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## Advanced Practice Nursing Intervention to Reduce Chemotherapy-Induced Nausea and Vomiting

Taylor Steger  
*Valparaiso University*

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**VALPO**

**ADVANCED PRACTICE NURSING INTERVENTION TO REDUCE  
CHEMOTHERAPY-INDUCED NAUSEA AND VOMITING**

by

**TAYLOR STEGER**

**EVIDENCE-BASED PRACTICE PROJECT REPORT**

Submitted to the College of Nursing and Health Professions

of Valparaiso University,

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in partial fulfillment of the requirements

For the degree of

**DOCTOR OF NURSING PRACTICE**

2021

*Michelle* 4/21/21

Advisor

Date

*Taylor Steger*

Student

4/21/21

Date

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## **ABSTRACT**

Chemotherapy-induced nausea and vomiting (CINV) occurs in 70-90% of those receiving moderate-to-high emetogenic chemotherapy (Mastrangelo, 2018; Ranganath et al., 2015). Early management of chemotherapy side effects improves patient outcomes and decreases hospitalizations. The purpose of this DNP project was to utilize an evidence-based strategy to minimize CINV and to reduce the number of health care visits related to CINV over a 16-week period. The Iowa Model provided the framework for this project. A literature search was conducted of five databases, which yielded nine relevant articles. Evidence levels include four level II, four level VI, and one level VII, according to Melnyk and Fineout-Overholt's (2015) hierarchy of evidence. The JHNEBP Research Appraisal Tools were used to appraise the evidence: seven pieces of evidence were rated high quality and two pieces were rated good quality. For this project, treatment naïve patients receiving moderate or high emetogenic chemotherapy received telephone calls on Days 2, 3, and 10 post-chemotherapy. The Rhodes Index of Nausea, Vomiting, and Retching (INVR) questionnaire was administered during each call and additional interventions were recommended based on INVR scores. The findings show that a telephone intervention and administration of a nausea questionnaire, while not necessarily decreasing overall CINV scores, did address symptoms in a cost-effective manner. There was an increase in infusion center visits that attributed to a decrease in ED visits and hospitalizations. Six of the 45 comparison group patients required hospitalizations for CINV (13.33%), compared to 1 of the 24 intervention group participants (4.17%).

*Keywords:* CINV, INVR, telephone intervention





## CHAPTER 1

### INTRODUCTION

#### Background

Nausea and vomiting are the most common side effects of chemotherapy, occurring in 70-90% of patients receiving moderate or high emetogenic chemotherapy (Mastrangelo, 2018; Ranganath et al., 2015). Although nausea or vomiting can occur independently in patients receiving chemotherapy, they often occur together and are labeled CINV. CINV can be classified into five types: acute, delayed, anticipatory, breakthrough, and refractory (Adel, 2017; Moradian & Howell, 2015). Acute CINV occurs within 24 hours of initial administration of chemotherapy; delayed CINV occurs after 24 hours but may peak in two to three days (Adel, 2017). Patients who have previously experienced CINV may experience anticipatory CINV, which occurs when a sensory experience (e.g., smell, sound, or taste) triggers a response prior to administration of subsequent chemotherapy (Adel, 2017). Breakthrough CINV occurs within five days of chemotherapy despite the use of a guideline-recommended antiemetic agent, while refractory CINV consistently occurs in ongoing chemotherapy despite the use of guideline-recommended antiemetic agents (Adel, 2017).

There are different pathways in the body which induce emesis, each relying on a set of different neurotransmitters (e.g., serotonin, dopamine, histamine, and substance P). Receptors for these neurotransmitters are found in high numbers in the dorsal vagal complex, area postrema, and gastrointestinal (GI) tract (Hornby, 2001). Traditional chemotherapy agents e.g. cisplatin [cisplatin] damage the GI tract and cause calcium dependent exocytic release of 5-hydroxytryptamine (5-HT<sub>3</sub>) from enterochromaffin cells in the GI mucosa (Hornby, 2001). Released 5-HT<sub>3</sub> binds to its receptors on the vagal afferent neurons and this binding activates the chemoreceptor trigger zone (CTZ) and vomiting center (VC) (Ranganath et al., 2015). Once activated, the VC modulates efferent transmission to respiratory, vasomotor and salivary

centers, as well as to abdominal muscles, the diaphragm and the esophagus, resulting in emesis (Ranganath et al., 2015). This occurs with moderate or high emetogenic chemotherapy, particularly cisplatin (Hesketh et al., 2017). 5-HT<sub>3</sub> receptor antagonists, neurokinin 1 (NK1-) receptor antagonists and dopamine antagonists have proven to be effective in preventing CINV (Ranganath et al., 2015).

In addition to the treatment-specific risk factors for developing CINV, patient-specific risk factors have also been identified. Although some variability in patient-specific risk factors relates to the chemotherapy regimen, the most frequently identified patient specific factors are age and gender, along with a previous history of motion sickness and/or pregnancy-related nausea and vomiting, and previous CINV (Adel, 2017). Patients who are younger than 50 years and/or female are at a higher risk for developing CINV (Adel, 2017).

Annually, 650,000 oncology patients receive chemotherapy in an outpatient oncology clinic in the U.S. (Centers for Disease Control and Prevention [CDC], 2019). Of these, an estimated 585,000 will experience CINV. Nausea and vomiting affect patients physically, psychologically and emotionally, which affects overall health and wellbeing. CINV has considerable negative impacts on physical, cognitive, social, emotional, and role functioning (Moradian & Howell, 2015). Research has demonstrated that CINV incidence is greatest on days 3-5 after chemotherapy treatment (Mastrangelo, 2018). Without CINV control, patients are more likely to miss treatments, stop treatments all together, and/or have burdensome and expensive hospitalizations (Traeger et al., 2015)

Early detection and management of side effects of chemotherapy are important to improve patient outcomes, as well as to decrease hospital admissions and morbidity. Previous research studies have examined the advanced practice nurse's role in promoting CINV management (Moradian & Howell, 2015; van Dusseldorp et al., 2018). Within these studies, researchers have demonstrated the potential to identify CINV and reduce psychological distress (Moradian & Howell, 2015). However, these studies have not been able to quantify the response

to patient concerns in real-time and its impact on CINV management (Trager et al., 2015). Aims of this evidence-based practice project (EBP) are to (a) identify CINV early in chemotherapy treatment and (b) implement successful interventions to reduce the complications encountered by patients experiencing CINV.

### **Data from the Literature Supporting Need for the Project**

Cancer affects millions of Americans annually, whether they are patients, family members, health care professionals, or others. While there is great information and research available in the U.S. about cancer and its treatments, there is less emphasis of treating the side effects of cancer therapies. Because cancer is such an enormous health problem, it is simply too large to have high-quality, thorough research studies on all its aspects. The adult population, and most commonly the age bracket of 65-74 years, accounts for the bulk of cancer cases in U.S. (American Cancer Society [ACS], 2020a).

Nausea and vomiting are two well-known side effects of chemotherapy and radiation treatments. With cisplatin use, the percentage on average of patients experience CINV increases to approximately 90% (Mastrangelo, 2018).

A review of the literature demonstrated that using validated tools to measure CINV improves compliance with antiemetic treatments and leads to overall decreases in CINV (Basch et al., 2016; Mooney et al., 2017; & Sun et al., 2020). A number of studies have evaluated the effectiveness of telephone-based interventions in the management of CINV and other cancer-related symptoms (Hintistan et al., 2017; Jackson et al., 2019; Mooney et al., 2017; Rico et al., 2017; & Sun et al., 2020). Electronic systems have been developed to help facilitate symptom monitoring and management (Traeger et al., 2015). The interventions have been designed to improve patient-provider communication, alert providers to significant symptom issues, and support provider decision-making (Sun et al., 2020). Mobile phone and computer-based systems have been used by outpatients receiving chemotherapy as a symptom monitoring and management method and alert system for the cancer care team (Beck et al., 2017).

**National Data: Cancer Statistics**

The incidence of cancer in the U.S. from 2011-2015 was 439.2 per 100,000 men and women, with cancer mortality of 163.5 per 100,000 (National Cancer Institute [NCI], 2018). Even with how far cancer treatment has come, these numbers still remain staggering and these abbreviated statistics reflect the burden of cancer on society. These impacts are economical, psychosocial, and of course, physical. These expenditures reached \$147.3 billion in the U.S. in 2017, and they are only increasing (NCI, 2018). This data focuses on adults with cancer and the most common cancers in the U.S., but there are many other alarming statistics.

The above data focuses on adults with cancer and the most common cancers in the U.S., but there are many other alarming statistics. Males in the U.S. have a 40.14% lifetime risk of developing an invasive cancer and also have a 21.34% lifetime risk of dying from an invasive cancer (ACS, 2020a). For females, the lifetime risk of developing an invasive cancer is 38.70%, while the lifetime risk of dying from an invasive cancer is 18.33% (ACS, 2020a). Patients with invasive cancers are more likely to require intensive therapies that include emetogenic agents.

**State Data: Cancer Statistics**

For Indiana, new cancer cases for 2020 totaled 37,940, with 13,630 deaths (ACS, 2020a). From 2012-2016, the incidence of cancer for Indiana residents was 457.1 per 100,000 men and women and the cancer mortality from 2013-2017 was 175.6 per 100,000 men and women (ACS, 2020a). While the data were not exactly equivalent to national data, they were generally similar. Within Indiana, lung cancer has the largest percentage of new cases in 2019 (5,700), followed by breast (5,410), prostate (3,570), and colorectal (3,410) (ACS, 2020a). These statistics reflect the national population and further demonstrate the seriousness of the problem of cancer burden. Furthermore, considering the fact that Indiana residents with the most prevalent cancer (lung cancer) often receive moderately or highly emetogenic therapy, it could be projected that 5,130 newly diagnosed lung cancer patients experience CINV annually.

**Local Data: Cancer Statistics**

Region X encompasses the majority of Madison County, Indiana (Health Network X, 2018). This region has a slightly higher average age and percentage of older adults compared to other surrounding Indiana counties and has a lower median household income than Indiana, as well as the surrounding counties, with a poverty level at 19% (Health Network X, 2018). These economic statistics, combined with higher rates of unemployment and education levels, put this region (identified as a medically underserved area) at risk for poor health outcomes.

Reflective of the socioeconomic impact on health, Region X had higher rates of breast, lung, oral cavity/pharynx and prostate cancers than Indiana and the U.S. (Health Network X, 2018). The region was identified as in need for increased access for services related to lung cancer (Health Network X, 2018). As lung cancer therapies commonly include moderately emetogenic chemotherapy, it can be inferred that the region specifically needed CINV management resources, because the patient population had limited health care resources outside of the hospital and oncology office settings.

**Data from the Clinical Agency Supporting Need for the Project**

The Regional Cancer Center within Region X provided care for 60-70 oncology patients daily, five days a week, among three oncologists. The most common cancers seen in this patient population were lung cancer, head and neck cancers, colon cancer, and breast cancer (Oncologist Y, February 24, 2020). Colon and breast cancers commonly were treated with the standard of care identified by Ranganath et al. (2015), combinations of cisplatin and doxorubicin, chemotherapeutic agents with high emetogenic potential. The most common reasons oncology patients had sought additional office appointments was nausea and vomiting, which has been noted to occur in up to 90% of the patients seen within this practice (Oncologist Y, February 24, 2020). Consistent with findings reported in the supportive literature (Gyawali et al., 2016), these admissions and additional, unscheduled office visits put strains on patients

financially, and providers in the Regional Cancer Center had been challenged by the additional time required to provide the best care to their patients.

Of the 45 patients used for comparison data, one patient (out of 45) required a visit to the infusion center (2.22%). Twenty-three patients went to the ED. Several patients went to the ED more than once (56 total visits). Ten of the ED visits were related to CINV (22.22%). Seventeen patients had hospitalizations for the comparison group (37.78%). Four of these hospitalizations were related to CINV (8.89%). Several patients also had more than one hospitalization.

Key stakeholders at the Regional Cancer Center identified their patient population as lacking in educational resources to self-manage CINV. The oncologists and their support staff noted that their patients have low knowledge bases about cancer and cancer treatment. For this reason, it was determined that an advanced practice provider (APP) would be optimally suited to bridge the gap in education; the Doctor of Nursing (DNP) practice student served in this role. Using an established nausea questionnaire and providing additional guidance and education via telephone was designed to reduce the impact of CINV that patients experience in one of the most stressful times of their lives.

### **Purpose of the Evidence-Based Practice Project**

The reduction of CINV remains a major clinical issue, as CINV is directly related to adherence to scheduled chemotherapy treatments and maintenance of patient quality of life (Coolbrandt et al., 2018). The purposes of this EBP project were to limit CINV and to determine the impact of interventions on reducing the number of health care visits related to CINV.

### **PICOT Question**

Specifically, this project addressed the following PICOT question: In adult patients with cancer who are undergoing chemotherapy, does a telephone intervention which includes the administration of a nausea questionnaire and APP-guided interventions at Days 2, 3 and 10 post-chemotherapy decrease infusion center visits, emergency department (ED) visits, and

hospitalizations related to CINV complications as compared to current practice (no telephone follow-up or nausea questionnaire) over a 16-week period of time?

### **Significance of the EBP Project**

This project was designed to have a significant impact on patients and health care professionals. Cancer treatment symptom management improves patient and family quality of life, leads to better treatment compliance and offers survival advantages (Jackson et al., 2019). It has become obvious, within the literature, that there are needs for improvements in care and the management of these cancer side effects (Moradian & Howell, 2015). With the accessibility and functions of advancing technology, interventions involving telephones remain a crucial component of health care. With integration of self-management strategies, a great need for an intermediary between patients, technology, and health care providers has developed. The DNP student is well suited for an educational role that incorporates these initiatives to address CINV.

## CHAPTER 2

### EBP MODEL AND REVIEW OF LITERATURE

#### Evidence-based Practice Model

##### Overview of EBP Model

The Iowa Model Revised: Evidence-Based Practice to Promote Excellence in Health Care was chosen because of its applicability to the clinical problem, and permission for use was obtained (see Appendix A). This model has multiple phases and feedback loops to promote change, which is appropriate for a clinical problem of this severity. The Iowa Model was developed for multidisciplinary care teams and has been revised and updated. It is composed of several stages.

The Iowa Model begins by encouraging clinicians to identify triggering issues or opportunities (Iowa Model Collaborative, 2017). These can be from a variety of sources, including a patient or clinical issue, organizational, state, or national issue, from new evidence, from accrediting agency requirements, and/or based on the health care system's philosophy of care (Iowa Model Collaborative, 2017). The next stage is to state the question or purpose; this is followed by forming a team (Iowa Model Collaborative, 2017). This is an important step in the overall process and provides a key EBP model component: the multidisciplinary team approach of the model.

The next stage of the model is to assemble, appraise, and synthesize the body of evidence. This is done via systematic searching and leveling the evidence (Iowa Model Collaborative, 2017). Following a systematic search for and leveling of evidence, which is outlined in the remainder of this chapter, the next important stage is to design and pilot the practice change (Iowa Model Collaborative, 2017). The implementation plan is finalized, an evaluation plan is established, participants are engaged in the intervention (piloted practice change), and post-pilot data are collected (Iowa Model Collaborative, 2017).



