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Can Follow Up Phone Calls Decrease Complications of Chemotherapy Toxicities In Adults?

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Can Follow Up Phone Calls Decrease Complications of Chemotherapy Toxicities In Adults?

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Abstract

Approximately 22% of all cancer patients in the United States receive chemotherapy. Older adults account for 60 % of new cancer diagnoses in the United States. The aging process is associated with comorbidities that potentially can increase toxicities associated with chemotherapy. These include coronary artery disease, hypertension, and diabetes. Monitoring for toxicities during treatment and intervening when needed allows patients to move forward in their treatment plan. Interruptions in the treatment plan have the potential to adversely affect treatment goals. The purpose of this study is to determine if patients receiving phone calls on predetermined days had fewer days of treatment delay related to toxicities before proceeding to cycle 2 of chemotherapy and a decrease number of emergency department visits/hospitalizations related to toxicities. The study also followed those patients that received education from the nurse practitioner to determine if they had fewer days of treatment delay related to toxicities compared to those patients that did not have treatment delays. Sixty one participants were in the treatment group and 60 were in the control group. A statistical significance of .043 was found with patients receiving phone calls after starting treatment. There was no statistical significance in telephone calls affecting emergency department visits. There was no statistical significance in education by the nurse practitioner. Sample population was a limited in number but broad in diagnoses. Future research could benefit from following this topic in a larger metropolitan area where there are sufficient numbers of patients to follow with similar diagnosis.

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Follow Up Phone Calls Decrease Complications of Chemotherapy Toxicities In Adults?

More than one million individuals in the United States develop cancer each year (American Cancer Society, 2013). Early detection allows for prompt treatment and increases success of treatment. Understanding what happens to the body during the course of treatment helps the patient to be knowledgeable of the changes to the body and cope with the changes as they are affected. This understanding allows chemotherapy to be given as prescribed and focuses on the destruction of cancer cells.

Background and Significance

Cancer is a major health concern in the United States and globally. One in four deaths in the United States is cancer related (Coriat et al., 2012). Approximately 22% of all cancer patients are treated with chemotherapy (Fitch & Pyenson, 2010). The cancer rate among older individuals in the United States and Europe accounts for 60% of new cancer diagnoses and 70% of all deaths associated with cancer (Lynch, Marcone, & Kagan, 2007). In the United States, 50% of cancers are discovered in individuals aged 65-95 (Balducci & Extermann, 2000). Aging is related to a declining function of many organ system and comorbidities such as coronary artery disease, diabetes, and hypertension are more common (Lynch, Marcone, & King, 2010). Both comorbidities and drugs used to treat comorbidities have the potential to increase chemotherapeutic toxicities. Physiological changes such as increased body fat and decreased protein can also increase risk of chemotherapeutic toxicities (Lynch et al., 2010).

Statement of the Problem

One treatment option for cancer is chemotherapy. Chemotherapy is the use of chemicals to obliterate cancer cells (Maltzman & Millar, 2010). Research into the effects that drugs have on anticancer activity began in the early 1900's when nitrogen mustard was found to suppress

bone marrow production (Maltzman & Millar, 2010). Chemotherapy can have different treatment roles and these include:

- stopping the spread of cancer cells
- slowing cancer cell growth
- destroying cancer cells that may have spread to other body parts
- relieving symptoms caused by cancer such as blockage and pain
- curing cancer (American Cancer Society, 2013).

Over the last 30 years, knowledge of chemotherapy and cancer has evolved and many new drugs have been developed (Polovich, Whitford, & Olsen, 2009). During this time studies have been conducted comparing standard treatment to new treatment. This process has established specific regimens of drugs based on the type of cancer, stage of cancer, and specifics of the patient's health to determine a treatment plan. Cycles of chemotherapy are utilized to kill cancer cells and also allow for normal, healthy cells to recover from damage. This damage to normal, healthy cells can cause toxicities. These toxicities can include fatigue, fever, low blood counts (white cells, red cells, and platelets), mucositis (mouth sores), diarrhea, constipation, nausea, and vomiting and can delay treatment causing a decrease in effectiveness of the delayed chemotherapy (Polovich et al., 2009).

