

2019

De Novo Cancer Monitoring for Adult Heart Transplant Patients to Improve Early Detection and Intervention

Angelo C. Mabasa

Follow this and additional works at: https://scholarworks.umass.edu/nursing_dnp_capstone



Part of the [Nursing Commons](#)

Mabasa, Angelo C., "De Novo Cancer Monitoring for Adult Heart Transplant Patients to Improve Early Detection and Intervention" (2019). *Doctor of Nursing Practice (DNP) Projects*. 195.
Retrieved from https://scholarworks.umass.edu/nursing_dnp_capstone/195

This Open Access is brought to you for free and open access by the College of Nursing at ScholarWorks@UMass Amherst. It has been accepted for inclusion in Doctor of Nursing Practice (DNP) Projects by an authorized administrator of ScholarWorks@UMass Amherst. For more information, please contact scholarworks@library.umass.edu.

De Novo Cancer Monitoring for Adult Heart Transplant Patients
to Improve Early Detection and Intervention

Angelo C. Mabasa

University of Massachusetts Amherst

Chair: Dr. Jeungok Choi, RN, PhD

Mentor: Dr. Paolo C. Colombo, MD

Date of Submission: April 21, 2019

Acknowledgment

I would like to express my deepest gratitude and appreciation to the persons below who made this goal a reality.

To my academic mentor, Dr. Jeungok Choi, I will always be grateful for your tireless patience, timely support, wisdom, advice and guidance.

To my work mentor, Dr. Paolo Colombo, my gratitude for your guidance, understanding, and support in providing me the learning opportunities in carrying out this study. A special thank you also to Dr. Sun Hi Lee, for your unwavering trust and support. You have indeed taught me many things over the years.

To my family, no one but you has been more important to me in the pursuit of this goal. I will always be grateful to my parents, Dr. and Mrs. Jose Mabasa, for instilling in me the love of learning. To my children, Melissa and Angelo, thank you for the constant inspiration, support, and joy you provided me during this journey. To my wife, Helen, I could not have done this without you. You have supported me in countless ways along this long, arduous and challenging journey. Words cannot express my gratitude. From the bottom of my heart thank you, Love!

Lastly, a prayer of thank you to God for none of these would have been possible without His blessings and graces.

Table of Contents

Acknowledgements.....	2
Abstract.....	6
Introduction.....	7
Background.....	7
Problem Statement.....	10
Organization “Gap” Analysis of the Project Site.....	11
Literature Review.....	12
Search Method.....	12
Search Results.....	12
Synthesis.....	14
Conceptual Framework.....	17
Methods.....	17
Project Site and Population.....	17
Study Design.....	18
Measurement Instrument.....	19
Implementation Procedures.....	19
Data Collection.....	19
Pre-Intervention phase.....	20
Intervention Phase.....	20
Preparing for the Call.....	21
Conducting the telephone follow-up call.....	21
Post-Intervention Phase.....	21

Statistical Analysis.....	22
Ethical Considerations /Protection of Human Subjects	22
Result	22
Socio-Demographics: & History of Illness.....	23
Intervention Group Follow-up Phone Calls.....	24
Control Group Follow-up Phone Calls	26
Comparison of Intervention and Control Groups	26
Discussion.....	27
Practice Implications.....	29
Facilitators and Barriers.....	30
Limitations of the Study.....	31
Study Strengths	31
Cost-Benefit Analysis/Budget	31
Conclusion	32
References.....	34
Appendix A.....	41
Appendix B	42
Appendix C.....	43
Appendix D.....	45
Appendix E	46
Appendix F.....	47
Appendix G.....	49
Appendix H.....	51

Appendix I 52

Appendix J 53

Appendix K..... 54

Appendix L 55

Appendix M 56

Appendix N..... 57

Appendix O..... 58

Abstract

Background. The surgical advancements in orthotopic heart transplantation along with improvements in immunosuppressive drugs increase the survival rate and quality of life of heart transplant recipients. However, the prolonged use of immunosuppressive medications increases the risk of infection and related cancer. Solid organ transplant recipients have approximately two to three-fold higher risk of developing de novo cancers. Thus, modulation of immunosuppression regimen and cancer screening appear as key factors in preventing and treating de novo cancer among solid organ transplant recipients.

Purpose: The purpose of this project was to examine the effectiveness of multiple follow-up phone calls after clinic visits as an intervention to enhance compliance with cancer surveillance in adult heart transplant recipients.

Methods: The convenience sample of consenting participants (n= 41) was randomly divided into intervention (n = 21) and control (n=20) groups. The intervention group received multiple follow-up phone calls at designated time intervals after a clinic visit to reinforce compliance with cancer screening. The control group continued to receive routine care.

Results: The intervention resulted in a significant statistical difference ($\chi^2 (1) = 4.062$, $p=0.044<.05$) between the control and the intervention groups for timely cancer screening. The intervention group had a 50% follow-up with a specialist compared to the 15% follow up-rate of the control group.

Conclusion: A nurse practitioner-led multiple follow-up phone calls was effective in increasing de novo cancer screening among adult heart transplant recipients.

Keywords: solid organ transplantation, immunosuppression, de novo cancer, follow-up phone calls.

De Novo Cancer Monitoring for Adult Heart Transplant Patients to Improve Early Detection and Intervention

Introduction

Organ transplantation is currently being utilized increasingly as a treatment for an otherwise end-stage fatal organ disease. The advances in surgical techniques and improvements in anti-rejection medications prolong the survival of the solid transplant organ recipients (Piselli et al., 2014). However, the chronic use of immunosuppressive medications increases the risk of opportunistic diseases, particularly infections and virus-related malignancies (Piselli et al., 2014). Malignancy has become one of the three major causes of death after transplantation; the overall incidence of cancer is increased two to three-fold in solid organ transplant recipients compared to the general population (Albugami et al., 2014; Chapman et al., 2013). Despite the increase in cancer-related incidents among solid organ transplant recipients, studies show that cancer screenings are not routinely done (Turkeli et al., 2016). Once the solid organ recipients who are chronically immunosuppressed are diagnosed with full-blown cancer, the mode of treatments and its ill effects are almost always very difficult, expensive and potentially deadly. According to Katabathina et al. (2015), management strategies which can improve malignancy-related morbidity and mortality in transplant recipients include prevention of risk factors, appropriate modulation of immunosuppressive agents, prophylaxis against infection-related malignancies, and use of intensive targeted screening programs. Thus, there is an essential need for different health care providers of solid organ transplanted recipients to tailor a specific type of surveillance and thorough evaluation for early recognition of de novo (newly developed) cancer to avoid full-blown cancer in already complicated health status.

Background

According to the United Network for Organ Sharing (UNOS) (2018), in the United States alone, there were a total of 34,768 organ transplants in 2017; the national data of the transplanted organs from January 1, 1988, to February 15, 2018, was 724,356, and of those heart transplants totaled to about 10% (Appendix A). Organ transplantation is currently being utilized increasingly as a treatment for an otherwise end-stage fatal organ disease. For patients who are living with the most advanced heart failure, orthotopic heart transplantation (OHT) provides a means of significantly improving the quality of life; proved to be clinically useful, life-saving and cost-effective (Linden, 2009). Transplant recipients are living better and longer lives due to surgical advancements and improvements in immunosuppressive drugs. However, prolonged exposure to immunosuppression increases the risk of de novo cancer among these patients (Piselli et al., 2014). A common thread from the literature is that too much immunosuppression decreases the ability of the immune system to fight against different oncogenic events and thus expose the patient to increased risks of de novo cancer development (Acuna et al., 2017; Albugami et al., 2014; Chapman et al., 2013; Collins et al., 2012). A likely explanation of the predisposition for de novo malignancy among solid organ recipients (e.g., heart) is that immunosuppression impairs the immune surveillance of virus-transformed cells by the body, and thus increases the frequency of virus infection (Vial & Descotes, 2003).

Cancer incidence increases with time following heart transplantation: one year (2.6%), five years (14.1%), and ten years (27.9 %) (Lund et al., 2013). Youn et al. (2018) supported these stating that the risk of any de novo solid malignancy between years one and five after transplantation was 10.7% — skin cancer (7.0%), non-skin solid cancer (4.0%), and lymphoproliferative disorders (0.9%). Youn et al. (2018) also further stipulated that patients who had developed de novo malignancy have increased mortality compared to those who did not.

The literature search showed at least a two to three-fold increase for malignancy development among solid transplant recipients compared to the general public (Albugami & Kiberd, 2014; Chapman et al., 2013). A cohort study by Engels et al. (2011) utilizing linked data from the United States Scientific Registry of Transplant recipients from 1987 to 2008 and 13 state/regional cancer registries reported a 1,374.7 incidence per 100,000 or a 6.1% de novo malignancy (10,656 out of 175,732) during follow up, corresponding to an overall doubling cancer risk compared to the general public. The U.S. based study by Engels et al. (2011), observed a broad spectrum of cancer risk including numerous infections related and unrelated malignancies. The infection-related malignancies noted are as follows in decreasing order: non-Hodgkin's lymphoma, liver, stomach, Kaposi's sarcoma, oropharynx including the tonsils, anus, Hodgkin lymphoma, vulva, cervix, penis, nasopharynx, and vagina (Engels et al., 2011). The risk for infection-unrelated malignancies was also significantly elevated for cancers. In decreasing order, the infection-related cancers are as follows: the lung, prostate, kidney, colorectum, breast, melanoma, thyroid, urinary bladder, skin and pancreas, other oral cavity and pharynx, lip, plasma cell neoplasms, acute myeloid leukemia, larynx, esophagus, uterine corpus, soft tissue including heart, salivary gland, ovary, small intestine, brain, testis, other biliary, intrahepatic bile duct, chronic myeloid leukemia, chronic lymphocytic leukemia, gallbladder, eye and orbit, renal, pelvis, acute lymphocytic leukemia, mesothelioma, bones and joints, and those that were grouped as other unspecified malignancies, miscellaneous specified malignancies, or tumors with poorly specified histology (Engels et al., 2011). Later studies by Acuna et al. (2017) supported the above statement affirming that the incidence of de novo malignant growth varies with different organs — breast, prostate, ovarian and brain cancers have fewer incidents with the de novo development of cancer compared to lung, colon, melanoma, liver cancers and lymphoma.

Chapman et al. (2013) also found that depending on which solid organ was transplanted, the areas where the de novo cancer grew varied in sites, frequency, aggression, and overall fatal outcome.

Despite the higher frequency of cancer among solid organ transplant recipients, studies showed that (1) cancer screenings are not routinely done, and (2) early identification of cancer diagnosis leads to improved survival (Turkeli et al., 2016). Management strategies that can improve malignancy-related morbidity and mortality in transplant recipients (e.g. heart transplant) include prevention of risk factors, appropriate modulation of immunosuppressive agents to maintain a balance between avoidance of rejection and cancer prevention; prophylaxis against infection-related malignancy, and the use of intensive targeted screening programs (Katabathina et al., 2015).