Once pilot data has been reviewed, it is important for the team to consider if the practice change is appropriate to fully adopt into practice. If so, the organization has to integrate and sustain the practice change (Iowa Model Collaborative, 2017). They may also need to hardwire the practice change into the electronic medical records (EMR) system and reinforce the practice change as necessary (Iowa Model Collaborative, 2017).

One assumption of the Iowa Model is that there will be an effective team to implement the EBP, including opinion leaders and change champions. The Iowa Model requires a core group, which is a select group of practitioners with the mutual goal of disseminating information regarding a practice change and facilitating the change in practice by other staff members in their unit or peer group (Everett & Titler, 2006). The Iowa Model also assumes users will have the education, practice, specialty, and innovative views that will allow for the adoption of the practice change. Outreach and consultation by experts are another important component of the Iowa Model; this allows for education and feedback. (Everett & Titler, 2006). Organizational variables are assumptions of the Iowa Model; these include access to researchers, authority to change practice and support from peers, other disciplines, and administrators (Everett & Titler, 2006). The Iowa Model assumes there will be the roles of staff nurse, advanced practice nurse, nurse manager, associate director for clinical services, and a chief nurse executive (Everett & Titler, 2006); there are expectations for each of these roles.

### **Application of EBP Model to DNP Project**

The Iowa Model was determined to be valuable for the EBP project, as the model clearly outlines a process to go through to implement a practice change. The multidisciplinary approach and incorporated feedback loops help all members follow the process, and the model was specific enough to allow project leaders to be able to clearly follow the stages. Thus, the Iowa Model was deemed to be suitable for guiding implementation of a telephone intervention to address CINV in an oncology office setting.

The first stage of the Iowa Model, identifying a triggering issue or opportunity, was undertaken earlier. The oncologist within the Regional Cancer Center welcomed the DNP student, recognizing the opportunity to have a clinical problem addressed through a scholarly project led by the DNP student. The oncologist had reported that barriers were impacting the quality of life for patients undergoing chemotherapy and a limitation of services was in conflict with the health care system's philosophy of care. This led to the next stage of the Iowa Model, and a question or purpose was developed. Given that the practice values quality of life for patients undergoing chemotherapy yet has limited appointments and resources available to address CINV, what evidence-based interventions were viable to use. The next stage, stating the question or purpose, was completed by forming the clinically relevant PICOT question. This clinical question can be addressed through the EBP process and addresses an organizational priority for the Regional Cancer Center. Although those caring for the oncology patients at the Regional Cancer Center could already be labeled as a team, a specific team was formed for the purpose of the addressing this clinical issue, with the DNP student in a leadership role. Key stakeholders were identified and recruited. These individuals included the DNP student (serving in the leadership role of APP), the project facilitator/oncologist, the nurse manager, and clinical support staff.

Additional steps of the Iowa Model were followed as the DNP student searched for evidence regarding interventions for nausea and vomiting from chemotherapy. The evidence was made into a table of best sources. Within the next stage of the Iowa Model, the DNP student reviewed, critiqued, and synthesized the body of evidence so the team could work towards the next stage, designing and piloting the practice change. This step, DNP Project implementation and evaluation, was completed in a controlled environment with data measurement using the INVR questionnaire (see Appendix B) to create a care map for nausea and vomiting symptom management and evaluating the impact of this intervention on CINV-related office visits. In addition to these stages of the Iowa Model, it was anticipated that the

DNP student would disseminate the findings of the pilot change to peers and others within the DNP program, the organizational system of the Regional Cancer Center, and local, regional, and/or national APRN professional organizations. Findings would then be published within a repository which serves as a central exchange for scholarship.

Following completion of piloting the practice change, led by the DNP student, it was anticipated that the remaining stages would be led by the oncologist and nurse manager, integrating and sustaining the practice change. If the telephone intervention with administration of a nausea questionnaire was successful, a plan for sustainability would be developed by the DNP student so that it could be adopted by the staff to use on all new oncology patients who would be seen in the office. Recommendations for redesign or revision would be provided. Depending on the success and applicability of the intervention, this could involve changes to medication regimens for CINV. It could also involve enlisting other health care disciplines to create a patient navigation program centering around CINV management. The plan for sustaining the practice change was anticipated to involve education and in-services for the staff, as well as education for the patients. It was also anticipated that the piloted change will be fully adopted by having protocols and order sets in the EMR that could be utilized by staff.

### **Strengths and Limitations of EBP Model for DNP Project**

One strength of the Iowa Model for this DNP project was the model's established success in leading practice change. The model has been widely used and its strengths have been established. A recent survey of 431 health care professionals revealed that 88% reported they had used the Iowa Model (Iowa Model Collaborative, 2017). The revised model was said to be a straightforward, linear format with necessary added detail on how to pilot practice change (Iowa Model Collaborative, 2017). Because of its revisions, the model now it contains fully developed materials, allowing for organized training, ease of adoption, and a user-friendly approach (Lloyd et al., 2016). The user-friendly design was integral to developing student understanding on how to use a systematic approach in making a significant practice difference

(as either a quality improvement project or new change process) (Lloyd et al., 2016). All of these identified strengths were essential to the DNP student leading this EBP change.

Despite the number of strengths for using the Iowa Model for this DNP project, limitations also existed. One limitation of using the model for this DNP project was that it could be too complex for novice nurses (Iowa Model Collaborative, 2017). Other limitations included complexity of the arrows on the diagram of the model (which could make the model more difficult to follow); it would also be helpful if the model provided additional clarification on knowing when evidence is sufficient to change practice (Iowa Model Collaborative, 2017). In considering the stages of this DNP project, the DNP student was aware that she could be unable to complete the final stages of the project; sustaining practice change and disseminating results of the sustained project. The DNP student recognized these as limitations for this project but determined that the strengths and advantages outweighed the limitations. Thus, the model was deemed appropriate to guide this DNP project.

## **Literature Search**

### **Sources Examined for Relevant Evidence**

The purposes of the literature search were (a) to find evidence to interventions for CINV and (b) to determine best practice interventions that reduce the incidence of CINV (see Figure 2.1).

### ***Search Engines***

The databases included were Cumulative Index to Nursing and Allied Health Literature (CINAHL), The Cochrane Library, Joanna Briggs Institute (JBI), Medline (PubMed) and Nursing & Allied Health Database.

### ***Key Words***

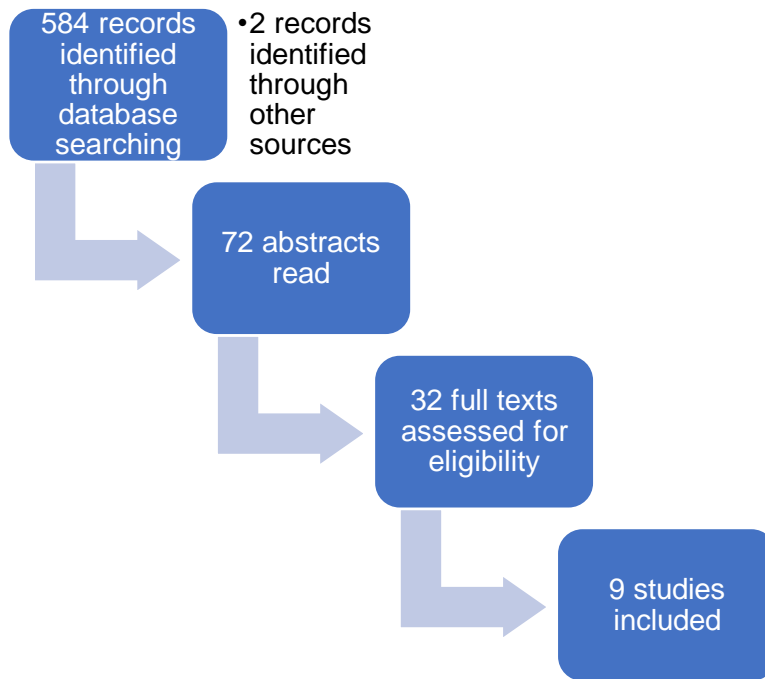
The key words used in the literature search were chemotherapy AND nausea and vomit\* AND nurs\*.

### ***Inclusion and Exclusion Criteria and Literature Search Results***

The limiters (inclusion criteria) used to obtain supportive evidence within all databases were the following: written in English, peer-reviewed, and published no earlier than 2015. Within the Nursing & Allied Health Database, “chemotherapy” and “nausea and vomit\*\*” were limited to abstracts.

Articles were then excluded if they focused only on specific medications to reduce CINV. Based on input from the EBP team, articles were also excluded from further consideration if they did not include the practice change found to be best fit for the practice setting: a telephone intervention. Additionally, articles were excluded if they did not include a clear evaluation of nausea and/or vomiting.

The search in The Cochrane Library yielded 73 results for inclusion. The abstracts and four full-length articles were read, and one was found to meet both the inclusion and exclusion criteria. The CINAHL search yielded 76 results: 14 abstracts and full-length texts were read, and two were found to meet the inclusion and exclusion criteria. The JBI search yielded 56 results. Twenty article abstracts were read, as well as three full-length articles, but none met both inclusion and exclusion criteria. Medline resulted in 226 results: 14 abstracts were read, as well as four full-length texts, and two of these pieces of literature met both the inclusion and exclusion criteria. Finally, Nursing & Allied Health Database yielded 153 results. Twenty abstracts were read, seven full-length texts were read, and two were included after meeting the criteria. Two final pieces of evidence were found to meet the inclusion and exclusion criteria after citation chasing. In total, nine pieces of evidence were identified for applicability (see Figure 2.1) and further evaluated for quality.

**Figure 2.1***Literature Search Results***Levels of Evidence**

Within the systematic search, nine sources were found to support the evidence-based practice change; each of these pieces of evidence were then reviewed and their level of evidence was determined. Melnyk and Fineout-Overholt's (2015) hierarchy of evidence also provided guidance for this determination. The rating system for the hierarchy of evidence ranks sources into seven levels. The higher a piece of evidence ranks in the hierarchy, the more likely the results accurately represent the evidence (Melnyk & Fineout-Overholt, 2015). This gives researchers more confidence that their interventions will have similar outcomes. Level I reflects the highest level of evidence and includes systematic reviews or meta-analyses of all relevant RCTs. Level II evidence is obtained from well-designed RCTs (Melnyk & Fineout-Overholt, 2015). Level III evidence is evidence from well-designed RCTs without randomization (Melnyk & Fineout-Overholt, 2015). Level IV evidence is evidence from case-control and cohort studies (Melnyk & Fineout-Overholt, 2015). Level V evidence is from systematic reviews of descriptive

and qualitative studies (Melnik & Fineout-Overholt, 2015). Level VI evidence is evidence from a single descriptive or qualitative study (Melnik & Fineout-Overholt, 2015). Finally, level VII evidence is evidence from authority opinions and/or reports of expert committees (Melnik & Fineout-Overholt, 2015).

There were four pieces of level II evidence, which consisted of evidence from at least one well-designed RCT (Basch et al., 2016; Franca et al., 2015; Mooney et al., 2017; & Sun et al., 2020) There were five pieces of level VI evidence, which were evidence from a single descriptive or qualitative study (Hintistan et al., 2017; Jackson et al., 2019; Karimi et al., 2017; Rico et al., 2017; & Underhill et al., 2015). Because Melnik and Fineout-Overholt (2015) do not provide specific guidance for leveling EBP projects, a decision was made to rank evidence published by Underhill et al. (2015) as level VI, rather than expert opinion (level VII). There was one piece of level VII evidence, which is evidence from authority opinions and/or reports of expert committees (Moretto et al., 2019).

### **Appraisal of Relevant Evidence**

Following obtaining permission for use (see Appendix C), The Johns Hopkins Research Evidence Appraisal Tool and the Johns Hopkins Non-Research Evidence Appraisal Tool were used to appraise the evidence. Specifically, the Non-Research Evidence Appraisal Tool was used in the appraisal of the EBP project identified within the CINAHL search, and the Research Evidence Appraisal Tool was used to assess the nine remaining sources of evidence found in the review of the literature. Appraisal scores were determined by the DNP student after appraisal checklists were finalized.

When using the Johns Hopkins tools, high quality indicates reliable and generalizable results. The study must have a sufficient sample size for the study design, an adequate control, and definitive conclusions; the researchers must also provide consistent recommendations based on a comprehensive literature review that includes thorough referencing to scientific evidence (Dearholt & Dang, 2017). Sources that meet these qualifications are given a quality

rating of “A”. Good quality evidence has reasonably consistent results. Good quality studies also have a sufficient sample size for the study design, has some component of control, and fairly definitive conclusions. The researchers should also provide reasonably consistent recommendations based on a fairly comprehensive literature review that included some references to scientific data (Dearholt & Dang, 2017). Sources that meet these checks are given a quality rating of “B”. A low-quality rating is given if there is little evidence with inconsistent results; there is an insufficient sample size for the study design, and conclusions cannot be drawn (Dearholt & Dang, 2017). Sources meeting these appraisal guidelines are given a quality rating of “C”. None of the sources from the evidence review were “C” quality sources.

A summary of the evidence supporting this EBP project, including quality ratings, can be found at the end of this chapter, in Table 2.2.



**Table 2.1**Literature Search Results

Database/Resource	Keywords/Phrases	Limiters	Results	Selected
CINAHL	chemotherapy AND nausea and vomit* AND nurs*	2015-2020, English, Scholarly Peer Reviewed	76	2
JBI	chemotherapy AND nausea and vomit* AND nurs*	2015-current	56	0
Medline/PubMed	chemotherapy AND nausea and vomit* AND nurs*	2015-2020, English, Scholarly Peer Reviewed	226	2
Nursing & Allied Health Database	ab(chemotherapy) AND ab (nausea and vomit*) AND nurs*	2015-2020, English, Scholarly Peer Reviewed	153	2
Cochrane	chemotherapy AND nausea and vomit* AND nurs*	2015-2020	73	1
Citation Chased			21	2
Hand Searched		2015-2020	6	0

**Level II Evidence**

**Basch et al. (2016).** Basch and colleagues (2016) conducted a non-blinded RCT to evaluate the Symptom Tracking and Reporting (STAR) system for cancer symptom management. The 12-symptom list measured symptom severity on a 0 to 4 numeric rating scale (0 not present, 4 disabling), capturing the most relevant list of high symptom burdens for cancer patients: appetite loss, constipation, cough, diarrhea, dyspnea, dysuria, fatigue, hot flashes, nausea, pain, neuropathy, and vomiting. The primary outcome was a change in health-related quality of life (HQRL) at 6 months from baseline. A secondary outcome was the number of emergency room visits and number of hospitalizations at one year. The sample included 766 adults, recruited from September 2007 to January 2011. Inclusion criteria included (a) planning to receive chemotherapy at Memorial Sloan Kettering Cancer Center and (b) being able to read English.