Chemotherapeutic toxicities increase health care costs. Statistics from the Milliman Client Report (Fitch & Pyeson, 2010) indicate that cancer patients' account for 0.68% of the commercially insured population but account for 10% of healthcare costs overall. In adult cancer patients, the average cost of chemotherapy is approximately \$111,000 per year. This cost is almost four times the associated cost of those patients with cancer that do not receive chemotherapy. This report further found that the national average of a chemotherapy related

inpatient hospital admission is \$22,000.00 and that the average chemotherapy related emergency room visit is \$800.00 (Fitch & Pyenson, 2010). Management of toxicities that would decrease inpatient and outpatient stays would offer significant financial savings to the patient, employer, and third party insurers (Fitch & Pyenson, 2010). Of equal or greater importance, early management of toxicities may also improve the cancer patient's overall sense of well being and perceived quality of life by allowing them to continue to participate in activities that bring pleasure.

Purpose of the Study

The purpose of this quality improvement project was to examine the effects of patient education by the nurse practitioner on the effects that the oncology patient experienced. The researcher identified a potential for improvement in the educational needs of newly diagnosed cancer patients regarding chemotherapy.

Definitions

There are several medical terms used throughout this paper. They include cancer, chemotherapy, and toxicities. Cancer is a group of malignant diseases that have abnormal cell growth (Polovich, et al., 2009). This abnormal cell growth results in lack of controlled growth and division of cells that results in development of tumors and has the potential to invade tissues around the tumor (Polovich et al., 2009). Chemotherapy is a classification of drugs that kill cancer cells (DeVita & Chu, 2008). A side effect is a condition that occurs when treatment affects healthy tissues (Polovich et al., 2009). These include nausea, vomiting, diarrhea, low blood counts, i.e. white cells, red cells, and platelets, mouth sores (mucositis), and decreased ability to fight infection when your white blood counts are low (nadir). Toxicity is condition that can be harmful to the body and is caused by a chemical agent. Grading scales are a standard

classification to assess toxicities of drugs used in cancer treatment. They are intended only as a guide to evaluate the toxicities. Care is determined by the medical judgment of the provider (National Cancer Institute, 2013).

Theoretical Foundation

A theoretical foundation was used to guide this research and provides a link between the variables under study and the proposed outcome. These variables included telephone calls, chemotherapy education, and the patient's progression into their second cycle of chemotherapy. Orem's Self Care Deficit theory was applicable to the clinical questions. The theory emphasized developing a system to assess patient needs prior to a significant life change and developmental strategies to aid the patient in meeting their healthcare needs. With increased knowledge of potential issues that could occur, the patient would know how to deal with events that arose specifically (Tomey & Alligood, 2006). In regard to this project, patient education on chemotherapy offered the patient the ability to have preventative medications in place if needed for nausea, vomiting, and diarrhea. The patient education further offered techniques to manage nausea and lack of appetite so that weight loss would be minimized and nutritional stores maintained. Strategies to manage anxiety and stress while staying active and trying to maintain current physical strength were also included. According to Orem's theory, facilitation of the identification of patient needs aids the patient in gaining knowledge of their condition and the potential side effects of their chemotherapy. This knowledge encourages the patient's independence during treatment (Tomey & Alligood, 2006).

Preview of the Literature

A literature review was conducted with an emphasis on two topics. The first topic reviewed was to determine if previous studies were found regarding phone call interventions

during chemotherapy to assess and manage toxicities. Keywords included: chemotherapy, toxicities, outpatient, follow-up, cancer, telephone calls, and nurse practitioner. The literature search began in 1990 and 17 articles were found. Of these articles, 12 articles meet the criteria of cancer, outpatient, and telephone calls. The quality improvement project by Lynch, Marcone, and King (2010) was the only study that reviewed the benefits of phone calls during the cycle of chemotherapy. No study reviewed findings of phone calls made by a nurse practitioner during the chemotherapy cycle. All of the articles that meet the inclusion criteria focused on the role that oncology nurses play in monitoring side effects of medications, reinforcing education, and increasing patient satisfaction. Only one study reviewed telephone calls in a medical oncology practice. A literature review was found that examined cancer nurse specialist utilizing the telephone as follow-up for patient care and be an alternative for traditional clinic appointments (Cusack & Taylor, 2010).