Heart transplant recipients receive life-saving and ameliorating therapy. However, complications are common and vary in severity from mild to fatal (Alba et al., 2016). The most frequent complications of heart transplantation included cellular or antibody-mediated rejections, cardiac allograft vasculopathy, graft dysfunction, chronic kidney disease, infection, and, of course, malignancy.

There is no standard recommendation for the different solid transplanted organs in monitoring de novo malignancy (Acuna et al., 2017). As a result, a critical need exists for an evidenced-based best practice screening, which is tailored to the individual patient's history that may include prior malignancy, family history of cancer, co-morbidities post-transplantation and the likelihood of de novo cancer development (Acuna et al., 2017; Albgami et al., 2014; Collins et al., 2012; Inamoto et al., 2015; Katabathina et al., 2015; Turkeli et al., 2016).

Problem Statement

The critical importance of addressing de novo cancer development among adult heart transplant recipients is indicated by findings that post solid organ transplantation (e.g., heart transplant recipients) develop a two to three-fold increased risk of de novo malignancy compared to the general public due to long-term use of immunosuppressant medications.

Organization “Gap” Analysis of the Project Site

The site of the DNP project was the out-patient clinic area in one of the major hospitals in New York City. The patients who are seen in this center are adult individuals with a primary diagnosis of advanced cardiac conditions such as advanced heart failure, Left Ventricular Assist Device (LVAD), and heart transplant. Ten transplant cardiologists are working in this center and ten adult nurse practitioners. Five out of 10 nurse practitioners, including the student, are heart transplant providers.

At the selected site, there is no specific written protocol or guideline as to when the adult heart transplant recipients should follow up with other relevant specialists for early cancer screening and intervention. There is an implied understanding among the heart transplant providers of the need for a specialist follow up outside cardiology. However, the implementation of such is inconsistent and varies from one provider to another. At the time of the patients' clinic visits, the patients are reminded of their immunosuppression status, which increases the risk of de novo cancer development and therefore the need for a cancer screening follow up. However, after such patient teaching/education, there is no further follow-up from the transplant team once they go home and until the next clinic visit. Due to the many complicated issues that heart transplant patients have to deal with, they are often too busy to schedule their cancer screenings. It is often postponed to later dates, and sometimes never performed. The farther stable heart transplant patients are from their transplant dates, the longer is their return date for clinic follow

up. Sometimes, these stable patients are seen every six months or more. This generates concerns since the longer patients take immunosuppressive medications, the higher is their likelihood of developing de novo malignancy (Alba et al., 2016; Lund et al., 2013; Piselli et al., 2014; Youn et al., 2018). If they did not have any screening, de novo cancer may have developed before the next visit. The lack of an explicit and specific guideline or policy at this particular site regarding de novo cancer development screening among adult heart transplant recipients indicates a “gap” in evidenced based-practice as recommended by current studies noted in the literature.

Literature Review

Search Method

A comprehensive search of the literature for evidence regarding adult heart transplantation de novo malignancy development and cancer screening care after heart transplantation was completed. The review of the literature was conducted to identify the current literature and practices in solid organ transplantation about the incidence of de novo cancer malignancy and the role of screening without focusing necessarily on disease management of adult heart transplant patients. The following databases were used: CINAHL Complete, JSTOR, Science Direct, Cochrane Library, and Google Scholar. Search terms included: *transplantation, solid organ transplantation; heart transplantation, cardiac transplantation; cancer or malignancy screening, de novo cancer; follow up phone calls, reminder systems to improve adherence, motivating patients with multiple phone calls.*

Search Results

In PubMed, there was no definition offered under MeSH for “solid organ transplantation.” However, if the word "solid" was removed, the remaining terms “organ transplantation” was defined as transference of an organ between individual of the same species

or between individual of different species. The literature review was solely focused on organ transplantations from human to human. Utilizing the PubMed Search Builder using the phrases “de novo cancer screening in organ transplantation” yielded 34 citations. Malignancy was defined within the PubMed MeSH term as new abnormal growth of tissue. Malignant neoplasm shows a higher degree of anaplasia and has the properties of invasion and metastasis, compared to a benign tumor.

“De novo cancer” or “malignancy” within PubMed Mesh term did not offer any definition. In CINAHL Complete, the terms “cancer screening” and “organ transplantation” were again entered in two fields, which yielded 43 citations. In JSTOR the same phrases were utilized with the addition of “Health Sciences” as a limiting factor which yielded 22 citations. In Science Direct, the “Expert Search” was utilized using the same phrases as above with further qualifiers limited: “transplant recipients” yielding 33 results after removal of duplicates. A total of 132 articles were retrieved from the databases mentioned above.

Review of the above literature did not include any specific articles about heart transplantation and followed up care for screening of de novo malignancy. Therefore, the DNP student expanded the search to include the following terms: *follow-up phone calls, reminder systems to improve adherence, motivating patients with multiple phone calls*. At this time, in CINAHL utilizing the Advanced Search: "telephone follow-up calls" rendered 226 results; with the addition of inclusion criteria only to include: English Language, Adults, and Nursing, from 2010-2018, the search rendered six articles. In the advanced search of JSTOR, using the terms "follow up phone calls" and "clinic discharge," the search yielded 25 articles from 2010 to 2018. In Cochrane Library: Medical Terms (MeSH): Reminder Systems and Nursing as subheadings exploded all trees; the systematic reviews of Cochrane Database

included 22 articles. The above articles obtained from the database searches were critically reviewed for relevance and reliability using The John Hopkins Nursing Evidence-Based Practice Rating Scale (Newhouse, Dearholt, Poe, Pugh, & White, 2005) leaving a total of 28 articles only, deemed to be 1A and 1B.

Synthesis

For patients who are living with severe advanced heart failure, orthotopic heart transplantation (OHT) provides a means of significantly improving the quality of life in patients with end-stage heart failure (Linden, 2009). Solid organ transplant recipients need immunosuppressive drugs to avoid rejection of their transplanted heart. However, chronic exposure to chronic immunosuppression state decreases the ability of the immune system to fight against oncogenesis, and thus exposing the patient to increased risks of de novo cancer development (Acuna et al., 2017; Albugami et al., 2014; Chapman et al., 2013; Collins et al., 2012).

The literature search reiterated the importance of regular screening many times to reduce the burden of cancer development among solid organ recipients (Acuna et al., 2017; Albugami et al., 2014; Collins et al., 2012; Inamoto et al., 2015; Katabathina et al., 2015; Turkeli et al., 2016). There is no one kit, tool or recommendation for all solid transplanted organs for the monitoring of de novo malignancy (Acuna et al., 2017); nevertheless, a critical need exists for an evidenced-based screening tailored to an individualized type of surveillance (Acuna et al., 2017; Albugami et al., 2014; Collins et al., 2012; Inamoto et al., 2015; Katabathina et al., 2015; Turkeli et al., 2016).

The evidenced-based intervention for this study is the utilization of follow-up phone calls among adult heart transplant recipients. During the literature search, the DNP student did not find any study regarding follow-up phone calls for cancer screening specific to heart transplant

recipients or any solid organ recipients for that matter. However, there were significant numbers of studies for best practice guidelines regarding follow up phone calls to promote the transition of care among hospital discharged patients. Such studies noted that follow-up phone calls resulted with positive effects such as increased patient satisfaction, decreased patient's anxiety, reduced emergency room or hospital re-admissions, and, importantly, *improved adherence with the plan of care*, (Biese et al., 2014; Dudas et al., 2001; Fenerty et al., 2012; Harrison et al., 2011). Based on these findings, it is then possible to apply this same principle and utilize the intervention of a follow-up phone call to obtain similar positive results for the purpose of this project.

A study by Biese et al. (2014) showed that a telephone call expedited the follow up of older patients discharged from the emergency department with their primary care physicians. Adherence of patients to follow-up with other providers plays a crucial role in medical surveillance of chronic diseases (Lin & Wu, 2014). As providers amidst times of significant budgetary cuts, nurse practitioners are positioned uniquely to conduct telephone follow-up calls for continuity of care, especially to those vulnerable populations (Hannan, 2012). For select complex patients with extensive and complicated discharge plans, ideal post-discharge care may require more intensive interventions such as repeated phone calls by a clinician or home visits (Burke & Coleman, 2013; Soong et al., 2014). According to Dudas et al. (2001), post-discharge follow-up phone calls can identify essential opportunities for intervention, which can prevent future issues. The compelling results of follow-up phone calls were confirmed many times by later studies. A Cochrane systematic review examining the effects of follow-up phone calls on patient outcomes found some evidence of improved aftereffects such as adherence to post-discharge appointments without evidence of adverse events (Mistiaen & Poot, 2006; Soong et al.,

2014). Telephone follow-up plays an important role where information can be reinforced thereby increasing compliance (Beaver, Twomey, Witham, Foy, & Luker, 2006). Telephone follow-up intervention also reduces the number of health problems post-discharge, decreases the frequency and intensity of issues; furthermore, patients consider the information they received from the telephone follow up as valuable (Clari et al., 2015). Studies showed that patients with poor health benefited from the follow-up after hospital discharge, which could prevent an unnecessary burden on the community health system (Clari et al., 2015). Findings generally showed that early follow-up after hospital discharge was associated with improved patient outcomes (Zierler, 2017).

A systematic review and meta-analysis by Lin and Wu (2014) regarding the impact of short message service (SMS) or text messaging versus telephone reminders on the follow-up rate of patients concluded that SMS and telephone reminders could both significantly improve the follow-up rate of patients towards their plan of treatment. However, telephone reminders were more effective with a higher risk of bias compared to that of the SMS reminders. According to Lindsay (2003), telephone follow-up may be considered a socially complex intervention characterized by actions that are difficult to define and control, contain many contextual factors, and can vary from one patient to another. Studies have indicated the importance of a nurse-led follow up with patients (Young et al., 2013). Patients were satisfied to discuss sensitive issues over the phone (Beaver et al., 2006) and were not only receptive to but actively wanted such intervention as an addition to their health care (Cox & Wilson, 2003).

There are different ways to provide a person-centered follow up. A face-to-face approach would seem to be more effective, however, could be considered time-consuming, and more expensive for the patients; thus, less feasible given the economic climate (Clari et al., 2015).

Telephone follow-up can be an excellent way to provide health education on managing symptoms, recognizing complications earlier, and giving patient reassurance (Calijo & Hogendorf-burgers, 2010; Cox et al., 2003; Hartford, 2005). Different studies as noted earlier showed that patients with varying diagnoses benefited from telephone follow-up. This may be related to the fact that patients have the opportunity to ask further questions, or that the clinicians may be able to reinforce the contents of the care plan. As a result, the economical and effective intervention of a follow-up phone call ensured increased patients' satisfaction, proved to have fewer hospital re-admissions, and promoted better patients' compliance regarding their discharge instructions (Biese et al., 2014; Dudas et al., 2001; Fenerty et al., 2012; Harrison et al., 2011).