Within the Basch et al. (2016) study, before randomization, participants were assigned to groups based on level of prior computer and email use: computer-experienced (those with regular access to a computer and at least weekly email use) and computer-inexperienced group (those not meeting computer-experience criteria). Participants in each of these groups (computer-inexperienced,  $n = 227$ ; and computer-experienced,  $n = 539$ ), were then randomized into usual care and STAR intervention. The mean age of all participants was 63 years, and the groups did not differ in baseline characteristics of cancer type and baseline HQRL. The researchers did note that the computer-inexperienced participants were significantly older, more often men, more often black, and less educated than those who were computer-experienced.

Within both the computer-experienced and computer-inexperienced groups in the Basch et al. (2016) study, those participants to usual care received symptom monitoring at the discretion of providers; symptoms were discussed at each clinical encounter with the oncologists and patients were encouraged to initiate telephone contact between visits for any symptoms that concerned them. Participants in the STAR intervention group who were in the

computer-inexperienced group ( $n = 155$ ) self-reported symptoms using STAR at clinic visits only via wireless touchscreen tablets or free-standing computer kiosks. “A report tracking participants’ symptoms was printed at each clinic visit for the nurse and oncologist” (Basch et al., 2020, p. 558). Those in the STAR intervention group who were computer-experienced ( $n = 296$ ) were provided remote access to STAR and received a weekly reminder via email encouraging them to self-report their symptoms. In addition, this group’s reports triggered email alerts to nurses when symptoms reports worsened by  $\geq 2$  points or reached an absolute grade of 3 or higher. The most common symptoms that triggered email alerts were fatigue, pain, anorexia, dyspnea, neuropathy, and nausea. The system informed participants that emails were not routinely monitored after business hours and participants were instructed to call the office. Nurses were then able to address the symptoms via advice provided on the telephone (in response to 77% of email alerts) which resulted in the initiation or change in supportive medication for 12% of the email alerts.

Basch et al. (2016) compared the usual care group to the intervention group within the computer-experienced and computer-inexperienced (STAR) arms for HQRL. The mean HQRL score from baseline to 6 months improved among more participants in the STAR groups compared to the usual care groups. (34% vs. 18%,  $p < .001$ ), with no more participants in the STAR intervention groups experienced improvement in HQRL by a clinically meaningful score  $\geq 6$  points compared with usual care (21% vs. 11%). Those participating in the intervention were also less likely to note that their symptoms worsened; the mean HQRL score from baseline to 6 months worsened among fewer participants in the STAR groups compared to the usual care groups (38% vs. 53%,  $p < .001$ ) and fewer experienced a worsening of 6 or more points (28% vs. 37%,  $p < .001$ ). Mean HQRL scores declined by less in the STAR groups compared with usual care ( $M = 1.4$  vs.  $M = 7.1$ ,  $p < .001$ ); these results achieved statistical significance in the

larger computer-experienced group ( $p = .006$ ,  $p < .001$ ) but were not statistically significant in the smaller computer-inexperienced computer group.

Additionally, fewer participants in the STAR group had visited the emergency room within one year as compared to the usual care group (34% vs. 41%,  $p = .02$ ). Basch et al. (2016) reported that there were fewer participants hospitalized from the STAR group at one year than the usual care group (44% vs. 49%,  $p = .08$ ).

Basch et al. (2016) concluded that the STAR web-based symptom reporting with automated clinical email alerts resulted in better HQRL, fewer ER visits, and fewer hospitalizations. The researchers concluded that self-reporting improves the experience, efficiency, and outcomes of oncology care as it related to chemotherapy symptom burden.

Using the Johns Hopkins Research Evidence Appraisal Tool, this piece of evidence was rated as “A” quality evidence. This research study supported that a telephone supplemented, nurse-guided intervention is appropriate and feasible for cancer symptom management, including CINV.

**Franca et al. (2015).** Franca and colleagues (2019) conducted a non-blinded RCT to evaluate the effectiveness of telenursing to reduce CINV. The sample included 61 adults receiving moderate or highly emetogenic chemotherapy in Brazil, who were reported to be homogenous in regard to sociodemographic and clinical characteristics.

Baseline measure of CINV was obtained and patients were randomized into control (3-minute telephone calls to primarily evaluate CINV, but general guidance was also provided) and experimental group (10-minute telephone calls providing detailed CINV education and management strategies [mechanism and triggering factors; scientific knowledge; preventive dietary, environmental, and behavioral measures; pharmacological intervention; and psychological support] that were tailored for each telephone call). Telephone calls were made for both groups five to six hours after administration of chemotherapy, 24 hours after administration, three days after therapy, and five days after treatment.

CINV was evaluated using the MASCC Multinational Association of Supportive Care in Cancer (MASCC) and the MASCC Antiemesis Tool (MAT) cancer patients. The scale measured if nausea and/or vomiting had been experienced since the last chemotherapy (0 = yes and 1 = no). If one of those symptoms was present, patients graded the severity of symptoms with scores from 1 (mild) to 10 (severe). The mean scores at each of the post-chemotherapy telephone call time periods were compared using *t*-tests.

Nausea occurrence and intensity increased 24 hours after chemotherapy and peak 3 days after treatment for both groups. But the experimental group had a lower occurrence (*t*-scores not reported) than the control group during each of the telephone calls, achieving statistical significance at 24 hours ( $M = .300$  vs.  $M = 5.483$ ,  $p = .05$ ). Statistical significance was more apparent in the degree of nausea experienced between the groups at 24 hours ( $M = .933$  vs.  $M = 2.219$ ,  $p = .0347$ ), 3 days ( $M = 2.064$  vs.  $M = 4.1$ ,  $p = .0295$ ), and 5 days ( $M = 1.3$  vs.  $M = 3.29$ ,  $p = .0069$ ) after therapy. Occurrence of vomiting was limited in both groups, with the highest occurrence ( $M = .100$  vs.  $M = .3878$ ,  $p = .008$ ) and number of episodes ( $M = .300$  vs.  $M = 1.1935$ ,  $p = .020$ ) at 3 days after chemotherapy.

Franca et al. (2015) concluded that the intervention was effective at a time when CINV is most prevalent and likely more difficult to control. The researchers stress the importance of organizational support and training for full implementation of this intervention.

Using the Johns Hopkins Research Evidence Appraisal Tool, this international research article rated as “A” quality evidence. The effectiveness of the telephone intervention and guided educational component, which can be provided by an APRN, supports the intervention being developed this EBP project.

**Mooney et al. (2017).** Mooney and colleagues (2017) conducted an RCT to test the efficacy of an automated symptom management system in reducing chemotherapy-related symptoms. The sample included 358 adult oncology patients beginning chemotherapy; 180 were randomized to the symptom care at home intervention, while 178 received enhanced usual

care. Inclusion criteria included (a) age 18 years or older; (b) life expectancy of at least 3 months; (c) beginning a cancer chemotherapy course planned for at least 3 cycles; (d) English speaking; and (e) having daily access to a telephone. The average age of participants was 55.8 years, and they were mainly Caucasian and female. "There were no significant differences between the control and intervention groups for demographic or disease variables and symptom severity at baseline" (Mooney et al., 2017, p. 542).

All participants in the Mooney et al. (2017) study (control and intervention) reported symptom data in a daily phone call within an automated system. The automated system gathered data on the presence of 11 symptoms (fatigue, difficulty sleeping, nausea and vomiting, pain, numbness and tingling, feelings of depression, feelings of anxiousness, distress over appearance, diarrhea, sore mouth, and difficulty thinking or concentrating); severity of symptoms was rated on a scale of 0 to 10: 0 (none); 1-3 (mild); 4-7 (moderate); and 8-10 (severe). The intervention group then received automated self-care management messages and were further managed via telephone by NPs who used a guideline-based decision support system to address poorly controlled symptoms, while the enhanced usual care group were reminded by the system to call their provider for symptom concerns. Data were collected daily for six months, unless the patient's chemotherapy course was completed earlier.

During the study period, Mooney et al. (2017) found that the most commonly reported symptoms of a moderate or severe level for at least one day included fatigue (86% of participants), pain (80%), difficulty sleeping (78%), and nausea/vomiting (60%). Patients in the intervention group had 67% fewer symptom days ( $p < .001$ ) and 39% less moderate days ( $p = .001$ ) than the enhanced usual care group. Mean nausea and vomiting severity ratings were significantly less in the SHC group:  $t = 2.769$  ( $p = .006$ ).

Mooney et al. (2017) concluded that their research provided strong evidence that the telephone-based intervention for symptom management was efficacious and significantly

reduced symptom burden. The researchers opined that this system could provide an extension of care and was particularly applicable for rural communities.

Using the Johns Hopkins Research Evidence Appraisal Tool, this research article rated as “A” quality evidence. The effectiveness of the telephone intervention and NP-guided management for severe symptoms of CINV was especially pertinent to this EBP project.

**Sun et al. (2020).** Sun and colleagues (2020) conducted a non-blinded RCT to evaluate the effect and feasibility of the SMILE (Symptom Management Improves your Life) system in cancer symptom management. The sample included 324 adults, recruited from December 2015 to November 2017, who were adult breast, gastric, or lung cancer patients starting adjuvant or palliative chemotherapy treatment. The mean age of participants was 52 years, and the randomized group did not differ in demographic or disease characteristics.

Within the Sun et al. (2020) study, participants were randomized into a control group (67 participants), experimental group 1 (135 participants), and experimental group 2 (122 participants). The control group monitored symptoms using the cancer symptom management system. Experimental group 1 used the cancer symptom management system and symptom reports were provided to health care providers. Experimental group 2 used the cancer symptom management system; symptom reports were provided to health care providers and education was provided. The SMILE system included a 20-symptom list with severity score ratings from 0 (no symptoms at all) to 10 (most severe possible).

Sun et al. (2020) noted that to evaluate the additional benefit of the evidence-based symptom management education on symptom severity, only the experimental groups were compared. Although the main article focused on the symptoms of fatigue and sleep disturbance, other components of the symptom list were included in a supplementary, downloadable table. The mean score for nausea and vomiting at baseline was as follows: experimental group 1,  $M = 3.2$ ; experimental group 2,  $M = 2.7$ . Measured at prior to the fifth chemotherapy treatment, the mean score for nausea and vomiting had risen to  $M = 9.26$  for experimental group 1 and only

$M = 6.33$  for experimental group 2; although this difference was likely clinically significant, it did not reach statistical significance ( $p = .709$ ). The authors did also report a decreasing prevalence of nausea and vomiting among participants; nausea and vomiting were experienced by 13% of participants after the first cycle of chemotherapy, and, after symptom severity ratings and subsequent patient education, was experienced by only 8.5% of participants. In regard to the evaluation of the system (rated on a scale of 1 to 5), patients in experimental group 2 reported that the symptom management education was easy to follow ( $M = 4.01$ ) and helpful for symptom management ( $M = 4.02$ ).

Pertinent to this project, Sun et al. (2020) concluded that the SMILE system could improve multiple symptoms and improves communication between patients and providers.

Using the Johns Hopkins Research Evidence Appraisal Tool, this piece of evidence was rated as “A” quality. Although a significant portion of the reported outcomes focused on sleep quality and fatigue, this research study supported patient acceptance for symptom management education, a key component of this EPB project. In addition, although not statistically significant, patients receiving symptom management education reported lower nausea and vomiting scores than their counterparts.

### ***Level VI Evidence***

**Hintistan et al. (2017).** Hintistan and colleagues (2017) conducted a quasi-experimental study to determine the effects of a nurse telephone intervention for lung cancer patients. The sample included 60 patients with lung cancer recruited from Ambulatory Chemotherapy Unit at the Research Hospital between February 2013 to December 2013. Inclusion criteria included: (a) having lung cancer; (b) being between the ages of 18 and 65 years; (c) speaking Turkish; (d) being literate; (e) receiving their first chemotherapy treatment; (f) being informed about their diagnosis; (g) having a performance status of 2 or lower according to The Eastern Cooperative Oncology Group (ECOG) Performance Status; (h) having no operation related to cancer; (i) having a telephone connection; (j) having no chronic diseases or physical handicap; (k) being



conscious and able to communicate; (l) being able to understand the items on the scale; and (m) volunteered for the research. The primary objective of the study was to determine the therapeutic effects of a nurse telephone follow-up for lung cancer patients.

The Hintistan et al. (2017) study occurred over a 4-month period. There were no significant differences between the control and experimental groups. There were 30 participants in the control group and 30 participants in the experimental group. The researchers used several questionnaires for the study. In addition to a demographic questionnaire, they used the Eastern Cooperative Oncology Group (ECOG) Performance Status tool. This tool assesses patients illness quality of life and using a Likert scale (0 = no complaints, able to sustain normal activities; 1 = having tumor symptoms but able to sustain normal life activities; 2 = irritating tumor symptoms but up approximately more than 50% of waking hours; 3 = severely sick, limited to bed more than 50% of waking hours; 4 = entirely disabled, completely limited to bed; 5 = deceased). Additionally, the Edmonton Symptom Assessment Scale (ESAS) was used. This tool assesses nine symptoms common to cancer patients, including pain, fatigue, nausea, distress, anxiety, drowsiness, changes in appetite, well-being, and shortness of breath. This tool also uses a Likert-type scale (0 = no symptoms, 10 = very severe symptoms). In this study, the researchers added three additional symptoms: skin and nail changes, mouth sores, and hand numbness. Finally, the Functional Living Index-Cancer (FLIC) was utilized to further evaluate quality of life in these cancer patients. This tool evaluates “physical function”, “psychological function”, “general well-being related to cancer”, “social function”, and “gastrointestinal symptoms”, for a total of 22 items. The tool calculates quality of life using a 7-point Likert scale, and higher scores indicate higher level functioning.

The control group was provided with standard care by the Ambulatory Chemotherapy Unit and no telephone follow-up. These participants completed the ESAS and FLIC after their first, third, and sixth chemotherapy treatments. The intervention group received standard care by the Ambulatory Chemotherapy Unit and a nurse telephone follow-up within a week after each

of the six chemotherapy sessions. The nurses administered the ESAS and FLIC after the first, third, and sixth chemotherapy treatments.

Hintistan et al. (2017) compared mean scores on the ESAS after the first, third, and sixth chemotherapy treatments. Subscale mean scores were lower in the intervention group compared to the control group for all subscale categories after the sixth treatment. Specifically related to this EBP project, nausea was significantly lower for the intervention group as compared to controls. For nausea,  $M = 7.37$  vs.  $M = 8.23$ ,  $p = .01$ . For the FLIC, gastrointestinal symptoms were less in the intervention group compared to the control group after each telephone call, although results did not reach statistical significance after the sixth session: after the first chemotherapy session,  $M = 8.70$  vs.  $M = 11.07$ , ( $p = .00$ ); after the third chemotherapy session,  $M = 7.87$  vs.  $M = 9.20$ , ( $p = .00$ ); after the sixth chemotherapy session,  $M = 5.93$  vs.  $M = 6.10$ , ( $p = .84$ ).