The second topic reviewed was to determine if previous studies were found regarding benefits of chemotherapy education provided to the patient by the nurse practitioner. Keywords included: chemotherapy, education, and nurse. The literature search resulted 13 articles. Of these articles, 7 articles meet the criteria. Although no studies were found to support nurse practitioners educating chemotherapy patients prior to treatment, studies supported that nurses performed education prior to chemotherapy.

Significance of Project for Nursing and Healthcare

Chemotherapy kills cancer cells. This occurs when cancer cells attempt to divide. Chemotherapy agents are divided in classes based on the impact to the cell cycle. The agent may be cell cycle-specific and exert the main cell kill when given in divided but repeated doses. The agent may be cell cycle non-specific and exert the main cell kill in tumors that have slowly

dividing cells (Polovich et al., 2009). Repeat cycles of chemotherapy produce further cell kill based on the chemotherapy agent and the cell cycle. Any interruption in this process adversely affects cure and allows cancer cells to continue to divide and grow (Joint Council for Clinical Oncology, 1993). Close monitoring for toxicities during treatment and interventions when needed are expected to allow patients to continue to the second cycle and continue maximum cancer cell kill. Receiving chemotherapy cycles according to evidenced based cancer guidelines increases the patient's success in killing cancer cells and meeting treatment goals (National Comprehensive Cancer Network, 2014).

Clinical Questions

This project will attempt to answer the following research questions. Research question one is do oncology patients that have received phone call interventions on predetermined days, compared to patients that do not receive phone calls, have fewer days of treatment delay related to toxicities before proceeding to second cycle of chemotherapy. Research question two is oncology patients receiving telephone call interventions on predetermined days, compared to patients that have not received telephone calls, have a decrease number of emergency room visits/hospitalization related to toxicities before beginning second cycle of chemotherapy. Research question three is oncology patients that receive chemotherapy education from the nurse practitioner, compared to patients who do not receive chemotherapy education from the nurse practitioner, have fewer days of delay before proceeding to second cycle of chemotherapy. In the study practice, patients are educated by the registered nurse (RN) prior to chemotherapy with general drug information. Education by the nurse practitioner contained more detailed information that was specific to the patient's cancer and comorbidities, chemotherapy regimen,

specific toxicities, and overall wellness level. Family members were able to participate and time was allowed to ask and answer questions.

Critical Review of Pertinent Literature

In review of the data presented by the American Cancer Society in their facts and figures for 2013, the four leading cancer diagnoses were lungs/bronchus, female breast, colorectal, and prostate. In comparing data on cancer statistics for the United States to Kentucky, female breast cancer and colorectal cancer were similar in the percentage of the population affected. Prostate cancer in Kentucky was found to be lower than the national average. Lung/bronchus cancers were found to be higher than the national average (American Cancer Society, 2013).

Table 1

Comparison of Estimated New Cancer cases in 2013

	Kentucky	United States
All sites	25,100	1,660,290
Lung/ Bronchus	4,560 (18.1%)	228,190 (13.7%)
Female breast	3,300 (13.1%)	232,340 (13.9%)
Colorectal	2,300 (9.1%)	142,820 (8.6%)
Prostate	3,130 (12.4%)	238,590 (14.3%)

Cancer Care and Telephone Calls

Phone calls in the oncology outpatient setting are a routine part of the day (Lucia, Decker, Isreal, & Decker, 2007). Telephone calls to patients were originally instituted after an expressed need of the patient. Patients that experienced symptoms related to their cancer and effects of treatment contacted oncology nurses for information and reassurances. The nurse offered advice, provided psychological support, encouraged self care, allayed fears, and referred

the patient to appropriate resources outside of the office when needed. This extension of practice extended continuity of care with the patient (Wilson & Hubert, 2002). Telephone follow-up has been shown to be a cost effective way for staff to communicate with patients and patients to communicate with staff and allows for information sharing and support. Cox and Wilson (2003) found that patients were receptive to phone calls as part of their plan of care. They were able to build a relationship with the oncology nurse that was less rushed and offered more time to talk (Cox & Wilson, 2003).

