APPENDIX B

CHEMOTHERAPY TEACHING CHECKLIST

Chemotherapy Teaching Checklist

| <i>Patient Specific Information</i> | <i>Treatment Regimen</i> | <i>How and What to Communicate</i> | <i>Patient Resources</i> |
|---|--|---|--|
| <ul style="list-style-type: none"> <input type="checkbox"/> Review what to expect the first day of treatment <input type="checkbox"/> Safety Information <ul style="list-style-type: none"> ○ "Safe Driving" ○ "We care about your safety" ○ No perfume / odorous foods <input type="checkbox"/> Confirm location of patient's pharmacy for prescriptions and refills <ul style="list-style-type: none"> ○ Non urgent Rx, please give 48 hour notice | <ul style="list-style-type: none"> <input type="checkbox"/> Review chemotherapy regimen <input type="checkbox"/> Print chemotherapy regimen specific education sheets <input type="checkbox"/> Review pre-medications (if applicable) <input type="checkbox"/> Review chemotherapy tip sheet <input type="checkbox"/> Review common side effects <input type="checkbox"/> Review 'Eating Hints' <input type="checkbox"/> Outline medication regimen post chemotherapy | <ul style="list-style-type: none"> <input type="checkbox"/> Review site specific contact information <input type="checkbox"/> Review how to get in touch with the clinic <input type="checkbox"/> Review when to call the MD <ul style="list-style-type: none"> ○ Temp \geq 100.5 degrees F ○ Uncontrolled vomiting ○ Uncontrolled diarrhea ○ Unusual constipation ○ Sore throat, pain in gums, white patches in mouth ○ Unexplained bleeding or bruising in skin, gums, or sputum | <ul style="list-style-type: none"> <input type="checkbox"/> Discuss Fertility <ul style="list-style-type: none"> ○ Sexuality and Cancer booklet ○ Infertility ○ Barrier for intercourse <input type="checkbox"/> Support services <ul style="list-style-type: none"> ○ Social work ○ Nutrition ○ Chaplain <input type="checkbox"/> Patient Liaison <ul style="list-style-type: none"> ○ Social work <input type="checkbox"/> Wig Boutique (if applicable) <input type="checkbox"/> American Cancer Society www.cancer.org <input type="checkbox"/> Tour of Cancer Center |

Note. Adapted with permission from Dana-Farber Cancer Institute.