The researchers concluded that the ESAS subscale scores for the intervention group were significantly better than the control group due to nurse telephone follow-up. The researchers found that the telephone follow-up helped manage side effects of chemotherapy, particularly vomiting (and oral mucositis). Thus, Hintistan et al. (2017) determined that a telephone intervention was a quick, effective method to improve the psychological and communicative needs of oncology patients.

Using the Johns Hopkins Research Evidence Appraisal Tool, this article rated as “A” quality evidence. This nurse-led, telephone-based intervention is especially applicable to this EBP project.

**Jackson et al. (2019).** Jackson and colleagues (2019) conducted a pilot study to determine the impact of implementing a CINV collaborative disease therapy management protocol. The sample included 45 participants recruited from October 2016 to January 2017 who were seen in an outpatient oncology clinic and had a referral from a qualified provider to help manage CINV. Inclusion criteria included being seen in a Medical University of South Carolina

Hollings Cancer Center outpatient oncology clinic. The primary objective was to determine the impact of a CINV protocol in an outpatient oncology clinic setting. A variety of cancer patients were included in the study, including head and neck, breast, colon/pancreatic, lung, acute lymphoblastic leukemia (ALL), prostate, and Non-Hodgkin lymphoma.

During the Jackson et al. (2019) study, which occurred over a 9-month period, 29 patients were referred for the management services which were provided by a pharmacist. Forty-six percent of these patients were receiving highly emetogenic chemotherapy, and 41% were receiving moderately emetogenic chemotherapy. Forty-five patients were referred for management of CINV. Participants used the MASCC (Multinational Association of Supportive Care in Cancer) questionnaire for symptom scores, which were rated using a 10-point scale (0 no nausea or vomiting, 10 worst nausea or vomiting) and received clinical interventions based on these scores. The management services included the use of a collaborative drug therapy management (CDTM) protocol/treatment algorithm. Interventions included addition of new medications (37% of referred patients), patient education (34% of referred patients), discontinuation of medications (10% of referred patients), and changing of doses, frequencies, and/or duration of medications (8% of referred patients). Pharmacists followed up with participants via a telephone call or during their next scheduled oncology visit. MASCC scores from only five of the 45 referred patients were available for evaluation post-intervention, limiting inferential data analysis, yet all of the five patients' scores showed improvements from baseline. Median acute nausea scores decreased from 8 at baseline to 0 after intervention, while median delayed nausea scores decreased from 10 at baseline to 0 after consultation. Median initial scores for acute vomiting scores were decreased from 4 at baseline to 0 after intervention. The authors concluded that the collaborative approach, using a management protocol which included telephone follow-up, was an effective strategy to address CINV.

Using the Johns Hopkins Research Evidence Appraisal Tool, this research article rated as "A" quality evidence. While a portion of the intervention was conducted during scheduled

clinic visits, the telephone-based follow-up is pertinent to this EBP project. While pharmacists were utilized in this intervention, their role could easily be assumed by an APRN, making this applicable to the EBP project.

**Rico et al. (2017).** Rico and colleagues (2017) conducted a pilot study to research the acceptance and perception of cHEmoTHErApp, a smartphone application for oncology patients. The sample consisted of 14 cancer patients at the Oncology Service of the HE/UFPel in Rio Grande do Sul in Brazil. Patients were eligible to participate if they were: (a) adults (ages 18-70); (b) started the first outpatient chemotherapy treatment between August and November 2016; (c) had their own cell phone; (d) were literate; and (e) read and spoke Portuguese. The average age of participants was 44 years, and a majority of participants were female (64%). The primary objective was to evaluate the acceptance and perception of patients of the receipt of SMS text messages, as well as to evaluate possible benefits reported by participants.

The intervention began with registering patients on the cHEmoTHErApp. Dates and hours of every outpatient chemotherapy session were indicated so that the periodicity of text messaging could be configured. Patients first received a text message to their cell phone informing them that they would receive daily guidelines on their treatment through free text messages. Every day during the period of time that a patient was receiving chemotherapy treatment, they received a randomly selected text message. The same message was not repeated within a 45-day span. The content of the text messages included guidelines on water intake, hygiene care, food intake, physical activity, prevention and management of nausea, vomiting, diarrhea, intestinal constipation, loss of appetite, and altered taste, as well as emotional support and encouragement.

A questionnaire was developed to identify patient perceptions regarding cHEmoTHErApp. These considered of “yes or no” questions, Likert scale questions, and open answer questions. These included: whether the patient read the messages daily (yes or no), whether they understood the message guidelines (yes or no), whether they had difficulty

implanting the interventions (yes or no), if the messages were helpful in their treatment (yes or no), the reason(s) the messages helped their treatment (open answer), if the messages were considered to have any benefit (yes or no), the benefit of the messages (open answer), and the level of satisfaction of the messages (very satisfied, satisfied, neither satisfied nor dissatisfied, dissatisfied, or very dissatisfied).

All participants answered that they understood the content of the messages. All participants considered the messages helpful in their treatment, and all answered “yes” when asked if the messages had any benefit. Thirteen participants reported being “very satisfied” with the messages, and the remaining participant reported being “satisfied”.

Rico and colleagues (2017) concluded that cHEmoTHErApp was a helpful tool in guiding patients through chemotherapy treatment. The researchers found the text messaging intervention to be well-accepted by participants and to be particularly helpful in side effect prevention management (which included nausea and vomiting).

Using the Johns Hopkins Research Evidence Appraisal Tool, this evidence is rated as “B” quality evidence. While Rico and colleagues did not directly analyze the data specific to CINV, the acceptance of cell phone technology and pre-developed messages to guide self-management of chemotherapy side effects provides additional support for this EBP project.

**Underhill et al. (2015).** Underhill and colleagues (2015) conducted a nurse-led EBP project to monitor and improve CINV. The participants were 30 patients in an ambulatory oncology practice. Inclusion criteria were adult patients (at least 18 years of age) with a cancer diagnosis who were scheduled to start cycle one of a new chemotherapy regimen. There were more female participants than males (24 to 7) and the average age of participants was 56. Eleven participants were receiving high emetogenic chemotherapy, while 15 participants were receiving moderate emetogenic chemotherapy. Patients had one of several cancer diagnoses, including breast, lung, pancreatic, and colorectal. Underhill et al. (2015) noted, “The primary objective was to evaluate the process of implementing a structured, nurse-led assessment and

telephone follow-up intervention. A secondary objective was to evaluate the occurrence of acute and delayed CINV, describe the frequency of anticipatory CINV, and describe frequency of changes in antiemetic prescription after nurse-led intervention” (p. 38).

Within the intervention a clinic nurse completed a structured telephone follow-up call at 24- and 72-hours post-chemotherapy treatment. The MAT (Multinational Association of Supportive Care in Cancer Antiemesis Tool) was used to collect data. Participants answered “yes” or “no” for symptom experiences, and then symptom severity was measured on a scale from 0 to 10 (0 no symptoms, 10 worst symptoms).

Within the EBP project, Underhill et al. (2015) found that reports of nausea decreased from 24 at the 24-hour call to 11 at the 48-hour call. Reports of vomiting decreased from three at the 24-hour call to two at the 48-hour call.

The project leaders concluded that the intervention was feasible for outpatient oncology practices and was useful for patient symptom reporting. Symptoms that required intervention were easily identified by intervention nurses and appropriate follow-up was conducted.

Using the Johns Hopkins Non-Research Evidence Appraisal Tool, this evidence is rated as “B” quality evidence. This telephone-based and nurse-led EBP project is applicable to the current EBP project.

### ***Level VII Evidence***

**Moretto et al. (2019).** Moretto and colleagues (2019) conducted an integrative review to identify the evidence for telephone follow-up by nurses for oncological patients undergoing chemotherapy in an outpatient clinic. They reviewed studies from the following databases: Literatura-Americana e do Caribe em Ciencias da Saude (LILACS), Banco de Dados em Enfermagem (BDENF), Medline, CINAHL, and Scopus. The keywords included were “Drug Therapy”, “Antineoplastic protocols”, and “Telephone”. Limiters were the past five years, and written in English, Spanish, or Portuguese. The searches for studies were conducted from September through October 2018. Inclusion criteria included: (a) original studies, (b) theme of

nursing intervention through telephone follow-up, and (c) treatment with outpatient antineoplastic chemotherapy. Exclusion criteria included (a) oral or intraperitoneal chemotherapy and (b) pediatric patients. The search resulted in 19 studies selected for review.

Moretto et al. (2019) followed six steps for the integrative review process: (1) selection of the guiding question; (2) definition of the characteristic of the primary surveys of the sample; (3) selection of surveys that composed the review sample; (4) analysis of the findings of the articles reviewed; (5) interpretation of results; and (6) review report, providing a critical examination of the findings. Moretto et al. (2019) reported that the studies were evaluated using the Rating System for the Hierarchy of Evidence for Intervention/Treatment Question.

The studies reviewed by Moretto et al. (2019) included a number of different designs: RCTs, quasi-experimental studies, observational studies, descriptive studies, and qualitative studies. The majority of the 19 studies were conducted in the U.S. and included patients with a variety of cancer types. Most of the telephone interventions occurred during the first week after chemotherapy treatment. In 13 of the studies, nurses led the telephone interventions (68.42%). There were a variety of results sought, including symptom control, specific symptom control of nausea and vomiting, fatigue, neurotoxicity, or a set of symptoms, HQRL, self-efficacy capacity, emotional support, and caregiver stress. Patient satisfaction with the intervention was addressed in eight studies. The synthesis of the evidence resulted in several themes, including management of chemotherapy-related symptoms, HQRL, self-efficacy, emotional support, caregiver stress, and patient satisfaction.

Moretto and colleagues (2019) found significant support for the use of telephone-based interventions to address the health care for oncology patients. The researchers found nurse-led interventions to be an effective, innovative solution for patients receiving outpatient chemotherapy.

Using the Johns Hopkins Evidence Research Appraisal Tool, this evidence was rated as “A” quality evidence. The support for the use of telephone-based, nurse-led interventions for chemotherapy symptom management, including CINV, is applicable to this EBP project.

### **Construction of Evidence-based Practice**

#### **Synthesis of Critically Appraised Literature**

Several detailed themes emerged from the review of the literature for implementation of an intervention aimed at reducing CINV (Basch et al., 2016; Franca et al., 2015; Hintistan et al., 2017; Jackson et al., 2019; Karimi et al., 2017; Mooney et al., 2017; Rico et al., 2017; Sun et al., 2020; & Underhill et al., 2015). One theme was that intervention involving technology and nurses/NPs for CINV management were accepted and feasible. While measured in various ways in the different studies, all mentioned that participants were satisfied with the format of the intervention and found it worthwhile and easy to use. Another theme that emerged was that this type of telephone intervention needs to become standard practice. It should be incorporated into EMRs and can serve as an extension of services (Mooney et al., 2017; Rico et al., 2017, Sun et al., 2020). Multiple researchers (Jackson et al., 2019; Mooney et al., 2017; Sun et al., 2020) mentioned that this type of intervention would be particularly helpful for rural populations or patients that live farther from where they receive oncology care.

Another theme that emerged was the idea of how best to implement this type of intervention. Some authors suggested it would be better to start this type of intervention later in the course of chemotherapy. Others suggested it would only be necessary for patients to participate in a phone intervention when symptomatic (Jackson et al., 2019; Karimi et al., 2017). Overall, the research supported the premise that a telephone intervention for CINV reduces symptom burden and improves patient’s health care related quality of life. Patients who experience less CINV require less office visits and hospitalizations related to chemotherapy side effects.



One of the limitations that came out of the literature was that several of the analyses were retrospective in nature. Some researchers mentioned a lack of diversity in their study populations (Basch et al., 2016; Jackson et al., 2019; Mooney et al., 2017) and others were conducted in a single center or oncology practice (Karimi et al., 2017; Rico et al., 2017; Sun et al., 2020; Underhill et al., 2015). In addition, socio-economic factors, as well as environmental factors, as they relate to chemotherapy symptom management can be limitations. The social support and caregiver presence, or lack thereof, for chemotherapy patients can impact management greatly. This can be a difficult population to track long-term, unfortunately, and that was considered as a limitation in some studies.

### **Best Practice Model Recommendation**

The best practice recommendation, from the appraised-literature, was that all patients initiating chemotherapy should be educated about CINV, screened for CINV symptoms and warranted additional therapy, and provided guidance on the management of gastrointestinal side effects (including initiatives to prevent or minimize CINV). The use of a telephone intervention was strongly recommended within the literature.

Founded on the evidence from the review of the literature, the DNP student has chosen to implement an intervention aimed at reducing CINV. The EBP project was designed for the DNP student to follow a specific sequence for implementation of a CINV reduction program. Consistent with the reviewed literature, the intervention featured multiple telephone follow-up calls post-chemotherapy (which included the administration of a nausea questionnaire and recommendations for additional measures for CINV reduction, when warranted). Reflective of the supportive evidence, the patient-specific INVR questionnaire used within the Rhodes and McDaniel (1999) study was incorporated within this EBP project.

### **How the Best Practice Model Will Answer the Clinical Question**

This intervention was designed to answer the clinical question: Do follow-up telephone calls and discussion of CINV symptoms reduce symptom burden? Upon completion of the

literature review, the DNP student believed this intervention would reduce CINV symptom burden. Specifically, it was anticipated that participants who received telephone calls post-chemotherapy would have less nausea and vomiting related to chemotherapy and better health care quality of life. Thus, the best practice model will answer the PICOT question: In adult patients with cancer who are undergoing chemotherapy, does a telephone intervention which includes the administration of a nausea questionnaire and APP-guided interventions at days 2, 3, and 10 post-chemotherapy decrease infusion center visits, ED visits, and hospitalizations related to CINV complications as compared to current practice (no telephone follow-up or nausea questionnaire) over a 16-week period of time?