Conceptual Framework

The conceptual framework that the DNP student used for this project was the Self Care Deficit theory by Dorothy E. Orem (Appendix B). The Theory of Self Care posits that patients need to initiate self-care related activities to maintain health and well-being (Orem, 1997). The DNP student has always been a proponent that patients should take ownership of their health. A study by Hibbard and Greene (2013) showed rising evidence that patients who are more activated or involved in their care obtain better results and care experiences. Interventions and policies therefore aimed at promoting and establishing the patients' role in managing their health care should be measured (Hibbard & Greene, 2013). This DNP project intends ultimately to implement a practice change policy that would encourage a self-care response geared explicitly toward early cancer screening among adult heart transplant recipients at the project site.

Methods

Project Site and Population

The project site was in one of the advanced cardiac care out-patient clinics in an urban area. The stakeholders were the Medical Director of the Heart Failure, LVAD, and Heart Transplant Program; and the adult heart transplant cardiologists.

The study populations were the adult heart transplant recipients who came for their clinic visit. These patients were randomly selected from the caseload of the DNP student. The inclusion criteria included (1) > 18 years old, (2) s/p OHT > 1 year, (3) not currently being treated for cancer, (4) has access to either phone line or mobile phone. The exclusion criteria included (1) cognitively impaired individuals, (2) non-English speaking.

Those who fit the inclusion criteria were approached by the student to join the study. A total of 43 patients were approached, but only 41 (95%) consented to join the study. One (1) patient declined to join while the other one (1) was too sick to have consented.

Study Design

The convenience sample of consenting adult heart transplant participants (n= 41) was randomly divided into the control (n = 20) and intervention (n=21) groups. The intervention group received standard care plus follow-up phone calls at specific intervals specifically to remind them of de novo cancer screening. The control group received standard care.

In order to measure the outcomes of this DNP Project, the student utilized The Time Series Design or sometimes called the Interrupted Time Series (ITS). The Time Series Design or ITS utilizes observations at multiple time points on a group or individual before and after an intervention to check whether the intended intervention had an effect (Campbell et al., 1963; Penfold et al., 2013; Polit et al., 2004). Here, a string of consecutive observations equally spaced in time is interrupted by the imposition of a treatment or intervention (Harris et al., 2006). In this study, the DNP student placed a total of four phone calls space between 7-10 days to the

intervention group specifically for discussions regarding the importance of de novo cancer screening in the setting of immunosuppression. The control group received their routine care.

Measurement Instrument

The “Post Clinic Follow-up Phone Call Tool” (Appendix C) was designed by the DNP student specific to this project; it has not been tested before this project study. The design of this tool was patterned after the “How to Conduct a Postdischarge Follow up Phone Call” from the Re-Engineered Discharge (RED) Toolkit (RED, 2013). The tool served as a consistent guide for the DNP student during the intervention phase of the study specifically before, during and after the telephone follow-up.

Implementation/Procedures

The DNP student assembled a project team that included the DNP student as the project leader, a doctorally prepared faculty mentor from one public university in Western Massachusetts, and a doctorally prepared practice mentor from the project site. After the IRB approvals from both the public university (Appendix D) and project site were obtained, the DNP student proceeded with the implementation phase and data collection. The DNP student utilized the assistance of a statistician for guidance with the needed statistical computation.

Data Collection/Implementation

The data collection and the implementation phase were divided into three phases: (1) the pre-intervention phase, (2) the intervention phase, (3) and the post-intervention phase. The pre-intervention phase included the recruitment of participants. The intervention phase included the actual calling of the patient utilizing the principles of the Time Series design and the use of The Post Clinic Follow-up Phone Call Tool. The post-intervention phase included the data gathering, analysis, and interpretation.

Pre-Intervention phase. The pre-intervention phase included the recruitment of participants from November 26, 2018, to January 16, 2019, in the hours of 9 AM to 1 PM, Mondays to Thursdays. All patients were from the cohort of the DNP student who came for their routine, sick or post-hospitalization clinic visits.

All recruited patients were done in a face to face fashion. Once the patient expressed interest in joining the study, the student then explained the study in detail. Furthermore, the student also handed, read and explained to the patient the pre-printed statement in layman's term (Appendix E), which explained the relationship between chronic immunosuppression and de novo cancer development. At the end of the clinic encounter, signed consent was requested from the patient. Once the consent was obtained, the DNP student then proceeded to collect the needed data from the patients' charts. The clinic questionnaire form was utilized as a guide (Appendix F).

As noted above, 95% of the patients who were approached by the student consented to join the study. At the end of the recruitment dates, the DNP student randomly divided the selected patients to the control group and the intervention group. To do this, the student wrote the individual name of each participant in a small piece of paper and then placed inside a brown paper bag. The student then mixed well the names inside the paper bag drawing the first 21 names and assigned them to the intervention group. The remaining twenty names were assigned to the control group.

Intervention phase. The intervention phase was from January 28, 2018, to February 27, 2019. The control group did not receive any follow-up phone calls except at the last week of the intervention phase to ascertain whether the participants followed up or not with their cancer screening. The intervention group received a total of 4 calls at point intervals specifically to

remind them regarding de novo cancer screening. The patients took the opportunity to ask further questions and discussions. If attempts to speak with patients were unsuccessful, the student attempted to call 3 to 4 more times daily until contact was established. If after the third-day contact was not established, then the student waited until the next cycle.

Preparing for the call. Prior to calling the patients, the DNP student reviewed the participants' demographics, preferences as to when and whom to call, health status and present illness. The student also reviewed the diagnoses, plan of care, and in particular the discussion regarding follow up care with the relevant specialist for de novo cancer screening.

Conducting the telephone follow-up call. The DNP student introduced himself and reminded the patient of the purpose of the call. The student strictly followed the steps outlined in Follow-up Phone Calls, illustrated in Appendix C for accurate documentation and data gathering. "Have you seen or made a follow-up appointment with the required specialist"? "What made you do the follow up"? If the participant answered yes and provided a future date of appointment, then no further phone calls were made. Those participants who did not see or made an appointment with a specialist, an analysis as to their possible reasons (transportation, weather-related, busy, family reasons, recent hospitalizations and the like) were explored. Assistance was provided whenever it was applicable. For example, a number of the social worker was provided to the patient if it was necessary for transportation issues. A discussion of the effects of chronic immunosuppression regarding de novo malignancy was also reinforced.

Post-intervention phase. The post-intervention phase started on February 28, 2019, when all the telephone follow-up calls to both the intervention and control groups were completed. At this point, data were collected and analyzed to see whether the intervention was effective in prompting or motivating the heart transplant recipients to follow up with relevant

specialists for de novo cancer monitoring. Results from both the control and intervention groups were analyzed.

Statistical Analysis

An Excel spreadsheet was utilized for recording of collected data. The Statistical Program for the Social Science (SPSS, IBM Corp, Version 25) software was used for the analysis of the data. The chi-squared analysis was performed to compare the percent of screening between the intervention and control group.

Ethical Considerations/Protection of Human Subjects

Strict adherence to the Health Insurance Portability and Accountability Act of 1996 (HIPAA) was observed to ensure the confidentiality of the participant's Protected Health Information (HPI). All identifiable characteristics of the participants were eliminated. All electronic files containing identifiable information was password protected to prevent access by unauthorized users, and only the project leader had access to the said password.

All of the subjects were those who solely and freely volunteered to be participants; a copy of signed consent was provided to each participant. All subjects were educated about the consent and were advised multiple times that withdrawal from the project at any point in time will have no repercussions. Risks and benefits were explained to the subjects; there was no potential health risk expected from the project. No monetary compensation was provided to the participants; likewise, there was no associated cost from the participants as well. The data gathered after the study was destroyed per the institution policy.

Result

Socio-Demographics of Study Participants

The total sample size of the study was 41 (control group n=20; intervention group n=21). The mean age of the total population size was 60.3 (SD=12.36). Among the total participants, 32 (78%) were male, and 9 (22 %) were female. There were 26 (63 %) White, 9 (22%) Black, and 2 (5%) Hispanic, Asian and others respectively. 9 (22%) participants were single, 29 (71%) were married, and 3 (7%) were divorced. Of these participants, 3 (7%) had elementary schooling, 10 (24%) were high school graduates, 7 (17%) had some college degree, 13 (31%) finished college and 8(20%) obtained graduate school degrees. Employment wise, 18 (44%) participants are still working, 10 (24%) are disabled and 13 (32%) are retired. Income wise, 2 (5%) indicated an income between \$10,000 - \$30,000, and 39 (95%) stipulated an income more than \$30,000 annually. Table 1 in Appendix G outlines the specific socio-demographic profiles between the two groups.

History of Illness

The history of illness was limited to include only whether the patient had malignancy before or after transplantation, history of rejection (cellular or antibody mediated), other solid organ transplantation and number of years from initial transplantation. From the total population, 31(76%) participants had no history of cancer and 10 (24%) had a past medical history of cancer prior to heart transplantation. 30 participants (73%) had no history of cellular or antibody-mediated rejections, while 11 (27 %) had a history of either cellular or antibody-mediated rejections. 2 (5%) of the participants had two solid organ transplantations while the rest (39%) only had a heart transplant history. 16 of these participants (39%) were recently transplanted between 1-5 years, 8 (20%) were transplanted between 5-10 years, 11 (27%) between 10-15 years, and 6 (14.6 %) between 15-20 years. None of the participants were beyond twenty years

of post-heart transplantation. Table 2 in Appendix H outlines in detail the comparison of the history of illness between the control and intervention groups.

Intervention Group Follow-up Phone Calls

Multiple calls at time intervals between 7-10 days were placed to the intervention group from January 28, 2019, thru February 27, 2019.

First phone call. The participants in the intervention group received their first call on January 28, 2019, thru January 30, 2019. All answered the call except for one who was outside of the country at that time. One participant was removed from the study due to recurrence of malignancy. One patient already saw a specialist attributing the reason for the follow-up to the earlier specific discussion about the possible increased risk of de novo malignancy among heart transplant patients. 2 (11%) participants indicated that they were not able to see a specialist due to weather-related issue, 10 (56%) participants said they were busy, 3 (17%) indicated that they forgot, and another 3 (17%) participants stated that were either recently discharged from the hospital or were dealing with other health issues (Appendix I).