Although telephone follow-up was a commonly used means of communicating with the patient (Cox & Wilson, 2003), the literature showed few studies that have reviewed the volume and type of calls received in an outpatient oncology setting (Flannery, Phillips, & Lyons, 2009). The purpose of this study was to define the number of calls received, who made the calls, and the reason for the calls. In this study, 5,283 calls were made in 86 work days. The mean number of phone calls per day was 61.4. The reasons for calls varied based on practice type. The data did reveal that telephone calls in the outpatient setting constituted a large portion of an oncology practice's time and can be highly variable based on the number of calls per day (Flannery et al., 2009).

Beney, Devine, Chow, Ignoffo, Mitsunaga, Shahkarami, McMillian, and Bero (2002) studied the effects of telephone follow up on physical well-being such as the physical, social, emotional, and functional status of the patient. Though their findings did not demonstrate a statistical difference, the authors did determine that providers overestimate how well a patient understands his treatment plan and follow up discharge plan (Beney, et al., 2002). Although not correlated to the outpatient setting, Poncia, et al., (2000) hypothesized that by identifying higher risk elderly patients early on that nursing interventions could prevent emergency department

visits. Telephone calls were used to assess treatment understanding and deficits in patient education. Telephone calls also identified potential problems that were managed before the concerns became serious. The study concluded that phone calls offered low cost, high value interventions that could possibly decrease unnecessary visits to the emergency room as well as improve overall health (Poncia, et al., 2000).

There was little literature regarding the financial impact that telephone calls may have on the patient and third party payers. In a study by Lucia, et al., (2007), the authors found that management of symptoms by specialty nurses decrease cost of care. Due to this advanced education in the oncology field and use of proven algorithms when dealing with calls, most patients' needs are met over the phone by the oncology certified nurse (Lucia, et al., 2007). One of the variables that Lucia, et al., (2007) followed was symptom management. The setting was a community oncology practice with 7 physicians that see approximately 1,600 new patients annually. In the study, a total of 66 of 332 patients (19.8%) called regarding symptom management. The projected time of patient travel to the oncologist's office for the symptom management range from \$75-\$150 per visit with a total annual cost of \$257,400-\$514,800. With a 20% copay over 12 months the estimated savings utilizing telephone calls compared to office visits for patient's symptom management is \$51,000 and \$102,000 annually. Savings to third party payers could range from \$200,000 to \$400,000 annually for symptom management. This study clearly shows significant financial savings with the utilization of follow-up telephone calls (Lucia et al., 2007).

Two studies reviewed the effects of telephone follow up in radiation oncology patient. Hagopian and Rubenstein (2009) surmised that although the analysis of data did not show significant differences in anxiety, side effects, coping skills, and self-care strategies in patients

who received telephone calls compared as compared to those who did not, the survey did indicate that the telephone calls were an avenue that health care team members showed care and concern for their patients (Hagopian & Rubenstein, 1990). Munro, Shaw, Clark, Becker, and Greenwood (1994) proposed that the withdrawal of daily contact associated with radiation can be stressful and that routine phone calls between end of treatment and the first follow up appointment may alleviate this separation stress. Of the two arms of the study, there was not a statistically significant difference in the two groups. The authors state that telephone calls were well received and appreciated by patients, but the cost of the intervention was high and could not be justified. Neither study was able to prove the benefit of these telephone calls after radiation treatments were completed. Munro, et al., (1994) did acknowledge that certain patients who may feel isolated or have increased anxiety may benefit from the telephone calls after treatment. They further suggest assessing for the effect of targeted interventions (Munro, et al., 1994).

In a quality improvement project by Lynch, et al., (2010), the authors noted that older individuals receiving chemotherapy have the potential for increased complications due to chemotherapy drugs, current medications, and comorbidities. The authors further theorized that the identification of older adults at risk for chemotherapy toxicities could decrease the effects of these side effects if they were promptly identified and treated. Targeted questions were asked that were based on expected side effects so that tailored care could be given over the phone or the patient would be scheduled for the appropriate office visit. These telephone call interventions were made on predetermined days after treatment began (Lynch, et al., 2010).