**Table 2.2**

*Evidence Table*

Reference	Design	Sample	Methods	Major Findings & Recommendations	Level/Quality
Basch et al., 2016	RCT	766 adult oncology patients	STAR was developed for nonblinded RCT with experimental group 1 (computer-inexperienced), experimental group 2 (computer-experienced), and control group (usual care). 12 symptoms were assessed weekly using a tablet or computer.	<p>Mean HQRL score from baseline to 6 months <i>improved</i> among intervention groups as compared to usual care (34% vs. 18%, <math>p &lt; .001</math>), and more participants in the intervention groups experienced clinically meaningful HQRL <i>improvement</i> scores (21% vs. 11%).</p> <p>Mean HQRL score worsened among fewer in intervention group as compared to usual care (38% vs. 53%; <math>p &lt; .001</math>), while participants in intervention group experienced a 6-point <i>worsening</i> in HQRL scores (28% vs. 37%; <math>p &lt; .001</math>).</p> <p>Fewer intervention participants ED within 1 year (34% vs. 41%; <math>p = .02</math>).</p> <p>Fewer intervention participants were hospitalized at 1 year (44% vs. 49%; <math>p = .08</math>).</p> <p>STAR resulted in better HQRL, fewer ED visits, and fewer hospitalizations.</p>	II/A

Reference	Design	Sample	Methods	Major Findings & Recommendations	Level/Quality
Franca et al., 2019	RCT	61 adult oncology patients	<p>The control group received 3-minute telephone calls to evaluate CINV, as well as general guidance. The experimental group received 10-minute phone telephone calls with detailed CINV education and management strategies. Calls were made at 5-6 hours after chemotherapy administration, 3 days after therapy, and 5 days after therapy. CINV was evaluated using the MASCC tool and MAT.</p>	<p>The experimental group had lower occurrences of nausea compared to the control group during each of the telephone calls, with a statistically significant difference at 24 hours (<math>M = .300</math> vs. <math>M = .5483</math>; <math>p = .05</math>).</p> <p>The degree of nausea experienced at 3 days was less in the experimental group (<math>M = 2.064</math> vs. <math>M = 4.1</math>; <math>p = .0295</math>).</p> <p>The degree of nausea experienced at 5 days was also less in the experimental group (<math>M = 1.3</math> vs. <math>M = 3.29</math>; <math>p = .0069</math>).</p> <p>The intervention was effective at a time when CINV is most prevalent.</p>	II/A

Reference	Design	Sample	Methods	Major Findings & Recommendations	Level/Quality
Hintistan et al., 2017	Quasi-experimental	60 adult oncology patients	<p>The control group received standard oncology care. The experimental group received telephone follow-up by nurses after their first, third, and sixth chemotherapy treatments. Chemotherapy-related symptoms were evaluated with ESAS, FLIC, and ECOG.</p>	<p>Subscale mean scores were lower in experimental group for all subscale categories after the sixth chemotherapy treatment per ESAS.</p> <p>Nausea was significantly lower in control group (<math>M = 7.37</math> vs. <math>M = 8.23</math>; <math>p .01</math>).</p> <p>GI symptoms were less in intervention group after each telephone call per FLIC scores.</p> <p>After 1st chemo session, GI symptoms were significantly lower in control group (<math>M = 8.70</math> vs. <math>M 11.07</math>; <math>p = .00</math>).</p> <p>After 3rd chemo session, GI symptoms were significantly lower in control group (<math>M 7.87</math> vs. <math>M 9.20</math>; <math>p = .00</math>).</p> <p>After 6<sup>th</sup> chemotherapy session, GI symptoms were significantly lower in control group (<math>M = 5.93</math> vs. <math>M = .6.10</math>; <math>p = .84</math>).</p> <p>A telephone nurse-led intervention is successful in reducing symptoms of chemotherapy and improving HQRL.</p>	VI/A

Reference	Design	Sample	Methods	Major Findings & Recommendations	Level/Quality
Jackson et al., 2019	Pilot study	45 adult oncology patients	<p>Patients received a referral from a qualified provider (pharmacist) to help manage CINV. Patients were interviewed and recommendations provided; follow-up telephone calls assessed symptoms. The MASCC tool was used. 188 clinical interventions were provided.</p>	<p>MASCC scores for 5 patients all showed improvement from baseline after intervention(s).</p> <p>Median acute vomiting scores stayed at 0.</p> <p>Median acute nausea scores went from 8 to 0.</p> <p>Median delayed vomiting scores went from 4 to 0.</p> <p>Median delayed nausea scores went from 10 to 0.</p> <p>Pharmacists provided a substantial number of intervention and support for oncology patients.</p>	VI/A

Reference	Design	Sample	Methods	Major Findings & Recommendations	Level/Quality
Mooney et al., 2017	RCT	358 adult oncology patients beginning chemotherapy	Patients were randomized into the SCH intervention or enhanced usual care. All participants called AMS daily reporting severity of 11 symptoms. SCH group received automated self-care messages and were further managed by NPs to address poorly controlled symptoms; enhanced care group were reminded by the system to contact provider for concerns.	<p>Patients in the intervention group had 67% fewer symptom days (<math>p &lt; .001</math>).</p> <p>Patients in the intervention group had 39% less moderate days (<math>p = .001</math>) compared to the enhanced care group.</p> <p>Mean nausea and vomiting severity ratings were significantly less in the SHC group: <math>t = 2.769</math>; (<math>p &lt; .006</math>).</p> <p>Telephone-based intervention is efficacious and significantly reduces symptom burden.</p>	II/A

Reference	Design	Sample	Methods	Major Findings & Recommendations	Level/Quality
Moretto et al., 2019	IR	19 studies included	<p>Most of the studies included had telephone interventions within the first week after initiation of chemotherapy.</p> <p>Nurse-led interventions comprised 68.42% of the studies.</p> <p>Study results included symptom control, HQRL, self-efficacy, emotional support, and caregiver stress.</p>	<p>Several themes emerged: management of chemotherapy-related symptoms, HQRL, self-efficacy, emotional support, caregiver stress, and patient satisfaction.</p> <p>Telehealth is an important component of multidisciplinary health care for oncology patients.</p> <p>Nurse-led interventions are effective for patients receiving outpatient chemotherapy.</p>	VII/A



Reference	Design	Sample	Methods	Major Findings & Recommendations	Level/Quality
Rico et al., 2017	Pilot study	14 adult oncology patients	<p>cHEmoTHErApp was developed to deliver SMS text messages. The first text message was sent as initial contact, and daily thereafter throughout the span of chemotherapy treatment. The text messages contained information about water intake, hygiene, food intake, physical activity, prevention and management of nausea, vomiting, diarrhea, constipation, loss of appetite, and altered taste, as well as emotional support and encouragement messages.</p>	<p>Evaluated with “yes or no” responses, Likert scale questions, and open answer questions: Whether the patient read messages daily (yes or no), whether they understood message guidelines (yes or no), whether they had difficulty implementing interventions (yes or no), if messages were helpful in their treatment (yes or no), reason(s) the messages helped their treatment (open answer), if messages were considered to have any benefit (yes or no), benefit(s) of the messages (open answer), and level of satisfaction of messages (very satisfied, satisfied, neither satisfied nor dissatisfied, or very dissatisfied).</p> <p>13 participants were “very satisfied” with the messages, and 1 participant was “satisfied” with the messages.</p> <p>cHEmoTHErApp is a helpful tool in guiding patients through chemotherapy treatments.</p>	VI/B

Reference	Design	Sample	Methods	Major Findings & Recommendations	Level/Quality
Sun et al., 2020	RCT	324 adult oncology patients undergoing chemotherapy	Divided patients into 3 groups: control, experimental 1 (telephone automated cancer symptom management system [SMILE] and reporting), experimental 2 (SMILE with additional telephone-based education); 20 symptoms were addressed; use of SMILE also evaluated.	<p>CINV increased less with symptom management education. Experimental 1 group: <math>M = 3.2</math> at baseline vs. 9.26 at 5<sup>th</sup> treatment; Experimental 2 group <math>M = 2.7</math> at baseline vs. 6.33 at 5<sup>th</sup> treatment (<math>p = .709</math>).</p> <p>Experimental 2 participants reported the education was easy to follow (<math>M = 4.01</math>) and helpful for symptom management (<math>M = 4.02</math>).</p> <p>Researchers noted that incorporating the system into EMRs is necessary.</p>	II/A
Underhill et al., 2015	EBP project	30 adult oncology patients	A clinic nurse completed a structured telephone follow-up call to the participant at 24- and 72-hours post-chemotherapy treatment. The MASCC tool was used.	<p>Nausea decreased from being present in 24 patients 24-hours post-therapy to 11 patients 48-hours post-therapy.</p> <p>Vomiting decreased from 3 patients at 24-hours post-therapy to 2 patients at 48-hours post-therapy.</p> <p>This intervention is feasible for outpatient oncology practices and is useful for patient symptom reporting.</p>	VI/B

## **CHAPTER 3**

### **IMPLEMENTATION OF PRACTICE CHANGE**

Successful implementation of the evidence-based CINV management program could only occur after a rigorous review of the literature had been completed. The Iowa Model of Evidence-Based Practice was used as a guideline for implementation. Identification of the problem was clearly highlighted by the ACS, NCI, and CDC. The problem was emphasized as an important primary prevention health care concern for the patient population at Regional X Cancer Center in a Midwest town.

The implementation phase involved planning the details of the specific intervention. It was a requirement to protect project participants and assess the practice setting where the intervention took place. After completing the university's research determination questionnaire, it was determined that the project did not meet the federal government's definition of human subjects' research and no further oversight was required of the university's institutional review board (IRB). Even with this determination, an IRB application was required at the parent hospital of the clinical site. The hospital's IRB committee reviewed this EBP project to ensure the ethical treatment of all participants was maintained. Following permission to commence this EBP project (see Appendix D), the DNP student supervised its implementation.

Participants safety and confidentiality were maintained using informed consent and education to all participants. The planning was detailed to share with the facility staff and participants. Data were collected, including information about past visits to the Regional Cancer Center and the ED. Survey data were also collected, which consisted mainly of participants demographic data. After the intervention, outcomes were revealed, and an analysis of the findings was completed. Extensive examination of the evidence surrounding this intervention was conducted.

### **Participants and Setting**

The participants engaged in the practice change were adult oncology patients at Regional X Cancer Center. The average age of patients seen in this oncology practice for the group sampled was 67 years, with 57% male patients and 43% female patients.

Participants were enrolled beginning August 3, 2020. Inclusion criteria were as follows: newly diagnosed adults (at least 18 years of age) oncology patients who were naïve to treatment and receiving high or moderate emetogenic intravenous chemotherapy.

Exclusion criteria were pregnant or lactating females and participants who, in the opinion of project facilitator/physician, warranted individualized attention provided by the office staff.

The project facilitator (Dr. X) was an oncologist with six years' experience in oncology services. Another key stakeholder (Dr. Y), also an oncologist, had ten years' experience in oncology services. The remaining staffing consisted of four registered nurses, five medical assistants, one practice manager, and two patient access staff members. The Regional X Cancer Center traditionally had seen 60-70 oncology patients daily among three oncology providers, five days a week. The practice had six patient rooms for initial and follow-up oncology visits among the three providers, as well as an infusion center on the second floor of the building. The infusion center staffed three registered nurses daily and one charge nurse and operated from 8:00a.m. to 5:00p.m. five days a week. This floor has served an average of eight patients for oncology and other (e.g. rheumatology) infusion services at one time. Participants were seen in the Regional Cancer Center oncology offices by Dr. X and Dr. Y. The project was approved by the medical director and practice manager. The participation of staff members was not expected, but staff was utilized for assistance with data measurements. The project facilitator aided in recruitment of participants. The identities of all participating patients remained anonymous. EMRs were reviewed for data collection purposes only.

### **Comparison Group Characteristics**

Although basic demographic data for the historical patient population was provided by the office, a chart audit was conducted to gather data for statistical comparison. During the period prior to implementation, from March 1, 2020 to July 1, 2020, there were 45 new oncology patients treated at Regional X Cancer Center and receiving moderate and highly emetogenic chemotherapy. The average age of patients was 62.9 years. There were slightly more male patients (52%) compared to female patients (48%). There were a variety of cancer types, including lung, cervical, colorectal, breast, pancreatic, lymphomas, and others. A majority of patients were Caucasian (74%). 24% were African American, 1% was Hispanic, and 1% was of another race. Of the 45 new oncology patients, one required a visit to the infusion center. Additionally, 23 of the patients required visits to the ED. Patients often went to the ED multiple times, for a total of 56 ED visits. Of the 56 ED visits, 10 were directly related to CINV. Finally, 17 patients required hospitalization. Several of these also had multiple hospitalizations, for a total of 26 hospitalizations. Of these 26 hospitalizations, six were directly related to CINV.

### **Intervention**

During the implementation period, from August 3, 2020, to January 2, 2021, potential participants were identified by the project facilitator (Dr. X) and referred to the DNP student. The first stage of the EBP project intervention was a screening visit for potentially eligible participants. This was done by obtaining information about the cancer diagnosis, cancer stage, and chemotherapy regimen from the EMR. The next step was conducted by the DNP student at the first appointment for a patient with a new cancer diagnosis that would require chemotherapy for treatment, consisted of obtaining informed consent, reviewing medical records, assessing vital signs, administering the demographic questionnaire (see Appendix E), and reviewing concurrent medications that may impact the plan of care. Those meeting inclusion criteria were approached by the DNP student,

advised about the change in procedure, provided detailed information about the intervention, and asked to participate. Those consenting to participate then completed a demographic questionnaire that asked questions about age, gender, race, marital status, educational level, employment level, and type of cancer. This questionnaire contained a medical record number (which was only available to authorized office staff who had access to the password protected computer system) that would allow for analyzing the effectiveness of the variable by demographic variable and was provided to the DNP student who placed each form (the consent and demographic forms) in a locked box in the project facilitator's/oncologist's office immediately following completion. The DNP student confirmed a phone number for contacting the patient and identified the most appropriate time for a call. The phone number, as well as designated date and time for the initial call, were added to the top right-hand corner of the Rhodes Index of Nausea, Vomiting, and Retching (INVR) form. The form included three copies of the INVR to assess symptoms on treatment Days 2, 3, and 10 and allow for prompt comparison of the severity of symptoms. These were kept secured at the home of the DNP student.

The INVR questionnaire came from a direct source (Rhodes & McDaniel, 1999) (see Appendix B). The nausea questionnaire (INVR) includes eight Likert-type questions, scored from 0 (lowest) to 4 (highest), for a maximum score of 32. Patients select the answers that most closely correspond with their nausea, vomiting, and retching in the last 24 hours.

With day 1 being the first chemotherapy infusion, the telephone calls took place on Days 2, 3, and 10 of the chemotherapy cycle. On Day 2, the DNP student called each participant within 30 minutes of the preferred time, re-introducing herself and making an inquiry regarding the patients' general well-being. Then, the INVR was administered and patients rated their CINV. The patient's ratings were recorded on the coordinating INVR form by the DNP student. The form was kept in a locked box in a secure location in the DNP student's home. Nausea and vomiting data obtained during the Day 2 call served as

the baseline for future comparison. The Day 2 data questionnaire was designated to serve as the baseline data because, as the project facilitator/oncologist had noted, the onset of nausea and vomiting was typically not noted until Day 3. Prior to ending the call, the DNP student confirmed the ideal time for the next follow-up contact.

During each of the calls, the DNP student initially reinforced the education provided regarding medications and other supportive measures to prevent and/or lessen CINV and then provided self-management interventions for CINV, developed by Dr. X and based on the scores of the INVR. Those with scores of 1 to 10 were advised to take their antiemetic medication as needed and drink a lot of oral fluids. Additional teaching for those with scores of 11-20 included taking their antiemetic medications on a regular schedule three times a day and to monitor oral fluid intake, with a goal of drinking at least 64 ounces of liquid each day. They were also advised that they would receive a telephone call from a nurse at the Regional X Cancer Center to further evaluate their symptoms within the next 24 hours. Those with scores of 21-32 were advised that they would receive a telephone call from a nurse at the Regional X Cancer Center within the hour with further instructions.

The Days 3 and 10 telephone calls followed the exact same format: initial data on nausea and vomiting was gathered using the INVR questionnaire, and self-management guidance was provided based on the overall score intensity on individual items, and presence of additional symptoms. The ideal time for follow-up contact on Day 10 was established at the end of the Day 3 call.