Second phone call. The intervention group received the second cycle of calls from February 6, 2019, thru February 8, 2019. During the second cycle of the phone call, two participants were not reachable by phone. One participant was able to obtain a specialist appointment on April 3, 2019. In addition, 5 of the participants (27.2%) saw the specialist. At this point in time, there were already a total of 6 participants who saw the patient. All of these 6 participants including the one who made the appointment on April 3, 2019 indicated that the reason for their decision to seek de novo cancer screening was because of the discussions during the first phone call. Those who did not see the specialist or made an appointment stipulated that they all want to see a specialist except for one person who had difficulty walking at that time.

The different reasons why the other participants did not see a specialist is illustrated in Appendix J.

Third phone call. The third cycle of follow-up phone call started on February 16, 2019, to February 19, 2019. At this time one more participant saw a specialist attributing the reason for their follow-up to the earlier discussions regarding the development of de novo malignancy among solid organ recipients. During this time, nobody indicated “forgetting” as the reason for not following up with a specialist. Of the remaining participants, 2 individuals (25%) indicated that insurance related issue or requirement prevented them from seeing the specialist, (i.e., they need to see their PCP first), 3 (37.5%) stated that recent hospitalization prevented them from seeing a specialist, 2 patients (25%) indicated family reasons, and 1 (12.5%) individual stated that having lots of things to do (busy) was the reason for not seeing a specialist. At this time there was no weather-related issue that was indicated by the participants as the reason for not following up with a specialist. All participants who did not see or make an appointment indicated that they all have the intent to see a specialist at some point due to the prior discussions (Appendix K). The same two participants, who did not respond during the second cycle, neither answered the phone calls again nor returned the requested messages for a callback. The student removed the two participants from the study.

Fourth call. The fourth call was placed on February 27, 2019. This was the last phone call for the intervention group. At this time 2 additional participants saw the specialist citing the discussions on prior phone calls as a motivating factor for early cancer de novo screening. One participant indicated a scheduled specialist appointment during the second week of April. Those who were not able to see a specialist or make an appointment stipulated: 1 participant (14%) due to insurance issues, 2 participants (28%)- busy, 1 participant (14%)- due to recent hospitalization

or dealing with other current health issues, and 3 participants (42%) cited family issues (Appendix L).

Control Group Follow-up Phone Call

The participants in the control group received one phone call from February 25, 2019, to February 27, 2019, to check whether they followed up to see a specialist for de novo cancer monitoring or screening. 3 participants (15%) stated that they saw a specialist. All three participants indicated that the specific discussion solely geared towards cancer screening during their last clinic visit motivated them for de novo cancer screening.

Two participants in the control group did not respond or call back within the allotted time. They were removed from the study. One participant underwent chemotherapy treatment and was also removed from the study. Of the remaining participants in the control group, 14 (82.3%) did not see a specialist or make any appointment for de novo cancer screening. However, all of them indicated that they will follow up with a specialist in the near future for de novo cancer screening. Out of these 14 participants, 4 (28.5%) patients indicated that they were busy; 8 patients (57%) stated that they forgot, and 2 patients (14%) indicated that they just left the hospital (Appendix M).

Comparison of Intervention vs. Control Group

The intervention resulted in a statistically significant difference ($\chi^2(1) = 4.062$, $p=0.044 < .05$) between the control and the intervention groups for timely cancer screening. Patients in the intervention and control groups differed significantly in their cancer screening follow-up with a specialist. The intervention group had a 50% follow-up with a specialist compared to the 15% follow up-rate of the control group. Please refer to the Chi Square Table in Appendix N.

Discussion

The literature review showed that despite the current knowledge regarding the increased risk of cancer development among solid organ recipients (e.g., heart), cancer screenings are not done routinely or aggressively (Turkeli et al., 2016). Solid organ recipients (e.g., heart) who receive a later diagnosis of cancer compared to an early diagnosis have poorer outcomes compared to those who had early identification and treatment (Collins et al., 2012).

The evidenced-based intervention for this study was the utilization of follow-up phone calls among adult heart transplant recipients. The assumption of the study was that multiple follow-up phone calls as an intervention would prompt heart transplant patients for an individualized cancer screening specific to their health situation. As was mentioned earlier, various studies showed that follow-up phone calls resulted in increased patient satisfaction, reduced emergency room or hospital re-admissions, and, improved adherence with the plan of care, (Biese et al., 2014; Dudas et al., 2001; Fenerty et al., 2012; Harrison et al., 2011). This was also affirmed by other studies such as the Cochrane Systematic Review indicating an improved in adherence to post-discharge appointments (Mistiaen & Poot, 2006; Soong et al., 2014). Furthermore, Patients consider the information they received from the telephone follow-up as valuable (Beaver, Twomey, Witham, Foy, & Luker, 2006) and thus by the reinforcement of information results in increased compliance to instructions (Beaver, Twomey, Witham, Foy, & Luker, 2006).

The result of this DNP study does seem to also affirm the above-cited studies. The statistical analysis on this project showed a significant difference in the number of follow-up rate with a specialist between the intervention (50%) and control groups (15%), Chi square: $\chi^2 = 4.062$, $df = 1$ $p = 0.044$. Moreover, it is worth noting that within the period of the intervention

phase, two other participants in the intervention group had set appointment dates with a specialist. They were not included in the total tally of those who actually saw the specialists, because they were outside of the intervention phase period. So had the intervention phase been scheduled up to the second week of April, then those who have seen the specialist would have been up to 61%. In contrast, while 15% of the participants in the control group saw the specialist, no one of those who did not see the specialist made any future appointment.

In this study, the intervention group received a total of four phone calls. Each phone call to every participant did not only include a reminder for him or her to follow-up with a specialist but more so a discussion and counseling regarding the effects of chronic immunosuppression state to one's overall health. The follow-up phone calls provided the participant and the DNP student an opportunity for a thoughtful and individualized discussion regarding the participant's specific cancer screening and other health or medical needs.

All participants who either saw a specialist or made an appointment in the near future indicated that the motivating factor for them was the follow-up phone calls along with the discussion and counseling that went with it. It is worth noting that all participants who did not see a specialist or made an appointment, in both the intervention and control groups did verbalize the importance of cancer screening for de novo malignancy. Not one of these participants in the control or intervention group indicated that cancer screening was not important or necessary. The most indicated reasons why the participants did not see a specialist were: (1) weather-related, (2) insurance issue, (3) busy, (4) forgot, (5) recent hospitalizations, and (5) family reasons.

Unlike the control group which received only one phone call (Appendix M), the frequencies and the percentages of the above-noted reasons in the intervention group varied from

the first thru the fourth telephone calls. For example, the percentages of those who stated that they “forgot” to follow-up were higher in the first and second calls compared to the third and phone calls. Likewise, compared to the first and second calls, there was an increase in the number of “family issues” as a reason why the participants did not see a specialist during the third and fourth calls which fell during around the President’s Day. Several of the participants were away with their family on a short vacation trip. The different tables in Appendices I thru L illustrate in detail the above point. Future research may be indicated to explain the variances of these responses.

Practice Implications

Repeated telephone follow-up calls as an intervention after a patient’s clinic visit is a feasible form of patient contact to support continuity of care in the outpatient area. It does seem to appear from this particular study that the individualized follow-up phone calls of a nurse practitioner yielded positive results regarding the patients’ compliance with cancer screening. For complex patients with extensive health history, a more intensive intervention like repeated phone calls may be necessary (Burke & Coleman, 2013; Soong et al., 2014). As providers amidst the budgetary cuts and economic climate, nurse practitioners are uniquely positioned to conduct telephone calls for continuity of care (Hannan, 2012).

Facilitators and Barriers

The setting facilitators were the noted stakeholders above. The DNP student found that most of the staffs and cardiologists and other nurse practitioners were supportive of the study. The barriers that were experienced by the student were (1) skepticism by a few of the staff members, (2) lack of time or shortage of internal resources such as staffing issues and, (3) resistance to change. According to Henderson (2012), transferring research findings into clinical

practice is a slow process, and the uptake is variable and haphazard. As stated earlier, the approach regarding discussion and follow-up regarding de novo malignant development among heart transplant providers varies from one provider to another. Implementing a protocol change regarding the aforementioned may be particularly challenging, and may be hindered by broad factors such as the organizational culture, external policy drivers, and health professional perceptions of the problem or style of management (Henderson, 2012).

Limitation of the Study

There are several limitations to this study. First, the subject population is small and was carried in one Transplant Center Only. Second, the student had minimal clinic days during the recruitment phase due to the major holidays (Thanksgiving, Christmas, New Year). This in part affected the number of recruited participants. Furthermore, the intervention phase also fell after the New Year and the President's day where several of the participants were away on vacation. This affected in part some of the participants' responses to the follow-up phone calls, and also in making the necessary appointments to the specialists. Third, another limitation of this study was time. The intervention phase was only done in 31 days. The follow-up phone calls which were 7-10 days apart may have been too close to one another. Fourth, the "follow-up phone call tool" which the DNP student utilized as a guide during the intervention phase has not been tested in prior studies. Some of the verbiage used as a reason for not following (e.g., busy, family issues) may be overlapping. It needed more definition.

Study Strengths

The organization where the study was done supports research studies for improvement in the excellence of patient care. The above-noted stakeholders were also supportive of the study. As was noted earlier, all the participants were from the cohort of patients of the DNP student.

The student has been their provider for at least five years. Therefore, a certain level of trust had been established already.

Furthermore, the participants were more responsive when contacted by the student. However, given the fact that the participants are patients of the DNP student, it is worth noting that during the recruitment and intervention phases of the study, careful consideration was observed to avoid soft coercion for the participants to either join or continue with the study. The participants were reminded many times that there would be no repercussions or explanations required if they decided not to participate or stay with the study. However, it is noteworthy to mention that the majority of those who consented verbally expressed their desire to freely join the project as their small contribution to the second chance in life.

Cost-Benefit Analysis/Budget

The cost of this DNP project was minimal (Appendix N). The student was the leader of the project. The student and the stakeholders are also employees of the heart transplant program and therefore incurred no additional expenses during the meeting sessions before, during and after the study. The student utilized the free services of a statistician. All participants were voluntary; there were no monetary payments or benefits provided to them.

Given the positive result of the study, the potential benefit of this project is substantial both in terms of human life and financial savings from the hospital and the overall healthcare system. Supposing that if a conservative estimate of only 25% (instead of the 50%) who followed up with a specialist were diagnosed with a de novo malignancy in their early stages, then these would translate to early modulation of their immunosuppression and intervention of the specialists. These would translate to about 17, 299 number of patients from the total heart transplant patients noted from the recent national data of UNOS. One can then presuppose that

these conservative estimate of 17, 299 patients may have a potentially limited hospital admission compared to a complicated full-blown malignancy admission in the setting of chronic immunosuppression.