While there were many differences in each of the studies reviewed, all studies indicated that the patient was receptive to the individualized care given by telephone calls and attention that was given through the telephone call interventions. The majority of the studies ranged from

Level II to level VI. It was difficult to compare variables from one study to another. The study by Lynch, et al, (2010) was the only study that made phone calls on predetermined days; the remaining study phone calls were inconsistently utilized. This lack of regularity in timing of phone calls made it difficult to compare between studies. Population size for the studies that included phone call interventions was small. There was no continuity between any of the study questions. The literature was supportive of telephone calls with oncology patients after treatment was completed. No studies were found that reflected telephone follow-up during chemotherapy treatment with the exception of the quality improvement project by Lynch et al.,(2010).

Chemotherapy Education

High levels of anxiety can negatively impact a patient's ability to understand and retain information that is presented to them related to their diagnosis of cancer. However, there is evidence that educational interventions at diagnosis and during treatment plan development can improve anxiety symptoms, decrease side effects and improve quality of life (Mann, 2011). Of the articles that met the inclusion criteria in the systematic review, both standardized education and individualized education were included.

Standardized education included predetermined content and educational checklists were utilized. Muellar and Glennon (2007) found that the check list was beneficial to the oncology nurse when educating the patient. The checklist provided a means of documenting the educational intervention and increased the consistency of the all chemotherapy educational interventions that each cancer patient received (Muellar & Glennon, 2007; Mann, 2011; Rigdon, 2010). Malone (2007) in an educational component utilized multimedia presentations in a group setting. 84% of the responders gave the class excellent/good comments and fair/poor comments expressed the desire for more information (Malone, 2007).

One quality improvement model included individualized education. Prior to the intervention, the oncology nurse is responsible for the assessing the patient's needs and preferences for learning. An individual plan of care is developed for the patient based on their specific cancer type, recommended treatment plan, and potential side effects. This plan was developed prior to interaction with the patient and any specific personal information to build an instructional educational foundation. Mann, (2011), identified that patient understanding of the educational information related to their disease was low. The patients studied did not fully understand what was taught to them. This resulted in increased phone calls and unnecessary visits to the emergency department. Mann felt that there needed to be more personal knowledge of the patient before an educational care plan could be developed (Mann, 2011).

Of the literature reviewed, studies support that effective patient education delivered prior to initiation of treatment can improve symptoms associated with fear and anxiety, decrease side effects related to treatment, and improve quality of life (Mann, 2011; Mueller & Glennon, 2007; Rigdon, 2010). Educating the patient prior to the beginning of chemotherapy may help to improve coping skills during treatment (Malone, 2007).

Methods

Population

The population for the study consisted of patients living in south central Kentucky from 13 counties and one patient from Tennessee. Average median household income at the time of the report was \$43,073 with a population of 4,380,415 people (United States Census Bureau, 2010) . The state unemployment rate was 8.1% (Kentucky.gov, 2013). Kentucky falls behind other states despite strong growth in urban areas. The rural areas show low levels of growth particularly in Eastern Kentucky (Davis, 2009). Kentucky consists of 120 counties with

thirty-five being classified as urban and 85 classified as rural (Davis, 2009). There are various definitions of rural as defined by the US Department of Health and Human Services. The definition by exception is an area that has a non-urban status (US Department of Health and Human Services, 2013) Per the United States Office of Management and Budget (OMB), the state is comprised of metropolitan statistical areas (MSA). A MSA is defined as a core urban area with greater than 50,000 people and one or more counties adjacent to the urban county that has a high degree of social and economic integration. Warren and Edmonson counties are classified as MSA (Kentucky Labor Market Information [KYLMI], 2013). All counties were classified as a medically underserved area except for Simpson County (US Department of Health and Human Services, 2013). Percentage of the Kentucky counties in the study that lived below the poverty level ranged from 16.1% to 23.7% (United States Census Bureau, 2013). The unemployment rates for the Kentucky counties in the study ranged from 7% to 12.8% (United States Census Bureau, 2013).