At the end of the intervention, the DNP student reviewed the data. INVR scores were compared pre- and post-intervention; Day 2 to Days 3 and 10. Patient safety issues related to a CINV intervention were evaluated throughout the intervention.

### **Validity and Reliability of Data Measures**

The Rhodes INVR has been used since the 1990s to evaluate nausea and vomiting associated with a number of medical conditions. Noting that reliable and valid self-reporting instruments were essential for managing nausea and vomiting, Rhodes and McDaniel

(1999) worked to revise the tool, while ensuring that it remained reliable and user-friendly. The reliability and validity of the self-report tool had been established through the previous research (Ahmad, 2005; Kim et al., 2007). Ahmad (2005) found that the tool had both validity and reliability with a Spearman Correlation Coefficient of .87, split-half reliability of .90, and Cronbach's Alpha of .98. Additional international research (Kim et al., 2007) confirmed the tool's validity and reliability, reporting Cronbach's Alpha scores ranging from .912 to .968 and strongly correlated test-retest scores of all items (Spearman's coefficients: .962-1.000,  $p < .0001$ ).

### **Comparison**

To determine the intervention's impact on self-reported CINV, patients INVR scores were compared at baseline (therapy Day 2) to therapy Days 3 and 10. To answer the PICOT question, the number of patients undergoing chemotherapy from August 3, 2020 to January 2, 2021 will be compared to patients receiving chemotherapy from March 1, 2020 to July 1, 2020 in regard to infusion center visits, ED visits, and hospitalizations.

### **Outcomes**

The primary outcome of this EBP project was the need for additional health care visits related to CINV complications: infusion center visits, ED visits, and hospitalizations related to CINV. The number of visits for CINV complications was gathered from EMR records and compared to the comparison group data.

Secondary outcomes included a reduction in INVR scores from baseline (measured at Day 2) to follow-up telephone calls (measured on Days 3 and 10). For data analysis, patients' scores were categorized into mild (INVR scores of 0-10), moderate (INVR scores of 11-20), and severe (INVR scores from 21-30) categories.

### **Measures**

The secondary outcome data were compared using the ANOVA statistic in the Statistical Package for the Social Sciences (SPSS). The Day 2 scores on the INVR questionnaire were compared to the Days 3 and 10 scores on the INVR questionnaire.



All data was entered into SPSS Statistics 25. Descriptive statistics (i.e. means, ranges, and percentages) were used to identify the group of participants by key demographic characteristics. A power analysis statistical test was run to determine the minimum number of participants and determined to be 51 participants in order to achieve statistical significance. An ANOVA test was run to compare mean scores of all participants from Day 2 to Days 3 and 10. Inferential statistics were used to compare participants who needed additional interventions (infusion center visits, ED visits, hospitalizations). One-way ANOVA testing and independent samples *t*-tests were used to compare scores between men and women. Paired samples *t*-tests also compared Day 2 scores to Day 3 scores, Day 2 scores to Day 10 scores, and Day 3 scores to Day 10 scores. The primary outcome was to decrease symptom burden related to CINV via the INVR questionnaire and subsequent interventions. One secondary outcome was to document which interventions were required based on INVR questionnaire responses. Another secondary outcome was to determine which intervention regimens are utilized most often.

### **Time**

The EBP project intervention began August 3, 2020. Enrollment in the EBP project intervention was designed to last for four months, to coincide with the traditional influx of new patients at this Regional Cancer Center in the fall. This extended to five months, after recruitment was slower than planned. The project duration also helped ensure enough participants can be recruited (a minimum of 51 participants by power analysis) to maximize the probability of obtaining statistically significant results.

### **Protection of Human Subjects**

Prior to data collection, IRB approval was obtained by the DNP student. The DNP student and project facilitator completed the EBP project in accordance with protocol set forth by the IRB at Hospital X, obtained informed consent, and will report unanticipated problems involving risks to participants or others in accordance with Hospital X's IRB Policies and Procedures and all federal requirements. Collection, recording, and reporting

of data was accurate and ensured the privacy, health, and welfare of participants during and after the study. As outlined in the implementation plan, patient confidentiality was maintained throughout the EBP project by removing patient identifiers, obtaining informed consent, and abiding by HIPAA regulations.

All forms pertaining to the EBP project were distributed and collected by the DNP student to maintain consistency. Once completed by the consenting patients, the pre-intervention and intervention questionnaires were immediately placed in a locked box in the oncology practice office, specifically, in the office of the project facilitator (Dr. X). Dr. X's office was locked when not in use and only available to authorized personnel (e.g. nurse manager) during the working day. Participants were identified by numbers; no names were used. Identifiable patient information from the EMR was kept in a separate location at the DNP student's home. Once the intervention period was completed, the DNP student brought the locked box home to analyze the data and input it into SPSS Statistics 25 and to analyze the data. A notebook was utilized to keep track of dates and times participants enrolled in the intervention and completed the questionnaires. This was kept in a locked filing cabinet in the office of Dr. X. The data will be kept locked in the office of Dr. X for three years following the EBP project, then shredded.

Participants were advised that they could withdraw from the EBP project at any time without impacting their usual care. All data and records generated during the EBP project were kept confidential in accordance with Institutional Policies and HIPAA on subject privacy. The DNP student and project facilitator will not use the data and records for any purpose other than conducting the EBP project. No identifiable data will be used for future research without first obtaining IRB approval. Risks were expected to be minimal with this EBP project. There are anticipated to be no physical risks as a result of the EBP project were anticipated, but psychological risks from the intervention and project-related procedures could occur; including anxiety, depression, guilt, and loss of self-esteem. Strategies used to mitigate untoward psychological risks included developing a rapport

during the initial visit, using the same standard questionnaire at each telephone call, as well as providing reassurance, identifying the events as they occurred, and promptly reporting these to the project site facilitator for further management.

The reduction of CINV remains a major clinical issue, as CINV is directly related to adherence to scheduled chemotherapy treatments and maintenance of patient quality of life (Coolbrandt et al., 2018). The purposes of this EBP project were to limit CINV and to determine the impact of interventions on reducing the number of health care visits related to CINV. This project addressed the following PICOT question: In adult patients with cancer who are undergoing chemotherapy, does a telephone intervention which includes the administration of a nausea questionnaire and APP-guided interventions at Days 2, 3 and 10 post-chemotherapy decrease infusion center visits, ED visits, and hospitalizations related to CINV complications as compared to current practice (no telephone follow-up or nausea questionnaire) over a 16-week period of time?

### **Participants**

A number of statistical analyses were completed to determine if the participants in the EBP project were representative of the patient population within the oncology practice. The findings of those analyses are outlined in the paragraphs below.

The average age of the participants in the EBP project was  $M = 66.6667$  years ( $SD = 10.37416$ ), with ages ranging from 43 to 81 (see Table 4.1). The mean age of the comparison group was  $M = 62.9167$  years ( $SD = 12.65913$ ). Using a paired-samples  $t$ -test, no significant difference in ages was found ( $t(23) = 1.041$ ,  $p = .308$ ), making the EBP project participants representative of the population.

The literature showed that younger oncology patients are at higher risk for CINV (Underhill et al., 2015). But for participants in the lower half of the age bracket (ages 43-67), the majority of participants ( $n = 10$ ) reported symptoms equivalent with mild scores on the INVR questionnaire. These findings were equivalent to the CINV ratings of older participants. For participants in the upper half of the age bracket (ages 68-81), 10 participants reported symptoms equivalent with mild scores on the INVR questionnaire, and two participants averaged moderate scores on the INVR questionnaire for this intervention.

Thus, there were no major differences in scores on the IVNR questionnaire between younger and older participants.

There were 15 males and 9 females who participated in the intervention: 63% males and 37% females. This is slightly more male dominant than the average patient population in the oncology practice, which was determined by sampling the population (comparison group), to be 57% male patients ( $n = 26$ ) and 43% female patients ( $n = 19$ ), but the intervention group was determined to be representative of the patient population within the practice ( $\chi^2(1) = .22, p = .521$ ).

Participants in the EBP project consisted of 23 Caucasian participants (95.83%) and one African American participant (4.17%). In the comparison group, there were 38 (84.44%) Caucasian patients, 5 African American patients (11.11%), 1 Asian patient (2.22%), and 1 patient (2.22%) who was of another race.

There were six participants with lung cancer, five participants with lymphoma, four participants with head and neck cancers, four participants with breast cancer, two patients with colorectal cancer, one participant with cervical cancer, one participant with pancreatic cancer, and one participant with bladder cancer. These are reflective of the entire oncological patient population in the practice, in which the most common cancers were lung, head and neck, colon, and breast.

Twenty-three participants received high emetogenic chemotherapy, and one participant received moderate emetogenic chemotherapy. A variety of cancer stages were represented, partly due to the differences in staging of various cancers. Participants were most often diagnosed with a stage III or stage IV cancer. It can be extrapolated that this is reflective of the patient population, which has a 19% poverty rate, is of a low socioeconomic class, and is less likely to seek primary prevention health care and participate in screening that could provide a diagnosis at an earlier disease stage.

Six participants did not answer all three telephone calls, and therefore did not complete the INVR questionnaire three times. All of these participants answered two of the three telephone calls. They were all Caucasian and diagnosed with a variety of cancer types. For this subgroup, four participants had symptom ratings that resulted in mild scores in both of the telephone calls that they did answer. Two participants had symptom ratings that resulted in one mild score and one moderate score. None of the participants did not answer any of the telephone calls. The attrition data was not computable due to sample size, but there were no significant differences in age, gender, or race for participants that did not answer all three telephone calls.

*Characteristics of the Participants*


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	<i>n</i> (%)
<hr/>	
Gender	
Male	15 (57)
Female	9 (43)
Race	
African American	1 (4)
Caucasian	23 (96)
Employment	
Full-time	4 (17)
Not employed	6 (25)
Retired	14 (58)
Level of Education	
High school	14 (58)
Some college	3 (12.5)
College degree	4 (17)
Other	3 (12.5)
Marital Status	
Single	6 (25)
Married	12 (50)
Divorced	5 (21)
Widowed	1 (4)

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*Note.*  $N = 24$ . Participants were on average 66.3 years old ( $SD = 10.37416$ ) and participant age did not differ by condition.

**Changes in Outcomes****Statistical Testing and Significance**

Statistical analyses were conducted to evaluate the effectiveness of the intervention on CINV burden using INVR questionnaire scores within one group ( $N = 24$ ). One-way repeated measures ANOVA compared mean scores for each of the three telephone call days. Paired samples  $t$ -tests were used to compare Day 2 scores to Day 3 scores, Day 3 scores to Day 10 scores, and Day 2 scores to Day 10 scores. Statistical significance for all data was established as  $p < .05$ . One-way repeated measures ANOVA as well as independent samples  $t$ -tests compared INVR questionnaire scores for men and women. Additional comparison data were not run on level of education, race, employment status, and marital status.

## **Findings**

### ***Primary Outcome***

The primary outcome of this EBP project was to decrease symptom burden related to CINV via INVR questionnaire and subsequent interventions. This was accomplished by comparing the number of infusion center visits, ED visits, and hospitalizations in the intervention group to the comparison group.

The findings (see Table 4.2) supported that a telephone intervention and administration of a nausea questionnaire with APP-guided interventions decreased ED visits and hospitalizations related to CINV. Evaluation of the effectiveness of reducing each of these additional points of care are outlined in the following paragraphs.

Statistical analyses were conducted to evaluate the effectiveness of the intervention for infusion center visits. For the comparison group, 1 of the 45 patients required at least one visit to the infusion center (2.22%). For the intervention group, 7 of the 24 participants (29.17%) required at least one visit to the infusion center at some point in the 16-week time period that the DNP student was completing the EBP project. Of these seven, five had infusion center visits during the 10-day period during which they were receiving calls and additional interventions. These five infusion center visits were all planned by the DNP student with the help of the staff at the oncology practice. The infusions consisted of IV



hydration, IV antiemetics, or both. When comparing the percentage of patients requiring infusion center visits, despite an increase in frequency among the intervention group, the increase was not statistically significant ( $\chi^2(1) = 2.534, p = .111$ ).

Statistical testing was also completed to evaluate the effectiveness of the intervention for ED visits. Within the comparison group, although 23 patients went to the ED (with several patients seeking ED care more than once, for a total of 56 visits), ten of the 45 patients (22.22%) specifically required a visit to the ED for CINV-related illness. Only 1 of the 24 intervention group participants (4.17%) required a visit to the ED during the 10-day intervention period, but that visit was unrelated to CINV. Three additional participants did visit the ED at some point during the 16-week period of observation, and these were also not related to CINV. A chi-square test of independence was not able to be calculated comparing the number of ED visits between the comparison and intervention groups over 16 weeks, because there were zero participants who required an ED visit for CINV in the intervention group.

Finally, statistical testing also evaluated the effectiveness of the intervention for reducing hospitalizations for CINV-related illness. Within the comparison group, 6 of the 45 patients required hospitalizations for CINV (13.33%), as compared to 1 of the 24 intervention participants (4.17%). Two participants in the intervention group had hospitalizations from August 3, 2020 to January 2, 2021, but neither during the 10-day intervention. One hospitalization was partially related to CINV symptoms (4.17%), and the other was not related to CINV. Despite the 9-percentage point reduction in hospitalizations, which could be considered clinically significant, this finding was not improved to a statistically significant level ( $\chi^2(1) = 3.130, p = .077$ ).

### ***Secondary Outcome***

The secondary outcome of this EBP project was to determine the impact of APP-guided interventions on reducing symptom burden of CINV. This was done by comparing the mean scores on the INVR questionnaire at Day 2 to scores on the INVR questionnaire at Days 3 and 10.

A repeated measures ANOVA was calculated comparing the INVR questionnaire scores for the group of participants at three different times: Day 2, Day 3 and Day 10 post-chemotherapy. Twenty-one participants answered the telephone call on Day 2. Twenty-three participants answered the telephone call on Day 3. Twenty-one participants also answered the telephone call on Day 10. Despite the intervention, a statistically significant increase in INVR questionnaire scores was noted ( $F(2,32) = 9.075, p < .001$ ).

Paired samples *t*-tests were performed to further analyze the data. Paired samples *t*-tests were conducted to compare participants who answered the telephone call on Day 2 and Day 3; participants who answered the telephone call on Day 3 and Day 10; and participants who answered the telephone call on Day 2 and Day 10. As noted in the above paragraph, not all participants answered each call; therefore, the means used for these analyses do differ from the entire group analysis and they do differ within each of these three comparisons noted below. When comparing the mean INVR scores on Day 2 to Day 3 ( $M = 3.100$  vs.  $M = 5.800$ ), the increase was not determined to be statistically significant ( $t(19) = -2.009, p = .059$ ). When comparing mean INVR scores on Day 3 to Day 10, the increase was not determined to be statistically significant ( $t(19) = -1.618, p = .122$ ), but the increase in INVR scores did reach statistical significance ( $t(19) = -5.014, p < .001$ ) when Day 2 scores were compared to Day 10 scores ( $M = 2.700$  vs.  $M = 10.400$ ).