There are many complications that full-blown cancer can bring about in heart transplant patients given their immunosuppression state. One example of many is septicemia, which would now require the services of other specialists, a critical care unit bed, and services, thus escalating higher potential costs. Septicemia was the most expensive condition treated in 2013 accounting for 23.7 billion dollars (Torio & Moore, 2016). Furthermore, re-admissions occurring after severe sepsis is commonly occurring within the first 30 days; incurring significant mortality and cost (Goodwin, Rice, Simpson, & Ford, 2015). The point here is not to highlight that heart transplant recipients' hospitalizations are either septicemic or fatal, but that the simple preventive measure proposed by this DNP project could potentially benefit others by avoiding such staggering human and financial costs.

Conclusion

The purpose of this project was to examine the effectiveness of multiple follow-up phone calls placed as an intervention several days after the clinic visits of adult heart transplant recipients. The result of the study showed that repeated telephone follow-up calls are feasible as an intervention after the patient's clinic visit to support continuity of care in the outpatient setting. The intervention yielded a positive result showing an increase in de novo cancer screening among the participants in the intervention group compared to the control group. These positive findings are similar to the different studies noted earlier regarding the benefits of telephone follow-up care. This may be related to the fact that the heart transplant recipients had

the opportunity to ask more deliberate and thoughtful questions, and the student to counsel and further discuss with them their individualized and specific plan of care.

The result of this DNP Project supports that multiple follow-up phone calls as an intervention can bring about positive effect on these heart transplant recipients with complex health issues. Early identification of de novo malignancy is critical because it could provide the transplant team at the time of diagnosis, the ability to modulate early the immunosuppression regimen in collaboration with the treatment plan of the specialist. This is to avoid further complications in what is already a complicated medical condition, thus avoiding unnecessary human sufferings and financial cost.

References

- Acuna, S. A., Huang, J. W., Dossa, F., Shah, P. S., Kim, S., & Baxter, N. (2017). Cancer Recurrence after solid organ transplantation: A systematic review and meta-analysis. *Transplantation Reviews*. <http://dx.doi.org/10.1016/j.trre.2017.08.003>
- Agency for Research Health and Quality (AHRQ). (2013.).
<https://www.ahrq.gov/professionals/systems/hospital/red/toolkit/index.html>
- Alba, A. C., Bain, E., Ng, N., Stein, M., O'Brien, K., Foroutan, F., & Ross, H. (2016). Complications after heart transplantation: hope for the best, but prepare for the worst. *International Journal of Transplantation Research and Medicine*, 2(2), 1-11. Retrieved from <https://www.clinmedjournals.org/articles/ijtrm/international-journal-of-transplantation-research-and-medicine-ijtrm-2-022.pdf>
- Albugami, M., & Kiberd, B. (2014). Pre and post transplantation strategies. *Transplantation Reviews*, 28, 76-82. Retrieved from www.elsevier.com/locate/trre
- Beaver, K., Twomey, M., Witham, G., Foy, S., & Luker, K. A. (2006). Meeting the information needs of women with breast cancer: piloting a nurse-led intervention. *European Journal of Oncology Nursing*, 10(5), 378-390. <http://dx.doi.org/10.1016/j.ejon.2006.02.004>
- Biese, K., LaMantia, M., Shofer, F., McCall, B., Robers, E., Stearns, S. C., ... Busby-Whitehead, J. (2014). A randomized trial exploring the effect of a telephone call follow-up on care plan compliance among older adults discharged home from the emergency department. *Official Journal of the Society for Academic Emergency Medicine*, 21(2), 188-195.
<http://dx.doi.org/10.1111/acem.12308>
- Burke, R. E., & Coleman, E. A. (2013). Interventions to decrease hospital readmissions. *JAMA Intern Med*, 173(8), 695-698. <http://dx.doi.org/10.1001/jamainternmed.2013.171>

- Calijouw, M. A., & Hogendorf-burgers, M. E. (2010). Gynotel: telephone advice to gynecological surgical patients after discharge. *Journal of Clinical Nursing*, 19(23-24), 3301-3306. <http://dx.doi.org/10.1111/j.1365-2702.2010.03395.x>
- Campbell, D. T., & Stanley, J. C. (1963). *Experimental and quasi-experimental designs for research*. Retrieved from <https://www.sfu.ca/~palys/Campbell&Stanley-1959-Exptl&QuasiExptlDesignsForResearch.pdf>
- Chapman, J. R., Webster, A. C., & Wong, G. (2013). Cancer in the transplant recipient. *Cold Spring Harbor Perspectives in Medicine*, 3, 1-15. <http://dx.doi.org/10.1101/cshperspect.a015677>
- Chen, M., Li, P., & Lin, F. (2016). Influence of structured telephone follow-up on patient compliance with rehabilitation after total knee arthroplasty. *Patient Preference and Adherence*, 10, 257-264. <http://dx.doi.org/10.2147/PPA.S102156>
- Clari, M., Frigerio, S., Ricceri, F., Pici, A., Alvaro, R., & Dimonte, V. (2015). Follow-up telephone calls to patients discharged after undergoing orthopedic surgery: double blind, randomized controlled trial of efficacy. *Journal of Clinical Nursing*, 24(19-20), 2736-2744. <http://dx.doi.org/10.1111/jocn.12795>
- Collins, M. G., Teo, E., Cole, S. R., Chan, C., McDonald, S. P., Russ, G. R., ... Coates, P. (2012). Screening for colorectal cancer and advanced colorectal neoplasia in kidney transplant recipients: cross sectional prevalence and diagnostic accuracy study of faecal immunochemical testing for hemoglobin and colonoscopy. *British Medical Journal*, 345(7871), 17. Retrieved from <http://www.jstor.org/stable/23278235>
- Cox, K., & Wilson, E. (2003). Follow-up for people with cancer; nurse-led services and telephone interventions. *Journal of Advanced Nursing*. Retrieved from

<https://onlinelibrary-wiley-com.silk.library.umass.edu/doi/10.1046/j.1365-2648.2003.02672.x>

- Dudas, V., Bookwalter, T., Kerr, K. M., & Pantilat, S. Z. (2001). The impact of follow-up telephone calls to patients after hospitalization. *The American Journal of Medicine*, *111*(9B), 26-30. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/11790365>
- Engels, E. A., Pfeiffer, R. M., Fraumeni Jr, J. F., Kasiske, B. L., Israni, A. K., Wolfe, R. A., & Goodrich, N. P. (2011). Spectrum of cancer risk among U.S. solid organ transplant recipients: The transplant cancer match study. *Journal of the American Medical Association*, *306*(17), 1891-1901. <http://dx.doi.org/10.1001/jama.2011.1592>.
- Fenerty, S. D., West, C., Davis, S. A., Kaplan, S. G., & Feldman, S. R. (2012). The effect of reminder systems on patients' adherence to treatment. *Patient Preference and Adherence*, *6*, 127-135. <http://dx.doi.org/10.2147/PPA.S26314>
- Gawlinski, A., & Rutledge, D. (2008). Selecting a model for evidence-based practice changes: A practical approach. *AACN Advanced Critical Care*, *19*(3), 291-300. Retrieved from <http://www.kau.edu.sa/Files/0004020/Subjects/EBP%20Changes%20project.pdf>
- Goodwin, A. J., Rice, D. A., Simpson, K. N., & Ford, D. W. (2015). Frequency, cost and risk factors of readmissions among severe sepsis survivors. *Critical Care Medicine*, *43*(4), 478-746. <http://dx.doi.org/10.1097%2FCCM.0000000000000859>
- Hannan, J. (2012). APN telephone follow up to low income first time mothers. *Journal of Clinical Nursing*, *22*(), 262-270. <http://dx.doi.org/10.1111/j.1365-2702.2011.04065.x>
- Harris, A. D., McGregor, J. C., Perencevich, E. N., Furuno, J. P., Zhu, J., Peterson, D. E., & Finkelstein, J. (2006). The use and interpretation of quasi-experimental studies in medical

- informatics. *Journal of American Medical Informatics Association*, 13(1), 16-23.
<http://dx.doi.org/10.1197%2Fjamia.M1749>
- Harrison, P. L., Hara, P. A., Pope, J. E., Young, M. C., & Rula, E. Y. (2011). The impact of postdischarge telephonic follow-up on hospital readmissions. *Population Health Management*, 14, 27-32. <http://dx.doi.org/10.1089/pop.2009.0076>
- Hibbard, J. H., & Greene, J. (2013). What the evidence shows about patient activation: Better health outcomes and care experiences; fewer data on costs. *Health Affairs*, 32(2), 207-214. <http://dx.doi.org/10.1377/hlthaff.2012.1061>.
- Inamoto, Y., Shah, N., Savani, B., Abraham, A., Ahmed, I., Akpek, G., ... Majhail, N. (2015). Secondary solid cancer screening following hematopoietic cell transplantation. *Bone Marrow Transplant*, 50(8), 1013-1023. <http://dx.doi.org/10.1038/bmt.2015.63>.
- Katabathina, V. S., Menias, C. O., Tammiseti, V. S., Lubner, M. G., Kielar, A., Shaaban, A., ... Hara, A. K. (2015). Malignancy after solid organ transplantation: comprehensive imaging review. *Radiographics*, 36(5). <http://dx.doi.org/10.1148/rg.2016150175>
- Linden, P. K. (2009). History of solid organ transplantation and organ donation. *Critical Care Clinics*, 25(1), 165-184. <http://dx.doi.org/10.1016/j.ccc.2008.12.001>
- Losh, S. C. (2017). Quasi-Experiments, internal validity and experiments II. Retrieved from <http://myweb.fsu.edu/slosh/MethodsGuide4.html>
- Lund, L. H., Edwards, L. B., Kucheryavaya, A. Y., Dipchand, A. I., Benden, C., Christie, J. D., ... Stehlik, J. (2013). The registry of the International Society for Heart and Lung Transplantation: Thirtieth official adult heart transplant report-2013; Focus Theme age. *The Journal of Heart and Lung Transplantation*, 32(10), 951-964.
<http://dx.doi.org/10.1016/j.healun.2013.08.006>

- Mistiaen, P., & Poot, E. (2006). Telephone follow-up, initiated by a hospital based health professional, for postdischarge problems in patients discharged from hospital to home. *Cochrane Database of Systematic Reviews*, 8(4).
<http://dx.doi.org/10.1002/14651858.CD004510.pub3>
- Moran, K., Burson, R., & Conrad, D. (2017). *The doctor of nursing practice scholarly project* (2 ed.). Burlington, MA: Jones & Barlett.
- Newhouse, R., Dearholt, S., Poe, S., Pugh, L. C., & White, K. (2005). JHNEBP evidence rating scales. In *The Johns Hopkins nursing evidence-based practice rating scale*. Baltimore, MD: The John Hopkins Hospital; Johns Hopkins University School of Nursing.
- Orem, D. E. (1997). Views of human beings specific to Nursing. *Nursing Science Quarterly*, 10(1), 26-28. Retrieved from
<http://journals.sagepub.com/silk.library.umass.edu/doi/pdf/10.1177/089431849701000110>
- Penfold, R. B., & Zhang, F. (2013). Use of interrupted time series analysis in evaluating health care quality improvements. *Academic Pediatrics*, 13(6), 38-44.
<http://dx.doi.org/https://doi.org/10.1016/j.acap.2013.08.002>
- Piselli, P., Verdirosi, D., Cimaglia, C., Busnach, G., Fratino, L., Ettorre, G. M., ... Serraino, D. (2014). Epidemiology of de novo malignancies after solid organ transplantation: Immunosuppression, infection and other risk factors. *Clinical Obstetrics and Gynaecology*, 28, 1251-1265. <http://dx.doi.org/10.1016/j.bpobgyn.2014.08.007>
- Polit, D. F., & Beck, C. T. (2004). *Nursing research principles and methods* (7 ed.). Philadelphia, PA: Lippincott Williams & Wilkins.