Table 2

Comparison of Kentucky counties by population, estimated for 2013, median income (2008-2012), percentage below the poverty line, unemployment rates, and medically underserved areas (MUA)

County	Population	Income	% below poverty level	Unemployment	MUA
Warren	118,370	\$43,509	18.9%	7%	Yes
Barren	43,027	\$37,587	19.9%	8.6%	Yes

Metcalfe	9,983	\$34,100	16.1%	9.6%	Yes
Simpson	17,793	\$40,903	17.2%	7.6%	No
Allen	20,311	\$36,123	19.7%	9.2%	Yes
Logan	26,876	\$35,962	19.2%	7.7%	Yes
Edmonson	12,062	\$35,243	18.9%	12%	Yes
Butler	12,793	\$36,237	22.7%	9.4%	Yes
Muhlenberg	31,179	\$38,835	19.3%	10.2%	Yes
Cumberland	6,789	\$29,885	23.7%	12.4%	Yes
Grayson	25,997	\$33,290	21.7%	12.8%	Yes
Adair	18,732	\$31,169	20.6%	8.9%	Yes
Hart	18,573	\$32,445	23.6%	8.3%	Yes

Ethical concerns of the patient were taken into consideration when developing the project. Privacy was afforded during educational sessions in the exam room. The patient's overall well being was incorporated into the educational session. The follow up phone call assessment tool was individualized to the patient needs based on the follow up questions, concerns from the previous phone calls, and the direction that the patient led the conversation. All phone calls were conducted by the nurse practitioner. Phone calls were repeated until contact was made with the patient. After the first phone call, explanation was given to the patient of approximately when the next phone call would occur. If unusual circumstances were expected for future phone calls, the NP and the patient discussed alternative times. The phone calls were intended to identify side effects early on in the cycle so that interventions could be implemented

to decrease severity and improve the patient's quality of life with the goal of starting second cycle on schedule.

Setting

The setting for this project was an oncology practice in a multispecialty clinic in the southeast US. The practice consisted on 2 medical oncologists with board certification in internal medicine and medical oncology. The nurse practitioner's patient focus was in oncology for over twenty years and was OCN certified. The practice had over 2000 active patients in 2013. The inclusion criteria included adults greater than 18 years of age that were receiving intravenous (IV) chemotherapy for any cancer. There was not an upper range limit to the study. IV chemotherapy agents were chosen over oral chemotherapy agents as the IV route was given in a controlled environment with right amount, at the right time, and evaluation of the patient before the treatment was given. There were many uncontrollable variables in the oral chemotherapy population. The patient population for the intervention group was obtained from August 26, 2013 to February 13, 2014. The review of the electronic health record for the control group was obtained from January 24, 2013 to August 5, 2013. A quasi-experimental design was used. This type of study was chosen as a randomized trial could not be conducted due to the size of the patient population. The study was chosen to estimate the causal impact that the intervention had on the population.

Various factors influenced a change in second cycle start dates that were not influenced by chemotherapy toxicities. These included holiday schedules, first treatment starting in the hospital on a weekend with remaining treatments to be given in the office, convenience for the patient, etc. Delay in treatment was considered greater than 7 days from expected second cycle start date.

Procedure

Patients that met the inclusion criteria had contact information confirmed prior to the beginning of treatment. Patients were called five times over the first ten days of their first cycle of treatment using a telephone follow up call form modeled from the quality improvement project conducted by Lynch, et al. Example of Chemotherapy Phone Call Assessment Tool questions are seen in Appendix A. The nurse practitioner asked questions regarding overall condition, nausea/vomiting, use of anti-emetics, ability to eat, mouth concerns, elimination, and fever. Patients' symptoms were identified and issues/concerns that were evident during phone calls were addressed. These included change in medications for nausea and vomiting, medications for mouth sores, dietary counseling, oral health maintenance, and steps for proper bowel elimination. Education and reassurances were offered with each phone call. Urgent matters were classified as fever greater than 100.5 during nadir, shortness of air, easy bruising/bleeding with history of thrombocytopenia, uncontrolled nausea, vomiting, and diarrhea. These conditions were triaged and referred for appropriate services based on the severity of the condition. The primary oncologist associated with the patient or oncologist on call was notified of significant changes in the patient's status. Approximately 40-60 minutes was spent per person by the nurse practitioner in five follow up phone calls in the first 10 days after the beginning of cycle 1. Electronic communication via email was offered to patients for non emergent concerns. Explanation was given that this form of communication was only for general information and may not have prompt response. All electronic communication was provided via a secure server maintained by information technology department of the multispecialty practice.

Data Analysis

Descriptive statistics were utilized to describe the sample characteristics. A chi square was used to compare a percentage of cases in the sample with hypothesized values. This statistical test explores the relationship between variables. The chi square was utilized to evaluate the relationship between the variables that were specific to each research question (Pallant, 2010). The phi coefficient was used to measure the degree of association between the two data sets (Pallant, 2010).