A repeated measures ANOVA was also calculated comparing the INVR questionnaire scores for men and women. Despite the notation that women scored higher than men on each of the days, this difference did not reach statistical significance ( $F(2,30) = .874, p = .297$ ). Additionally, independent samples *t*-tests were calculated. For Day 2, the mean score for men was 2.6047 ( $SD = 2.84400$ ). The mean score for women was 3.8350

( $SD = 3.86670$ ). Scores between men and women on Day 2 were not statistically significant ( $t = -.810, p = .428$ ). For Day 3, the mean score for men was 3.9336 ( $SD = 5.22110$ ). The mean score for women was 8.3356 ( $SD = 7.32860$ ). Despite women scoring higher on the INVR questionnaire on Days 2 and 3, the scores for Day 3 did not reach statistical significance ( $t = -1.686, p = .107$ ). Finally, for Day 10, the mean score for men was 9.8350 ( $SD = 9.73874$ ). The mean score for women was 8.3356 ( $SD = 7.22553$ ). Men scored higher on the INVR questionnaire on Day 10, but the scores did not reach statistical significance ( $t = .314, p = .702$ ).

**Secondary Outcome Interventions.** Scores on the INVR questionnaire were mostly mild (0-10); few participants reported moderate (11-20) or severe (21-30) symptoms (see Table 4.2). Eight participants had symptom ratings that fell in the mild category on all three of their telephone calls. These participants were told to drink plenty of clear liquids daily, as well as to take their antiemetic as needed. Five participants had symptom ratings that resulted in two mild scores and one moderate score, one participant had symptom ratings that resulted in one mild score and two moderate scores, and one participant had symptom ratings equivalent to all moderate scores. They were provided the same education as participants who received a mild score but were also advised to take their antiemetic around the clock and drink at least 64 ounces of clear liquids daily; they were also notified that they would receive a telephone call from the oncology practice within 24 hours. There was one participant who had symptom scoring equivalent to one mild, one moderate, and one severe score. Because at least one score rating was severe, this participant was provided the same baseline education as those with mild and moderate scores but were also notified that they would be receiving a telephone call from the oncology practice within the hour with further instructions.

**Table 4.2***Participant Scores and Interventions*

	Day 2 Score	Day 3 Score	Day 10 Score	Add'l Interventions First Cycle	Add'l Interventions Subsequent Cycles
1	0 (L)	0 (L)	8 (L)	None	None
2	5 (L)	7 (L)	28 (S)	IC	None
3	N/A	4 (L)	0 (L)	None	None
4	N/A	10 (L)	2 (L)	None	None
5	6 (L)	0 (L)	N/A	None	None
6	3 (L)	0 (L)	0 (L)	None	None
7	1 (L)	1 (L)	6 (L)	IC	IC
8	0 (L)	0 (L)	N/A	IC	None
9	4 (L)	9 (L)	11 (M)	IC x 3	Hospitalization
10	0 (L)	0 (L)	1 (L)	None	None
11	0 (L)	N/A	15 (M)	IC x 3, hospitalization	IC
12	5 (L)	15 (M)	9 (L)	None	None
13	0 (L)	0 (L)	0 (L)	IC	None
14	6 (L)	0 (L)	19 (M)	None	None
15	N/A	0 (L)	0 (L)	None	None
16	8 (L)	12 (M)	N/A	None	None
17	2 (L)	4 (L)	8 (L)	None	IC x 2
18	0 (L)	4 (L)	2 (L)	None	None
19	6 (L)	0 (L)	15 (M)	None	None
20	0 (L)	3 (L)	2 (L)	None	None
21	10 (L)	18 (M)	18 (M)	IC	None
22	1 (L)	17(M)	7 (L)	None	None
23	0 (L)	10 (L)	18 (M)	None	None
24	5 (L)	16 (M)	24 (S)	IC x 2	None

\*N/A = telephone call not answered

IC = infusion center

L = low

M = moderate

S = severe

\*Additional interventions only included those measured in the comparison group: infusion center visits, ED visits, and hospitalizations

There were some findings that warrant additional discussion. As noted in Table 4.2, three participants required infusion center visits in subsequent chemotherapy cycles. One of these participants also required an infusion center visit during their intervention period, and another participant also required a hospitalization. This patient opted for hospice services instead of completing all chemotherapy cycles. Most patients did not require the infusion center, ED, or hospital in subsequent chemotherapy cycles. However, many participants required additional interventions and/or additional office visits, both during the first chemotherapy cycle and subsequent chemotherapy cycles. On average, within this EBP project, participants 60 years of age and under had average INVR questionnaire scores slightly lower than participants 61 years of age and older. This is inconsistent with the literature reviewed for this EBP project, which revealed that those 60 years and younger were at higher risk for CINV (Underhill et al., 2015). In this EBP project, those who scored the highest on the INVR questionnaire (severe ratings, with scores greater than 20) were males in their 80s. Cancer type did not appear to be predictive of CINV. Nearly all of the participants received HEC chemotherapy, so there was no way to compare MEC versus HEC chemotherapy for INVR questionnaire scores.

In summary, the intervention within this EBP project was effective for reducing ED visits and hospitalizations. Earlier intervention resulted in an increase in infusion center visits, which were more cost-effective therapies and provided participants a familiar environment. Unfortunately, the intervention was not effective for decreasing INVR questionnaire scores, but the scores did serve as an appropriate tool for initiating APP-guided interventions that positively impacted the primary outcome.

## CHAPTER 5

### DISCUSSION

#### Explanation of Findings

The purposes of this EBP project were to limit CINV and to determine the impact of APP-guided interventions on reducing the number of health care visits related to CINV, specifically infusion center visits, ED visits, and hospitalizations. At the conclusion of the EBP project, the DNP student had several findings about CINV which are outlined below.

#### Primary Outcome

The primary outcome of this EBP project was to decrease the impact of symptom burden related to CINV by reducing infusion center visits, ED visits, and hospitalizations. Many of the APP-guided interventions were successful for doing so. When INVR questionnaire scores increased, the DNP student was able to initiate interventions, such as additional office visits, changes to therapies, and consults with physicians. The PICOT question was partially answered, with intervention group participants having fewer ED visits (0 in the intervention group vs. 22.22% of the comparison group) and hospital visits (2.22% in the intervention group vs. 29.17% of the comparison group). In comparison, the percentage of patients seen in the infusion center actually increased for the intervention group (29.17%) as opposed to the comparison group (2.22%). It is thought that the increased number of visits to the infusion center reflected that the sequelae of CINV were addressed in a timely, resource-efficient manner. These patients had contact with staff members who were more familiar with the participants and resulted in fewer ED visits and hospitalizations. It is anticipated that the decrease in ED visits and hospitalizations, although not statistically significant, were clinically significant. Furthermore, a previously completed power analysis set the number of participants required to achieve statistically significant results at 51 participants, while this project included only 24 participants. Thus,

the limited number of participants likely impacted the ability to achieve statistical significance despite the noted positive outcomes.

It is important to note the effectiveness of the APP-guided interventions for those who scored moderate scores on the INVR questionnaire. This appears to be the group in which the intervention was most helpful. Of importance is the finding that the DNP student was able to guide all participants and keep them out of the ED and hospital settings, the main goal of the EBP project. Extra contact with participants led to the use of additional antiemetic medications, extra appointments with the physicians, and infusion center visits. These were all critically important in reducing CINV complications and keeping participants out of the hospital setting.

For those whose symptoms ratings resulted in severe scores on the INVR questionnaire, the intervention was moderately helpful. These patients were flagged by the physicians as being as “high risk” for CINV. These patients had more advanced cancers and co-morbidities. Therefore, these patients overall had the most interventions from the DNP student, as well as being seen in the ED and hospital.

Another finding that warrants explanation is the effect of the intervention on older adults, who often have co-morbid conditions, making them more likely to need an ED visit or hospitalization. The APP-guided interventions were especially effective for this group. Both of the participants were males over the age of 80, and these males reported symptoms equivalent with a “severe” rating on at least one call. The APP-guided intervention afforded the opportunity for their symptoms to be addressed in a timely, resource-efficient manner. Thus, fewer ED visits or hospitalizations were needed.

It is also of note that participants with head and neck cancers required more additional interventions compared to other types of cancer. While none of these participants were also receiving radiation, many of them reported mucositis, stomatitis, loss of appetite, and loss of taste. Additionally, almost all of the participants with head and neck

cancers reported gastrointestinal reflux symptoms. These are likely contributing factors in the need for more infusion center visits and other additional interventions.

### **Secondary Outcome**

The secondary outcome of this EBP project was to determine the impact of APP-guided interventions, based on the INVR questionnaire scores, to reduce CINV. While the data and statistical analysis were mostly expected, some of the participant outcomes were not. For example, there were statistically significant increases in INVR questionnaire scores from Day 2 to Day 3 and Day 3 to Day 10, despite the intervention. Thus, one could summarize that the intervention was not beneficial in reducing CINV. But further discussion is warranted.

The supportive literature suggested patients experience the highest levels of nausea and vomiting 48 to 72 hours after receiving chemotherapy (Jackson et al., 2019). Therefore, the DNP student and project facilitator anticipated that CINV scores would increase from Day 2 to Day 3. Day 3 scores were anticipated by the project site facilitator and DNP student to be the highest. Neither the project facilitator nor the DNP student anticipated increases in scores from Day 3 to Day 10; therefore, patients had a 7-day period without telephone calls and APP-guided interventions to address the increase in CINV scores.

The majority of participants in this EBP project had mostly mild or “low” scores on the INVR questionnaire (13 of 24 participants had mild scores for all calls, while an additional 8 participants had only one moderate score among all calls), which was a somewhat unexpected finding, considering the significance of the impacts of CINV and the amount of research dedicated to it. Because most participants had mild scores on the INVR questionnaire, they received fewer education-based APP-provided interventions. Thus, it was impossible to determine if these patients would have benefited further from more intense APP-provided interventions (Rha et al., 2016 and Rico et al., 2017)



Finally, the intervention did not seem to be more effective at controlling CINV symptoms for women than men. Women scored higher on the INVR questionnaire on Days 2 and 3, and men scored higher on Day 10. Although women had higher mean scores on the questionnaire overall, they did not require more additional interventions than their male counterparts. Two women in the intervention group needed infusion center visits, while five men needed infusion center visits, with three men requiring at least two infusion center visits. This could be for a few reasons. Females, on average, spent more time on the telephone calls than their male counterparts. This resulted in more interventions like extra appointments with the oncologists and medication changes. Additionally, although a small difference, there were more single women in the intervention group compared to men. In a study by Winther et al. (2020), in their exploration of telephone-based interventions for healthcare, they found that participants liked someone to confide in regarding all health issues, access to professional and competent feedback, and a hotline for help and support. Women specifically were cited as valuing another voice to help them feel less burdensome to caregivers and protect their families from excessive worry (p. 3566). Males in the intervention group spent less time on the telephone calls and may have left out information that then resulted in more infusion center visits. This could also help explain why men had higher INVR questionnaire scores on Day 10.

### **Strengths and Limitations of the DNP Project**

#### **Strengths**

The main strength of this EBP project was acceptability by staff (key stakeholders) and participants. There was an identified need for this type of intervention at the project site. Thus, the EBP project had strong support from the project facilitator, who was the most important key stakeholder in leading the practice change, and there was little to no resistance to change. The project facilitator also served as a resource when additional interventions (i.e., infusion center visits) were needed. Using the Iowa Model Revised, the project facilitator was involved in the feedback loops, and his feedback resulted in

adaptations for the project. For example, when it became difficult to obtain data for the comparison group, the project facilitator connected the DNP student to the oncology staff pharmacist, who gathered the data. Following the leadership provided by the project facilitator, the DNP student also had full support of the staff. These staff members were readily available during the oncology practice hours and answered questions in a timely manner. They also contacted patients in the appropriate time limits, and the DNP student was able to hand the intervention off to one staff nurse and one staff medical assistant easily and seamlessly at the end of the intervention period. Not surprisingly, based on the leadership of the physician, the intervention was also well-accepted and appreciated by participants; none of the participants that were approached declined to participate.

A final strength of the EBP project was the ease of using the widely used INVR questionnaire, which had previously established validity and reliability. The questionnaire did not require a significant amount of time for either participants or the DNP student to complete, and its use allowed the DNP student to guide participants through the initial 10 days of chemotherapy treatment during a national pandemic and minimizing exposure to COVID-19 for this immunocompromised patient population.

### **Limitations**

A main barrier encountered was patient responsiveness and consequent attrition. Several patients did not answer all three telephone calls, and without additional follow-up, it is difficult to determine why the telephone call(s) were not answered or if additional interventions would have been warranted if the calls were answered. This limitation created some challenges to data analysis. Another barrier encountered was the difficulty enrolling participants. This was a limitation of the EBP project for a variety of reasons. First, the current healthcare climate and pandemic made scheduling appointments more difficult. Patients were also more hesitant to seek out providers and hospital settings. Oncology patients almost always require surgical procedures for biopsies and long-term IV access (at a minimum) for initial care, and this was unsettling for many due to a perceived increased

risk of exposure to COVID-19. Several patients also had difficulty with insurance before being able to start treatment, resulting in fewer participants initiating treatment even during an extended enrollment period.

. Another limitation was the timeframe designated for telephone call follow-up. Based on previous literature (Hesketh et al., 2017; Sun et al., 2020). CINV was measured at Days 2, 3, and 10. Given the participants' responses and lack of improvement in CINV scores (especially from Day 3 to Day 10), that schedule may not have been ideal.

### **Implications for the Future**

There are several future implications in the areas of APP practice, theory, research, and education. This EBP project provided several themes and results that APPs should address as they relate to CINV and oncology care. There are also implications for the professional nurse in the areas of practice and education.

#### **Practice**

Data analyzed within this EBP project revealed that a telephone intervention and administration of a CINV questionnaire decreased ED and hospital visits. This intervention was particularly helpful for groups identified as "high risk" for CINV (i.e., older adults) by providers. This translates into a need for oncology practices to be especially vigilant in follow-up with older adult patients, especially those 80 and older, as these adults are at higher risk for CINV complications. The additional vigilance may need to extend beyond a regular daily schedule; interventions for oncology patients are needed not only during office hours, but evenings and weekends as well. Future recommendations include a telephone line open to take calls twenty-four hours a day, seven days a week, as well as staff to respond to these patient needs. This can also include alternative follow-up strategies when telephone calls are not answered (e.g., an email follow-up or utilizing a family member/caregiver as a contact) when participants are unavailable or unable to answer calls. While this is best practice recommendation, it may be cost-prohibitive for most oncology practices. Still, the APP is best suited to provide additional interventions for CINV

management as an educator and leader; thus, to reduce practice costs the APP can also prepare the professional nurse to administer the INVR questionnaire via telephone calls and email.