Rau, J. (2014, October 2). Medicare fines 2,610 hospitals in third round of readmission penalties.

Kaiser Health News. Retrieved from <https://khn.org/news/medicare-readmissions-penalties-2015/>

Torio, C. M., & Moore, B. J. (2016). National inpatient hospital costs: the most expensive conditions by payer, 2013. Retrieved from [https://hcup-](https://hcup-us.ahrq.gov/reports/statbriefs/sb204-Most-Expensive-Hospital-Conditions.jsp)

[us.ahrq.gov/reports/statbriefs/sb204-Most-Expensive-Hospital-Conditions.jsp](https://hcup-us.ahrq.gov/reports/statbriefs/sb204-Most-Expensive-Hospital-Conditions.jsp)

Turkeli, M., Simsek, M., Aldemir, M. N., Yildirim, N., Cankaya, E., Erdemci, B., ... Korkut, E.

(2016). Are we late in the diagnosis of Malignities occurring in solid organ transplant patients" 11 years' experience. *The Eurasian Journal of Medicine*, 48, 33-66.

<http://dx.doi.org/10.5152/eurasianjmed.2015.0087>

United Network for Organ Sharing. (July 12, 2018). [https://unos.org/data/transplant-](https://unos.org/data/transplant-trends/transplants-by-organ-type/)

[trends/transplants-by-organ-type/](https://unos.org/data/transplant-trends/transplants-by-organ-type/)

Vial, T., & Descotes, J. (2003). Immunosuppressive drugs and cancer. *Toxicology*, 185, 229-240.

Retrieved from [https://ac-els-cdn-com.silk.library.umass.edu/S0300483X02006121/1-](https://ac-els-cdn-com.silk.library.umass.edu/S0300483X02006121/1-s2.0-S0300483X02006121-main.pdf?_tid=91dbf74e-1421-11e8-b247-00000aab0f26&acdnat=1518899693_ec0b7c1cf3a8e089ad0ef0a863ac6d2b)

[s2.0-S0300483X02006121-main.pdf?_tid=91dbf74e-1421-11e8-b247-](https://ac-els-cdn-com.silk.library.umass.edu/S0300483X02006121/1-s2.0-S0300483X02006121-main.pdf?_tid=91dbf74e-1421-11e8-b247-00000aab0f26&acdnat=1518899693_ec0b7c1cf3a8e089ad0ef0a863ac6d2b)

[00000aab0f26&acdnat=1518899693_ec0b7c1cf3a8e089ad0ef0a863ac6d2b](https://ac-els-cdn-com.silk.library.umass.edu/S0300483X02006121/1-s2.0-S0300483X02006121-main.pdf?_tid=91dbf74e-1421-11e8-b247-00000aab0f26&acdnat=1518899693_ec0b7c1cf3a8e089ad0ef0a863ac6d2b)

Youn, J. C., Stehlik, J., Wilk, A. R., Cherikh, W., Kim, I. C., Park, G. H., ... Kobashigawa, J. A.

(2018). Temporal trend of de novo malignancy development after heart transplantation.

Journal of the American College of Cardiology, 71(1), 40-49.

<http://dx.doi.org/10.1016/j.jacc.2017.10.077>

Young, J. M., Butow, P. N., Walsh, J., Durcinoska, I., Dobbins, T. A., Rodwell, L., ... Solomon,

M. J. (2013). Multicenter randomized trial of centralized nurse-led telephone based care

coordination to improve outcomes after surgical resection for colorectal cancer: The

CONNECT intervention. *Journal of Clinical Oncology*, 31(28), 3585-3592.

<http://dx.doi.org/10.1200/JCO.2012.48.1036>

Zierler, A. (Ed.). (2017). Effect of early follow-up after hospital discharge on outcomes in patients with heart failure and chronic obstructive pulmonary disease: A systematic Review [Entire issue]. *Health Quality Ontario*, 17(8). Retrieved from <http://www.hqontario.ca/Evidence-to-Improve-Care/Journal-Ontario-Health-Technology-Assessment-Series>

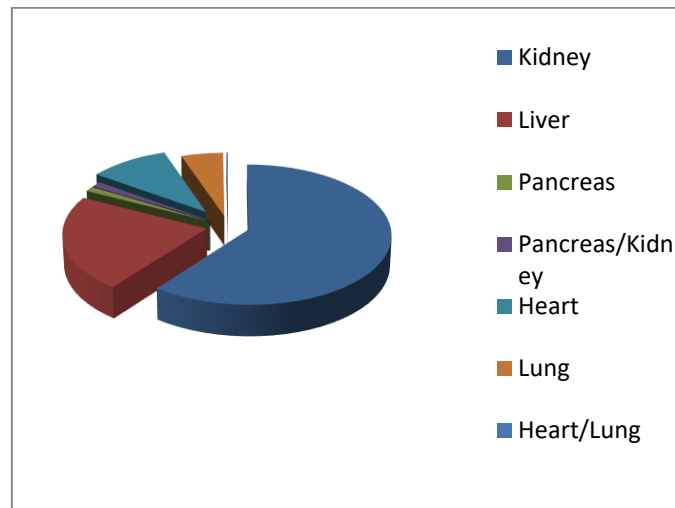
Appendix A

National Data

Transplants by Organ Type January 1, 1988 - January 31, 2018

Based on OPTN data as of February 18, 2018

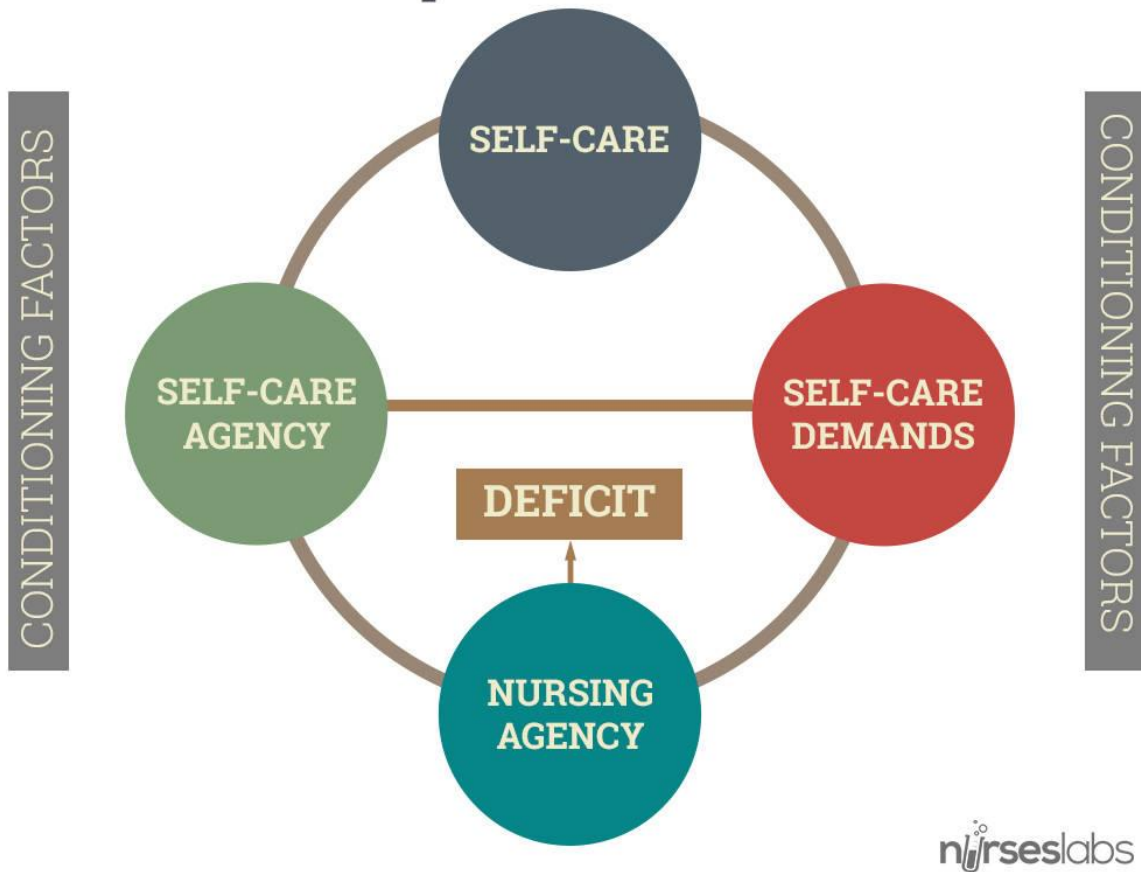
Organ	Transplants
Total	724,355
Kidney	426,842
Liver	156,587
Pancreas	8,577
Kidney / Pancreas	22,967
Heart	69,198
Lung	36,003
Heart / Lung	1,232
Intestine	2,921
Abdominal Wall	1
Head & Neck: Craniofacial	5
Head & Neck: Scalp	1
GU: Penile	1
GU: Uterus	10
Upper Limb: Bilateral	6
Upper Limb: Unilateral	4
Total	724,355



Source: 2018 United Network for Organ Sharing, a non –profit 501 (c) (3) organization
<https://unos.org/data/transplant-trends/transplants-by-organ-type>

Appendix B
Dorothea Orem Self Care Theory Diagram

Orem's Self-Care Theory
Conceptual Framework



Source: <https://nurseslabs.com/dorothea-orems-self-care-theory>

Appendix C
Post Clinic Follow-up Phone Calls

Intervention Group: _____

Control Group: _____

Date of Phone Call: _____

Pt Initials: _____

MRN: _____

Number of Phone Calls: _____

Patient Terminated Participation: ____ (Thank the patient for his/her time.)