Protection of Human Subjects

The Chemotherapy Phone Call project was approved by Western Kentucky University Institutional Review Board (IRB). Permission was obtained from Graves Gilbert Clinic's legal counsel, Craig Heckman, for collection of data from current patient records and retrospectively from the electronic health record of previously treated oncology patients. Confidentiality was maintained by assigning a two digit code to each record. The nurse practitioner will maintain a master list of this data. This master list, data, and statistical analysis reports will be stored on a USB drive in a locked file drawer in the office of the Coordinator of the Doctorate of the Nursing Practice Program at Western Kentucky University. Confidentiality was maintained and adhered through compliance with the Health Insurance Portability and Accountability Act (HIPAA).

Results

The sample size was 121 patients with a treatment group of 61 patients and a comparison group of 60 patients. In the treatment group, 30 females and 31 males participated. In the control group, 26 females and 34 males participated. In the treatment group, the ages ranged from 48-84 years old with the median age of 65 years. In the control group, the ages ranged from 38-90 years old with the median age being 66 years old. In the treatment group, the three largest diagnosis'

included lung, 15 (24.6%), breast, 9 (14.8%), and colon cancer, 7 (11.5%). In the control group, the three largest diagnosis', lung, 14 (23.3%), breast, 6 (10%), and colon, 6 (10%). Seven patients in both the treatment and the control group did not advance to cycle 2 due to stopping treatment. Estimated total time spent by the NP making phone calls was 40 – 60 hrs.

Table 3

Comparison of Treatment group to Control group

	Treatment group	Control group
Number (121)	61	60
Female	30	26
Male	31	34
Age	65(48-84)	66(38-90)
Diagnoses		
Lung	24.6%	21.6%
Breast	14.8%	10%
Colon	11.5%	11.7%
Other	49.1%	56.6%

The top three cancer diagnoses for the United States and for Kentucky were lung, breast, and colon cancer. In comparing the study statistical population for Kentucky and United States, the rankings of the top three diagnoses are the same at the state level and nationally.

Research Question1.

The first question was do patients that receive follow up phone calls experience fewer delays related to toxicities before proceeding to cycle 2. In the treatment group, 52 patients

(96.3%) advanced to cycle 2 without delay and 2 (3.7%) were delayed. In the control group, 45 patients (84.9%) advanced to cycle 2 and 8 (15.1%) were delayed. A Pearson chi square was conducted and indicated that there was significant difference in the patients that received phone calls when progressing to cycle 2 than the control group. Unfortunately, one of the assumptions of chi square was violated by having an n less than 5. Based on this finding, Fisher's Exact Test was run and the probability was found to be .043.

Table 4

Delay versus No delay comparison

	No delay	Delay	Total
Treatment group	52 (96.3%)	2 (3.7%)	54
Control group	45 (84.9%)	8 (15.1%)	53

p =.043

Research Question 2.

The second question was do patients that receive phone calls have fewer emergency department visits/hospital admissions before advancing to cycle 2. In the treatment group 6 out of 55 (9.8%) sought care in the emergency department/hospital compared to 9 out of 51(15%) from the control group. A Pearson chi square was conducted and indicated that there was no significant difference in the patients that received phone calls in the treatment group compared to the control group.

Table 5

Comparison of Treatment/Control group for Emergency Department visits

	No	Yes	Total
Treatment group	55 (90.2%)	6 (9.8%)	61
Control group	51 (85.0%)	9 (15.0%)	60
Total	106 (87.6%)	15 (12.4%)	121

Research Question 3.

The third research question was do patients in the treatment group that received chemotherapy education from the nurse practitioner (NP) have fewer delays related to toxicities before advancing to cycle 2 as compared to those patients that do not receive education from the NP. Thirty-one (50.8%) of the treatment group received NP delivered chemotherapy education. Pearson Chi Square was conducted on this variable and was not found to be statistically significant. Again, one of the assumptions of Chi square was violated as 2 cells were less than 5. Fisher's Exact test was completed and did not show significance as the probability was .264.