Because the telephone calls were helpful in keeping patients out of the ED and hospital during the first chemotherapy cycle, practices should consider using this intervention in subsequent chemotherapy cycles, provided the oncology practice can accommodate this service. As a leader, the APP could develop the policies and procedures for the staff to follow for all subsequent chemotherapy cycles. This initiative is especially important, as research has shown that cancer patients are most likely to report chemotherapy-related symptoms after the second chemotherapy cycle (Rha et al., 2016). Although a few symptom clusters have been identified as being stable throughout the chemotherapy (i.e., fatigue and loss of appetite/nausea), this further emphasizes the need for CINV intervention throughout the entirety of treatment (Rha et al., 2016).

This specific patient population was of low socioeconomic status and consisted of mostly retired Medicare recipients. Cost of treatments was a burden for this particular patient population; considering this limitation, financial concerns should be addressed as this project continues. The APP can work with insurance companies and other providers to provide this advocacy role for patients that need it. Considering the socioeconomic status, it is important to recognize that a telephone was necessary to participate in the intervention. This was not usually a problem for participants, although there were a few modifications made.

In the future, it would be important for the APP to consider the culture of patient population. This EBP project was well-accepted by all participants, but that may not be the case in different settings.

### **EBP Model**

The Iowa Model Revised has established success in leading practice change. Healthcare professionals find the model to be straightforward and linear (Iowa Model

Collaborative, 2017). While the staff within this EBP project did not have any significant challenges using the Iowa Model Revised, and subsequently implementing the practice change, critique of the model is that it can be too complex for novice healthcare professionals (Iowa Model Collaborative, 2017). Therefore, for this EBP project to be repeated or expanded, it should be noted that this EBP project works best with a small team led by skilled healthcare professionals. Ideally, an APP should form and lead the team, using a small group of dedicated staff (key stakeholders) to implement the change.

### **Research**

The evidence showed that patients starting chemotherapy for the first time should be educated about CINV, screened for symptoms of CINV, and provided with interventions to prevent or minimize CINV. There was also consistent evidence from the literature that demonstrated the effectiveness of using a telephone intervention is successful in aiding in minimizing CINV. Results from this EBP project were consistent with the research conducted by Basch et al. (2016) in that the intervention decreased ED visits. Yet, because the APP-guided interventions were not particularly effective at decreasing INVR questionnaire scores within this population, it would be appropriate to determine their effectiveness within other populations. It should be noted that this project did not have a comparison group that received the APP-guided interventions; thus, it is impossible to determine how high INVR questionnaire scores would have risen, if the earlier interventions were not implemented. Future research should focus on the development of effective, evidence-based interventions that can be standardized and used within oncology practice across the nation. Given the transition to telehealth during the pandemic, it would seem appropriate that future research include a focus on additional telehealth services to address CINV.

Additional areas of future research can focus on those individuals shown to be “outliers” in regard to the CINV scoring within this project. Ideally, effective strategies

should be developed to care for those most at risk for complications related to dehydration (e.g. those age 80 and older).

As the population for this EBP project was primarily white, middle-class American, it is also appropriate for additional research to focus on patients of color, who were underrepresented in this project and often not addressed within the research reviewed for this project. Including more diverse populations evaluated by the INVR questionnaire and managed APP-guided interventions would significantly add to the body of evidence regarding CINV management.

Because it was found that participants experienced nausea and vomiting later in the first chemotherapy cycle than anticipated, future research should focus on determining the most appropriate days for telephone calls to be made. Based on the findings of this EBP project, it was surmised that calling on Days 3, 8, and 10 may better reduce visits to the infusion center, ED, and hospital, but more research is needed.

Future research could focus on the emotional support that additional follow-up care for CINV management provides. Consistent with the recommendations provided by Moretto et al. (2019), future research could also focus on self-management strategies for CINV management and compared to usual care (Mooney et al., 2016).

In addition to previously identified recommendations for future evaluation, the standard for usual care may need to be further explored by researchers. Rha et al. (2016) stated that more than 75% of healthcare providers underestimated the incidence of delayed CINV and concluded that a change in CINV management, which would include a 5-HT<sub>3</sub> receptor antagonist, a NK1-receptor antagonist, and dexamethasone, would help reduce delayed CINV. Further research on these findings is warranted. Given the increase in INVR questionnaire scores on Day 10, it is important for future research to address delayed CINV. Janicki (2016), who reported that 58% of patients receiving MEC or HEC experience delayed CINV, with inconsistent prophylaxis being the main cause, used palonestron and netupitant (as compared to standard of treatment with a 5-HT<sub>3</sub> receptor antagonist) to

combat delayed CINV. These diverse recommendations of CINV management draw attention to the need for the development more research-based universal management guidelines for CINV that could be implemented by the APP. It was beyond the scope of the DNP student to manipulate the current practice for CINV medication treatment, but this is a consideration for future research.

### **Education**

All oncology patients should be educated on CINV management. Best practice shows that reminders about CINV management through telephone follow-up calls helps reduce CINV. CINV education should be conducted with verbal instruction, written materials, and other visual resources such as videos and text message reminders or emails; in a leadership role, the APP can develop these educational tools. For nurse professionals and APPs, CINV management should be a part of training and continuing education, especially for those working in oncology settings. Hospitals can also incorporate CINV management education for those that work with an oncology patient population. Although a staff oncology nurse is optimally suited to administer questions surrounding CINV and direct patients to the next level of intervention or care, APPs are the best educated to provide CINV management because of their focus on holistic patient care as well as patient education. APPs, specifically NPs, provide physical, social, psychosocial, and existential patient care (van Dusseldorp et al., 2018). APPs, with their strong educational background, can serve as a link between oncologists and the rest of the oncological healthcare team.

### **Conclusion**

Nausea and vomiting are extremely common side effects of chemotherapy. The reduction of CINV remains a major clinical issue, as CINV is directly related to adherence to schedule chemotherapy treatments and maintenance of patient quality of life (Coolbrandt et al., 2018). The purposes of this EBP project were to limit CINV and to determine the impact of interventions on reducing the number of healthcare visits related to CINV:

specifically, infusion center visits, ED visits, and hospitalizations. This project addressed the following PICOT question: In adult patients with cancer who are undergoing chemotherapy, does a telephone intervention which includes the administration of a nausea questionnaire and APP-guided interventions at Days 2, 3 and 10 post-chemotherapy decrease infusion center visits, emergency department (ED) visits, and hospitalizations related to CINV complications as compared to current practice (no telephone follow-up or nausea questionnaire) over a 16-week period of time? Ultimately, this EBP project was implemented to improve CINV symptom management and patient healthcare quality of life.

Although the findings of this EBP project did not reveal a benefit of reducing CINV scores, the APP-guided intervention reduced the use of the ED and decreased the need for hospitalizations. The use of resources to address CINV was shifted to the infusion center, a more cost-effective approach. This EBP project inadvertently addressed the financial burdens on healthcare systems, especially during a global pandemic. During this time, it was difficult for patients to be seen in the ED in a timely manner, and it was also unlikely that caregivers could accompany patients to the ED or visit them while hospitalized. Thus, it was determined that the oncology practice and attached infusion center was a more appropriate place for this patient population, with providers who were familiar with the patients and access to services that were more readily available. Ultimately, although CINV scores did not improve significantly during the project, the decreased utilization of the ED and hospital was congruent with improved patient outcomes.



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**BIOGRAPHICAL MATERIAL****Taylor A. Steger**

Mrs. Steger graduated from Indiana University with a bachelor's degrees in the science of nursing in 2015. She also graduated with minor degrees in Spanish and Psychology. She has worked in pediatrics and intensive care units as a registered nurse. She has been employed with IU Health at Riley Hospital for Children and St. Vincent hospitals. She also volunteers with a free health clinic in her area as a translator. She began graduate school work at Valparaiso University in 2016 in the Doctor of Nursing Practice (DNP) program. She is interested in working as a family nurse practitioner in a primary care practice setting and continuing to volunteer at the free health clinic. She has taken a special interest in oncology which was the inspiration for her DNP project. She has presented this work at the Indiana Virtual Summit 2020 conference with plans to present in June 2021 as well.

**ACRONYM LIST**

ACS: American Cancer Society

ALL: Acute Lymphoblastic Leukemia

AMS: Automated Messaging System

APP: Advanced Practice Provider

CDC: Centers for Disease Control and Prevention

CINAHL: Cumulative Index to Nursing & Allied Health Literature

CINV: Chemotherapy-Induced Nausea and Vomiting

DNP: Doctor of Nursing Practice

EBP: Evidence-Based Practice

ECOG: Eastern Cooperative Oncology Group

ED: Emergency Department

EMR: Electronic Medical Record

ESAS: Edmonton Symptom Assessment Scale

FLIC: Functional Living Index-Cancer

GI: Gastrointestinal

HIPAA: Health Insurance Portability and Accountability Act

HQRL: Health Care Related Quality of Life

INVR: Inventory of Nausea, Vomiting, and Retching

IRB: Institutional Review Board

JBI: Joanna Briggs Institute

JHNEBP: Johns Hopkins Nursing Evidence-Based Practice

MASCC: Multinational Association of Supportive Care in Cancer

MAT: MASCC Antiemesis Tool

NCI: National Cancer Institute

NP: Nurse Practitioner



RCT: Randomized Controlled Trial

SCH: Symptom Care at Home

SMILE: Symptom Management Improves Your Life

STAR: Symptom Tracking and Reporting

## APPENDIX A

## Permission to use The Iowa Model Revised

7/4/2020

Ascension Mail - [EXTERNAL] Permission to Use The Iowa Model Revised: Evidence-Based Practice to Promote Excellence in Health Care



Taylor Backes &lt;taylor.backes@ascension.org&gt;

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**[EXTERNAL] Permission to Use The Iowa Model Revised: Evidence-Based Practice to Promote Excellence in Health Care**

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Kimberly Jordan - University of Iowa Hospitals and Clinics <noreply@qemaiIserver.com> Thu, Jul 2, 2020 at 3:52 PM  
Reply-To: Kimberly Jordan - University of Iowa Hospitals and Clinics <kimberly-jordan@uiowa.edu>  
To: taylor.backes@ascension.org

You have permission, as requested today, to review and/or reproduce *The Iowa Model Revised: Evidence-Based Practice to Promote Excellence in Health Care*. Click the link below to open.

The Iowa Model Revised (2015)

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**Citation:** Iowa Model Collaborative. (2017). Iowa model of evidence-based practice: Revisions and validation. *Worldviews on Evidence-Based Nursing*, 14(3), 175-182. doi:10.1111/wvn.12223

In written material, please add the following statement:

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Please contact UIHCNursingResearchandEBP@uiowa.edu or 319-384-9098 with questions.

## APPENDIX B

## INVR Questionnaire

ID #:	Date:	Time:			
In the last 24 hours, I threw up _____ times.	I did not throw up	1-2	3-4	5-6	7 or more
In the last 24 hours, from retching or dry heaving, I have felt _____ distress.	No	Mild	Moderate	Great	Severe
In the last 24 hours, from vomiting or throwing up, I have felt _____ distress.	No	Mild	Moderate	Great	Severe
In the last 24 hours, I have felt nauseated or sick at my stomach _____.	Not at all	1 hour or less	2-3 hours	4-6 hours	6 or more
In the last 24 hours, from nausea/sickness at my stomach, I have felt _____ distress.	No	Mild	Moderate	Great	Severe
In the last 24 hours, each time I threw up, I produced a _____ amount.	I did not throw up	Small (up to 1/2 cup)	Moderate (1/2-2 cups)	Large (2-3 cups)	Very large (3 or more cups)
In the last 24 hours, I have felt nauseated or sick at my stomach _____ times.	None	1-2	3-4	5-6	7 or more
In the past 24 hours, I have had periods of retching or dry heaves without bringing anything up _____ times.	No	1	3-4	5-6	7 or more

**APPENDIX C****Permission to use the Johns Hopkins Model and Tools**

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**Johns Hopkins Nursing  
Center for Evidence-Based Practice**

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Thank you for your submission. We are happy to give you permission to use the JHNEBP model and tools in adherence of our legal terms noted below:

- 
- You may not modify the model or the tools without written approval from Johns Hopkins.
  - All reference to source forms should include “©The Johns Hopkins Hospital/The Johns Hopkins University.”
  - The tools may not be used for commercial purposes without special permission. If interested in commercial use or discussing changes to the tool, please email [ijhn@jhmi.edu](mailto:ijhn@jhmi.edu).

**APPENDIX D**

**Demographic Questionnaire**

What is your age in years? \_\_\_\_\_

What is your gender? (circle one or write in)

Male

Female

Other \_\_\_\_\_

What do you consider your race to be? (circle one or write in)

Black or African American

White or Caucasian

Asian

American Indian or Alaska Native

Native Hawaiian or other Pacific Islander

Hispanic

Other \_\_\_\_\_

What is your employment status? (circle one)

Employed full-time

Employed part-time

Not employed

Retired

Student

Prefer not to answer

What is your level of education? (circle one)

High school

Some college

College degree

Beyond a college degree

Other

What is your marital status? (circle one)

Single

Married

Divorced

Separated

Widowed

Other

What body part is being treated for cancer? (write in) \_\_\_\_\_

**APPENDIX E**

## Institutional Review Board

**APPROVAL OF SUBMISSION – EXPEDITED REVIEW**

On 7/15/2020, the IRB reviewed the following submission:

Type of Review:	Initial Study for R20200102
Title of Study:	Early Advanced Practice Nursing Intervention to Reduce Chemotherapy-Induced Nausea and Vomiting
Investigator:	
IRB ID:	R20200102
IND, IDE, or HDE:	None
Documents Reviewed:	<ul style="list-style-type: none"> <li>• Backes_CITI_HSR_Basic_AscensionAffiliated.pdf, Category: Other;</li> <li>• Backes_Investigator Agreement.pdf, Category: Other;</li> <li>• CINV Reduction HIPAA Authorization.pdf, Category: HIPAA Authorization;</li> <li>• CINV Reduction_ICF_07JUL2020.pdf, Category: Consent Form;</li> <li>• CV_TaylorBackesSteger.pdf, Category: Other;</li> <li>• Investigator Agreement.pdf, Category: Other;</li> <li>• Project Proposal.docx, Category: IRB Protocol;</li> <li>• Investigator Agreement, Category: Other</li> </ul>

The IRB determined that this study met the criteria for expedited review and approved the study from 7/15/2020 to 7/14/2021. Before 7/14/2021 or within 30 days of study closure, whichever is earlier, you are to submit a continuing review with required explanations. You can submit a continuing review by navigating to the active study and clicking Create Modification / CR.

If continuing review approval is not granted on or before 7/14/2021, approval of this study expires after that date. This study will be due for continuing review on or before 7/14/2021 inclusive. Failure to comply promptly with this continuing review process will result in an automatic suspension of the study.

In conducting this study, you must follow the requirements listed in the Investigator Manual (HRP-200), which can be found by navigating to the IRB Library within the eIRB system. Approval by the IRB does not indicate institutional commitment of resources nor does it indicate privileges to perform new procedures.

The Institutional Review Board is a duly constituted Institutional Review Board under 21 CFR Part 56 and operate in compliance with Good Clinical Practices and all applicable regulatory requirements.

Please direct all inquiries to the IRB Office at 317-338-2194.