Phone Call:

- Hello Mr./Ms./Mrs. _____. I am Angelo C. Mabasa, DNP student. I spoke to you about _____ days or weeks ago. As discussed, I am calling you to follow up regarding the cancer screening we spoke about.
- May I continue? → If the patient does not wish to continue, politely inquire if he or she wants to drop out of the study; if not ascertain the best time to call back.
- If the patient wishes to continue with the phone call; proceed with the following questions:
 - **Have you seen any doctor/provider/specialist specific to cancer screening?**
 - If yes:
 - When did you make the phone call? _____
 - When did you actually see the specialist? _____
 - What made you do the follow up? _____
 - Thank you for participating in the study. I will no longer call you back.
 - If No:
 - Can you tell me why you were not able to follow up with the specialist _____? (e.g. busy, family reasons, forgot, recent hospitalizations, others)
 - Or
 - Was it due to a transportation issue? (If yes, provide the phone number of the cardiac transplant social work department XXX-XXX-XXXX)
 - Was it due to a weather-related issue?
 - Was it due to a monetary issue?
 - Was it due to a work-related issue?
 - Was it due to the insurance issue? (If yes, provide the phone number of the Cardiac transplant social work department XXX-XXX-XXXX)
 - Was it because you did not think it was important to follow up?

- Other reasons: (e.g. Cultural, intentional or inadvertent reasons, etc.)
-

- **REINFORCE EFFECT OF IMMUNOSUPPRESSION ON DE NOVO CANCER DEVELOPMENT. THEN ASK THE PATIENT IF HE/SHE HAS ANY QUESTION.**

- **Remind patient that you will be calling again in 7-10 days if acceptable.**

Appendix D

IRB Letter of Approval University of Massachusetts Amherst



University of Massachusetts Amherst
108 Research Administration Bldg.
70 Butlerfield Terrace
Amherst, MA 01003-9242

**Research Compliance
Human Research Protection Office (HRPO)**
Telephone : (413) 545-3428
FAX (413) 577-1728

Certification of Human Subjects Approval

Date: November 8, 2018
To: Angelo Mabasa, Nursing
Other Investigator: Jeungok Choi, Nursing
From: Lynette Leidy Sievert, Chair, UMASS IRB

Protocol Title: De Novo Cancer Monitoring for Adult Heart Transplant Patients to Improve Early Detection and Intervention
Protocol ID: 2018-5186
Review Type: EXPEDITED - NEW
Paragraph ID: 7
Approval Date: 11/08/2018
Expiration Date: 11/07/2019
OGCA #:

This study has been reviewed and approved by the University of Massachusetts Amherst IRB, Federal Wide Assurance #00003909. Approval is granted with the understanding that investigator(s) are responsible for:

Revisions - All changes to the study (e.g. protocol, recruitment materials, consent form, additional key personnel), must be submitted for approval in e-protocol before instituting the changes. New personnel must have completed CITI training.

Renewals - All renewals need to be submitted at least 2 weeks prior to the expiration date listed on this approval letter.

Final Reports - Notify the IRB when your study is complete by submitting a Final Report Form in e-protocol.

Consent forms - A copy of the approved consent form (with the IRB stamp) must be used for each participant (Please note: Online consent forms will not be stamped). Investigators must retain copies of signed consent forms for six (6) years after close of the grant, or three (3) years if unfunded.

Use only IRB-approved study materials (e.g., questionnaires, letters, advertisements, flyers, scripts, etc.) in your research.

Unanticipated problems involving risks to participants or others - All such events must be reported in e-protocol as soon as possible, but no later than five (5) working days.

Please contact the Human Research Protection Office if you have any further questions. Best wishes for a successful project.

Appendix E
Chronic Immunosuppression and De Novo Cancer Development

Hello Mr./Ms./Mrs. _____. Thank you for participating in this study. As you well know, you are taking immunosuppressive medications to avoid rejection of your transplanted heart.

These immunosuppressive medications (Neoral or Cyclosporine; Prograf or Tacrolimus; Cellcept or Mycophenolate; Myfortic; Rapamune or Rapamycin; Everolimus or Zortress; or others which are not mentioned here) reduces your body's ability to fight against many things including cancer cells. **Recent studies showed that solid organ recipients (example heart) have a 2-3 increased risk of developing de novo (or new) cancer in their lifetime.**

It is therefore crucial that you keep a regular cancer screening schedule follow-up with other providers so that early development of any cancer is detected early. These providers or specialists may be your dermatologist (skin), gastroenterologist (stomach), urologist (prostate), hematologist (blood), nephrologist (kidney) and others.

If you have not made any appointment or gone to see any of the above specialist/s, it is highly recommended that you follow up sooner rather than later for reasons noted above.

Appendix F
Clinic Questionnaire Form

Intervention Group: ____

Control Group: ____

Today's Date: _____

Name: _____ (Initials Only)

MRN: _____ (Will be completed by the project study leader)

Sex: (Please choose one by indicating a check "✓" mark.)

Male ____

Female ____

Age: _____

Race: (Please choose one by indicating a check "✓" mark.)

White ____

Black ____

Hispanics ____

Asian ____

Others _____

Reason for Visit: (Please choose one by indicating a check "✓" mark.)

Sick Visit ____

Routine ____

Others: ____

Education (Please choose your highest level of education by indicating a check "✓" mark.)

High school Graduate ____

College graduate ____

Graduate School ____

Other: _____

Employment: (Please choose one by indicating a check "✓" mark.)

Profession ____

Retired: ____

Others (e.g. disability) _____

Date of Transplant (Please provide the date) (If you do not remember the exact date, the project leader will check in your chart)

Heart (#1) _____

Heart (#2) _____

Other Organs _____

Providers: (Please write the names and their field of expertise)

- PCP: _____
- Specialists: (dermatologist, gastroenterologist, urologist, dentist, endocrinologists, others)

- Others: _____

Telephone: (Please list in order of preference)

- Mobile _____
- Landline _____

Preferred time to be called: (Kindly indicate your preferred time for a follow up phone call. I will try to stay close to it as best as possible.)

- _____

Thank you for participating in this DNP Project Study.
Angelo C. Mabasa, NP.C
DNP Student

Appendix G
Table 1

Table 1
Sociodemographic Profile of the Intervention and Control Groups

	Intervention Group (n=21) n (%)	Control Group (n=20) n (%)
Gender	16 (76.2%)	16 (80%)
Male	5 (23.8%)	4 (20%)
Female		
Race		
White	13 (61.9%)	13 (65%)
Black	4 (19.0%)	5 (25%)
Hispanic	1(4.8%)	1 (5%)
Asian	1 (4.8%)	1 (5%)
Others	2 (9.5%)	
Marital Status		
Single	5 (23.8%)	4 (20%)
Married	15(71.4%)	14 (70%)
Divorced	1 (4.8%)	2(10%)
Education		
Elementary School only	1(4.8%)	2 (10%)
HS Graduate	5(23.8%)	5 (25%)
Some College	4 (19%)	3 (15%)
College Grad	7 (33.3%)	6 (30%)
Graduate School	4 (19%)	4 (20%)
Employment		
Currently Working	9 (42.9%)	9 (45%)

Disabled	6 (28.6%)	4 (20%)
Retired	6 (28.6%)	7 (35%)
Income		
>\$ 30,000	21 (100%)	18 (90%)
< \$ 30,000		2 (10%)

Appendix H
Table 2

Table 2.
Limited History of Illness of the Intervention and Control Groups

	Intervention Group(n=21) n(%)	Control Group (n=20) n (%)
Cancer History	Yes= 4 (19%)	Yes= 6 (30%)
	No= 17(80.9%)	No= 14 (70%)
Rejection History*	Yes= 5 (23.8%)	Yes= 6 (30%)
	No= 16 (76.2%)	No= 14 (70%)
Number of Years with cancer?	1-5= 9 (42.9%)	1-5= 7 (35%)
	5-10= 2 (9.5%)	5-10= 6 (30%)
	10-15= 4 (19%)	10-15=7 (35%)
	15-20= 6 (28.6%)	15-20= 0
	>20 = 0	>20= 0

*Rejection History includes and/or antibody mediated rejection

Appendix I
First Call Intervention Group

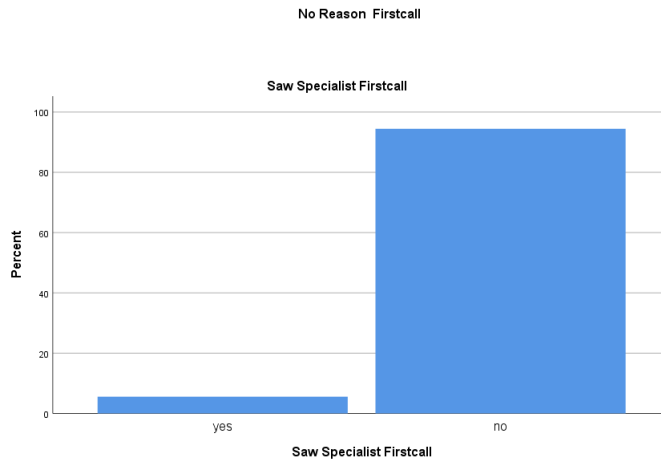
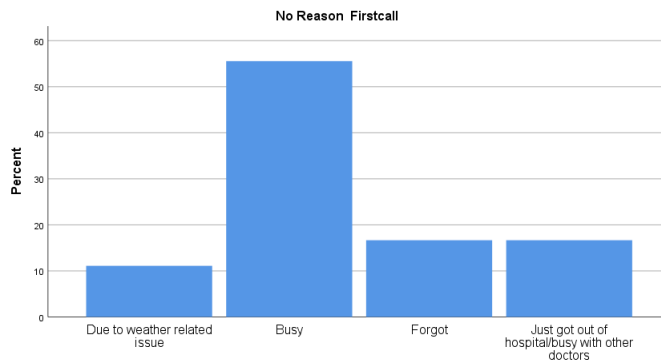
Table 3
Intervention Group Reason's for not following up with a specialist-First Call.

Intervention Group (N= 21)		
	Frequency	Valid Percent
Did not think it was important	0	
Transportation Issue	0	
Weather Related	2	11.1
Insurance Issue	0	
Busy	10	55.6
Forgot	3	16.7
Recent Hospitalization	3	16.7
Family Reasons	0	
Total		100%

*1 patient saw specialist already at first follow up phone call.

*1 patient was outside the country

*1 patient did not answer the call



Appendix J
Second Call Intervention Group

Table 4
Intervention Group Reason's for not following up with a specialist-Second Call.

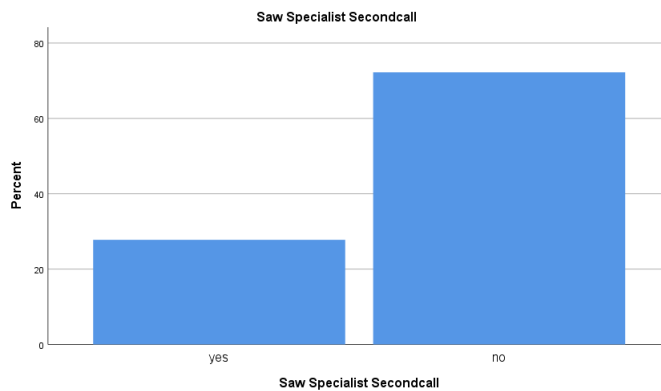
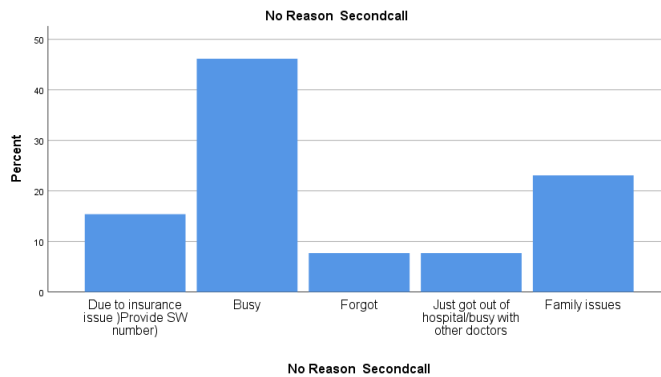
Intervention Group (N= 21)		
	Frequency	Valid Percent
Did not think it was important	0	
Transportation Issue	0	
Weather Related	0	
Insurance Issue	2	15.4
Busy	6	46.2
Forgot	1	7.7
Recent Hospitalization	1	7.7
Family Reasons	3	23.1
Total		100%

*5 patients saw specialist at second follow-up phone call.

*1 patient made an appointment on April 3, 2019

*1 excluded from study during the second call due to de novo malignancy development

*Total number of patients who saw specialist= 6 patients



**Appendix K
Third Call Intervention Group**

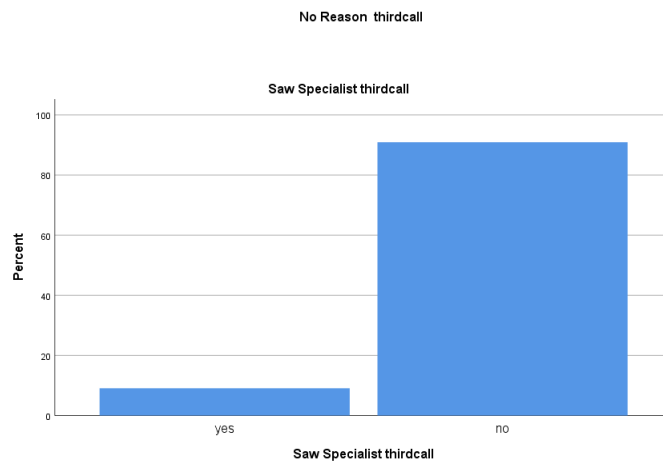
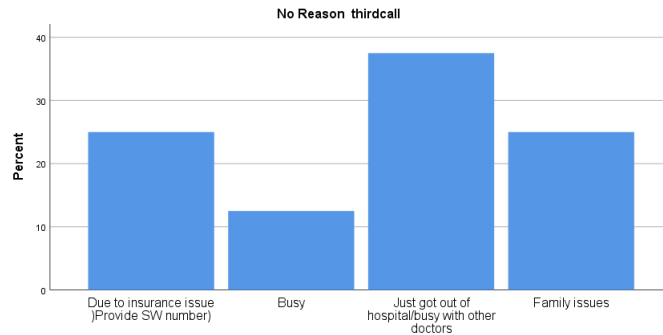
Table 5
Intervention Group Reason's for not following up with a specialist-Third Call.

Intervention Group (N= 18)		
	Frequency	Valid Percent
Did not think it was important	0	
Transportation Issue	0	
Weather Related	0	
Insurance Issue	2	25.0
Busy	1	12.5
Forgot	0	
Recent Hospitalization	3	37.5
Family Reasons	2	25
Total		100%

*1 patient saw specialist at third follow-up phone call.

*2 patients removed from the study for failing to answer more than two phone call cycles.

*Total number of patients who saw specialist= 7 patients



Appendix L
Fourth Call Intervention Group

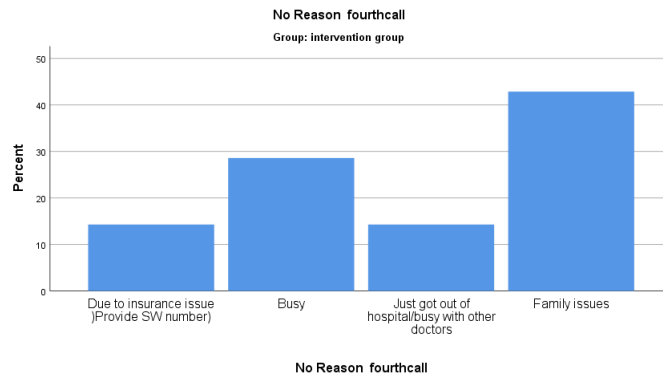
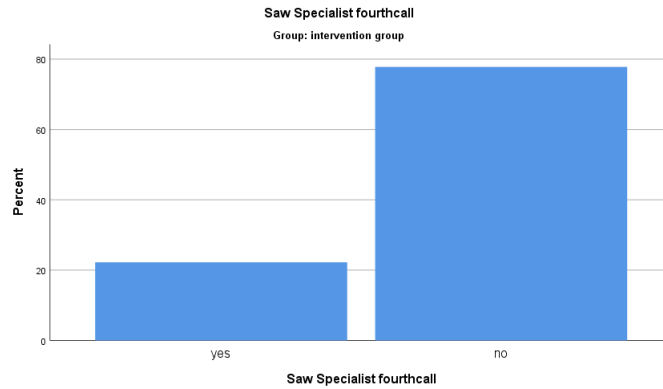
Table 6
Intervention Group Reason's for not following up with a specialist-Fourth Call.

Intervention Group (N= 18)		
	Frequency	Valid Percent
Did not think it was important	0	
Transportation Issue	0	
Weather Related	0	
Insurance Issue	1	14.3
Busy	2	28.6
Forgot	0	
Recent Hospitalization	1	14.3
Family Reasons	3	42.9
Total		100%

*2 patients saw specialist at fourth follow-up phone call.

*1 patient made an appointment for second week of April 2019.

*Total number of patients who saw specialist= 9 patients



**Appendix M
One Call to Control Group**

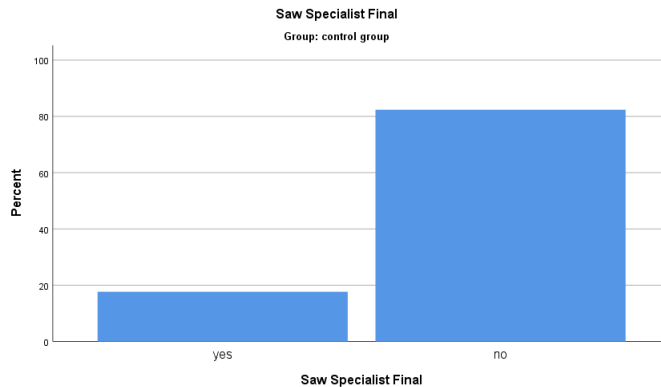
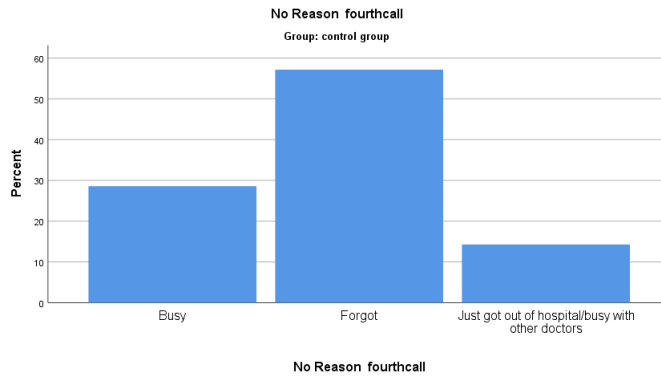
Table 7
Control Group's Reasons for not Following up With a Specialist

Control Group (N=20)		
	Frequency	Valid Percent
Did not think it was important	0	
Transportation Issue	0	
Weather Related	0	
Insurance Issue	0	
Busy	4	28.6
Forgot	8	57.1
Recent Hospitalization	2	14.3
Family Reasons	0	
Total		100%

*3 Patients saw Specialist

*1 Patient excluded from the study due to malignancy recurrence

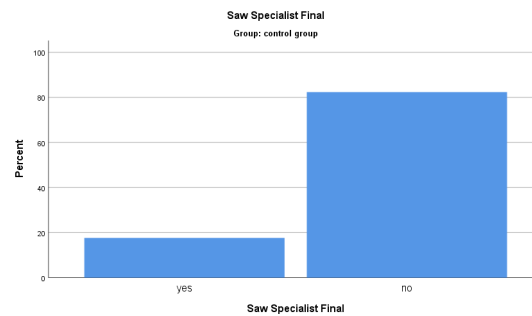
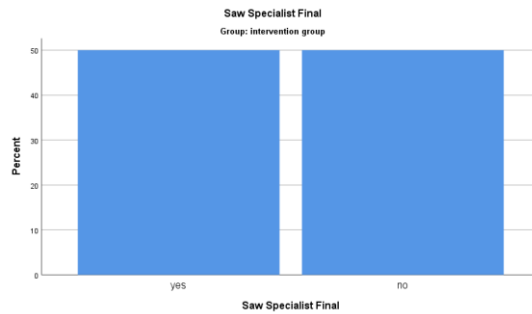
*2 Patients did not answer the call. Excluded from the study.



**Appendix N
Chi Square Table
Intervention and Control Group**

		Group		
Saw Specialist?		Intervention group	Control group	Total
Yes	Observed frequency	9	3	12
	Expected frequency	6.2	5.8	12
No	Observed frequency	9	14	23
	Expected frequency	11.8	11.2	23.0
Total	Observed frequency	18	17	35
	Expected frequency	18.0	17.0	35.0

$\chi^2 = 4.062, df = 1 \quad p = 0.044$



Appendix O
Actual Cost of the DNP Project

Item Description	Quantity/Unit	Cost	Total Amount
Typing Paper	2 Units	\$ 8.00	\$16.00
Laser Printer Cartridge	1 Cartridge	\$ 90.00	\$90.00
Statistician Fee		Free	\$0.00
Student Time	< > ~ 600 hours	\$ 0	\$0.00
Cell Phone	1 (Old Phone of the DNP Student)	\$ 0	\$0.00
Monthly Fee for the Cell Phone (Cricket) Talk and Text no data access	~1 month	\$ 25.00	\$25.00
Sim Card	1	\$10.00	\$10.00
Donations	0	0	0
Total Cost			\$141.00