Discussion

The top three cancer diagnoses for the United States and for Kentucky were lung, breast, and colon cancer. In comparing the study statistical population for Kentucky and United States, the rankings of the top three diagnoses are the same at the state level and nationally. Lung cancer comprised 24.6 % of the treatment group. This finding was significantly higher than that state findings of 18.1% and national findings of 13.7%. Breast cancer in the treatment group affected 14.8% of the participants and was slightly higher than the state finding (13.1%) and national

finding (13.9%). Colon cancer affected 11.5% of the treatment group and was higher than the state findings (9.1%) and national findings (8.6%).

Table 7

Comparison of treatment group, control group, and incidence rates for Kentucky and United States for lung, breast, and colon cancer.

	Lung Cancer	Breast Cancer	Colon cancer
Treatment group	24.6%	14.8%	11.5%
Control Group	23.6%	10.0%	10.0%
Kentucky	18.1%	13.1%	9.1%
National	13.7%	13.9%	8.6%

Summary of Results

Patients that are diagnosed with cancer and begin chemotherapy may have varying degrees of toxicities dependent on the chemotherapy agent that is received. At minimum, they will experience anxiety. Individualized care by the NP between appointments via phone calls during the first cycle of chemotherapy was expected to yield positive results by decreasing toxicities and allowing the patient to move on to cycle 2. This was statistically proven in the population studied. Further analysis showed that there was no statistical significance noted in the comparison of phone calls to emergency room/hospitalization and education by the nurse practitioner and delays in treatment.

Limitations

There were several limitations to this study. The sample size of 121 patients in both the treatment and control group did not offer a large enough sample in several of the statistical analysis conducted. After the datum was collected, each group had seven patients that did not progress to cycle 2. These included progression of disease and inability to tolerate treatments. A second limitation of the study was the inclusion of all diagnoses. The only qualifier to the type of cancer included in the study was that treatment be given intravenously. The data specific to cancer type may have yielded more significant findings when focused on a single diagnosis and a like population. To achieve the population size needed, a tertiary center or institution specific to the disease type would be required. If a single diagnosis with a satisfactory sample size was not feasible, pairing of diagnosis codes between treatment and control group may have controlled for differences that are found in cancer type, gender, and age. A third limitation of this study was that a follow up survey was not completed after the patient completed their first cycle of chemotherapy. Telephone calls were well received by the patients contacted. There was no data collected in the project regarding personal preferences of the patient and if the phone calls were beneficial. While telephone follow-up is not a billable service, research that offers benefit to the patient may support this service as a way of decreasing sick visits to the office and unnecessary emergency room visits.

Conclusions**Future Research**

As the cost of health care rise and third party payers search for ways to manage cost, there is discussion that cancer treatment may be allocated predetermined dollars based on diagnosis, evidence based treatment options, and follow up testing. Further research will be

needed on methods that can assist in the management of toxicities that will assist patients in completing treatment as scheduled. Care is reimbursement driven. The current education program in the oncology practice that was used in the study is not a service that third party payers are willing to pay. Patients continue to need be educated regarding treatment side effects but time for detailed counseling is not available. Suggested future research could include more information on group education for chemotherapy toxicities. The use of multimedia (IPad, podcast, video) to share needed educational components regarding cancer treatments is beginning to be seen in large metropolitan areas. As the patient population becomes more comfortable with technology, increase use of electronic communication will be seen.

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Appendix A: Chemotherapy Phone Call Assessment Tool

Chemo Phone Call Tool Day 1 Day 3 Day 5 Day 7 Day 10

Date:

Dx:

Tx date:

Chemo Regimen:

1. Overall Condition:

2. Nausea - No

Do you have antiemetic

Yes: nausea only

Vomiting: Y/N

Taking meds: Y/N

If no, meds changed to

3. Able to eat/drink? Yes

No - n/v controlled Y/N

Loss of appetite - Y/N

Recommendation:

Mouth Tenderness? - Y/N

Enc oral care

MMW

Thrush? Y/N

Nystatin s/s QID

4. Urinating: # in 24hrs/color

Decreased amt, push fluids

5. Bowels per routine? Y/N

Diarrhea, #, consistency, meds?

Constipation, last BM, Meds?

6. Fevers? No, thermometer at home?

Yes- >100.5 Y/N

Recommendation:

Comments: