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# Steroid-Induced Hyperglycemia in Patients with Malignancies: Healthcare Team Adaptation to a Paradigm Shift

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STEROID-INDUCED HYPERGLYCEMIA IN PATIENTS WITH MALIGNANCIES:  
HEALTHCARE TEAM ADAPTATION TO A PARADIGM SHIFT

Presented in Partial Fulfillment of the  
Requirements for the Degree of  
Doctor of Nursing Practice

Nova Southeastern University  
Health Professions Division  
College of Nursing

Miriam I. Silva  
2017



**NOVA SOUTHEASTERN UNIVERSITY  
HEALTH PROFESSIONS DIVISION  
COLLEGE OF NURSING**

Certification

We hereby certify that this DNP project, submitted by Miriam I. Silva, conforms to acceptable standards and is fully adequate in scope and quality to fulfill the project requirement for the Doctor of Nursing Practice degree.

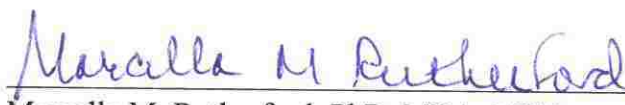
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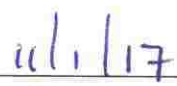
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## **Abstract**

**Background:** Caring for patients with malignancies and presenting hyperglycemia has been an ongoing problem that needed to be addressed. The Endocrinologist Society and the Joint British Diabetes Societies for Inpatient Care suggested a change in the process by which patients in this population are managed.

**Purpose:** The purpose of this project was to implement evidence-based practice guidelines for managing steroid-induced hyperglycemia focusing on the interdisciplinary team and adaptation of nurses who care for patients with malignancies.

**Theoretical Framework:** The theoretical framework selected for this project was Roy's Adaptation Model.

**Methods:** This project used a mixed method approach, with a triangulation design and incorporation of focus groups and a survey to evaluate the multidisciplinary team adaptation.

**Results:** The results indicated that 93% of the team reported positive perceptions of adaptation to the change in blood glucose monitoring with this patient population. Dietary staff expressed some concern with their change in procedures to support the steroid-induced hyperglycemia protocol.

**Conclusion:** This project demonstrated that the healthcare team can adapt to changes, that changes are difficult but needed to improve patients' outcomes. The pursuit of evidence-based practice involves ongoing appraisal of current standards of care with patient outcomes for consideration of the need for change or a paradigm shift.

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## Chapter 1

### **Nature of Project and Problem Identification**

Diabetes is the seventh leading cause of death in the United States (Centers for Disease Control and Prevention [CDC], 2011b). Uncontrolled glucose levels, with or without the presence of diabetes, may impact patients' outcomes and become challenging when their treatment is managed for certain malignancies or cancer. When patients undergo cancer treatment with steroids, hyperglycemia may occur, increasing the risk of poor cancer treatment outcomes (Harris et al., 2013). Hyperglycemia is a condition in which an excess of glucose in the blood exists because the body produces little or no insulin (Duan et al., 2014). Hyperglycemia-related conditions, such as obesity, pancreatitis, chronic stress, and cancer, are likely associated with tumor progression (Derr et al., 2010; Duan et al., 2014). Hyperglycemia is a serious, costly, and common healthcare problem for all hospitalized patients, with considerable significance to patients with malignancies (Harris et al., 2013).

Cancer is the second leading cause of death in the United States (Centers for Disease Control and Prevention [CDC], 2011a). Complications of cancer depend on the type of cancer, the stage at which it was discovered, treatment and medical management, and comorbidities (Stevens, Dinkel, & Catanzaro, 2011). Blood glucose control is an important part of the success of the cancer treatment. High doses of steroids usually precede chemotherapy; alternatively, steroids are given during chemotherapy treatment.

The contribution of steroids is not entirely understood, but several mechanisms have been investigated of why steroids cause high blood glucose levels. Steroids induce a hypermetabolic state, causing hyperglycemia postprandial as well as fasting (Stevens et al., 2011), and increasing insulin resistance in skeletal muscles (Harris et al., 2013). Hence, patients with malignancies with or without pre-existing diabetes present with hyperglycemia. In some cases, patients with cancer are poorly managed, with sliding scales insulin treatment or oral medications delaying recuperation and affecting patients' outcomes. Improvement of glycemic control with an alternative approach to include the use of basal insulin and nutritional insulin therapy may be the key intervention for the management of patients with malignancies and hyperglycemia (Umpierrez et al., 2011).

Hyperglycemia is defined as a blood glucose level higher than 126 mg/dL (Hershey et al., 2014). Some consequences of hyperglycemia are the high risk for infections; the development of clinical toxicities, such as renal and cardiac disease; and neuropathy (Hershey et al., 2014). Added are the costs of a disease such as cancer. Cancer expenses, including medical costs and loss of productivity, totaled \$263.8 billion in 2010 (Stevens et al., 2011). Hyperglycemia and diabetes are associated with certain cancers, such as pancreatic, colon, liver, and breast cancer (Harris et al., 2013).

Hyperglycemia is also linked to poor cancer treatment outcomes (Harris et al., 2013) because it may decrease the response to the chemotherapy medications (Hershey et al., 2014). Hyperglycemia is also associated with more hospitalized patients' deaths and developing diabetes after cancer treatment and surviving cancer (Stevens et al., 2011). Hyperglycemia also prolongs hospital stays and delays wound healing (Brady, Grimes, Armstrong, & Wood, 2014).

Diabetes is considered a risk factor for cancer (Hammer et al., 2015). Evidence shows a higher incidence of cancer in patients with diabetes (Duan et al., 2014).

Hyperglycemia, as the most important sign of diabetes, is responsible for the association of the excess of glucose and the glucose-hungry cells, creating, among other processes, tumors resistant to chemotherapy (Duan et al., 2014).

Hyperglycemia can also be induced by the use of glucocorticoids in patients with certain cancers. A variety of reasons exists for cancer patients receiving high doses of steroids, such as cerebral edema, prevention of nausea, and as a component of the cancer treatment with chemotherapy agents (Brady et al., 2014). This steroid treatment causes hyperglycemia in diabetic and nondiabetic patients with cancer. A total of 20% to 40% of patients without diabetes are affected by steroid-induced hyperglycemia (SIH; Freeland & Funnell, 2012). Steroids are prescribed for cancer patients as part of treatment in certain cases. In other instances, steroids are used to prevent or manage chemotherapy side effects, such as nausea and anorexia (Freeland & Funnell, 2012). A history of diabetes should be considered to control hyperglycemia during steroid treatment in patients with malignancies (Duan et al., 2014).

This chapter addresses the problem of steroid-induced hyperglycemia in nondiabetic patients with malignancies. The purpose statement and theoretical framework are also stated. The purpose is consideration of the process of adopting a new evidence-based approach to manage or improve patients' outcomes.

### **Problem Statement**

There is lack of utilization of evidence-based practice guidelines, as shown by data gathered at a South Florida hospital, by the interdisciplinary team, to include nurses in the oncology unit, in the management of hyperglycemia for nondiabetic patients with malignancies where steroids are an integral part of the treatment protocol.

### **Purpose Statement**

The purpose of this DNP project was to implement evidence-based practice guidelines for managing steroid-induced hyperglycemia in nondiabetic patients with malignancies, focusing on the interdisciplinary team and adaptation of nurses who care and monitor for patients with malignancies receiving high doses of steroids before, during, and after chemotherapy treatment to improve patients' outcomes.

### **Project Objectives**

The following were the objectives for this project:

1. Identify evidence-based practice guidelines associated with nursing management to control high-dose steroids hyperglycemia in patients with malignancies.
2. Design an interdisciplinary process to promote the paradigm shift of treatment for hyperglycemia in patients with malignancies.
3. Communicate information about the paradigm shift process on the treatment for hyperglycemia in patients with malignancies to all healthcare team members.

4. Examine the interdisciplinary team adaptation to the evidence-based process of the paradigm shift on the treatment for hyperglycemia in patients with malignancies.

### **Theoretical Foundation**

The theoretical framework selected for this project was Roy's Adaptation Model (RAM; Roy, 1976), which focuses on the person adapting in constant interaction with the environment. The internal and external are interrelated, with four adaptive systems (McEwen & Wills, 2011). The nurse's goal is to promote a successful adaptation.

#### **Roy's Adaptation Model**

Sister Callista Roy developed the Adaptation Model after being challenged by another nursing theorist, Dorothy Johnson, during Roy's graduate studies (Akyil & Erguney, 2013). Roy's model has been refined and defined since it was first published in 1976. The model has been applied in nursing theory, practice, research, and education.

Roy incorporated concepts from other theorists in nursing and related fields, including Helson's adaptation theory and Johnson's nursing model. Roy also integrated Rapoport's definitions of systems and concepts from Lazarus's coping model and Bertalanffy and Selye's stress and adaptation theories (McEwen & Wills, 2011). Roy's model presents the person as a holistic adaptive system that interacts with internal and external environmental stimuli. The human system faces the environmental stimuli, and the nurse's goal is to promote a successful adaptation.

The level of adaptation in the RAM represents life processes, with three levels of life processes—integrated, compensatory, and compromised. A completely integrated life can change to compensatory and attempts to readapt. Compromised processes occur



when the compensatory fails to readapt. The regulator, cognator, stabilizer, and innovator are subsystems of the process of coping in the RAM (Akyil & Erguney, 2013). The regulator subsystem responds to stimuli through neural, chemical, or endocrine coping channels. The stimuli from the environment affect other systems in the body, resulting in an automatic, unconscious response. The cognator subsystem responds through five cognitive-emotional channels: perceptual, information processing, learning, judgment, and emotion (Akyil & Erguney, 2013). All subsystems function together to maintain integrated life processes displayed as behaviors.

Behaviors are perceived in four adaptive modes or categories: physiologic-physical mode, self-concept-group-identify mode, role function mode, and interdependence mode (McEwen & Wills, 2011). The physiologic-physical mode is manifested by activities from the cells, tissues, organs, and systems of the body. The self-concept-group-identify mode includes body image, body sensation, and personal self—self-consistency, self-ideal, and moral, ethical, spiritual self. The role function mode is the role in society and a group, and the interdependence mode relates to interdependent relationships, love, respect, and value (McEwen & Wills, 2011). RAM is commonly used in nursing practice, in which nurses enhance the interaction between the person and the environment, promoting health.

### **Theory Selection Support**

RAM asks three central questions: Who is the focus of nursing care? What is the target of nursing care? When is nursing care indicated? (Roy, 1976). When applying RAM to nursing practice, nurses give their patients the highest quality of care that can be

given for patients in their individual situations. According to RAM, nurses promote adaptation of the patient during illness and health in all four modes.

Nurses make judgments of maladaptation based on an assessment, followed by focus on the stimuli that influence the maladaptation. Nurses manipulate the environment and elements of patients' systems to create adaptation. The use of RAM in nursing practice has had positive effects in the different dimensions of care for patients with diabetes, cancer, strokes, and cardiovascular diseases (Borzou, Mohammadi, Falahinia, Mousavi, & Khalili, 2015). RAM has also been shown useful in care of patients with cancer (Akyil & Erguney, 2013).

### **Application of the Theory**

The use of nursing models to support nursing interventions encourages researchers to use interventions that are effective and promote health (Abumaria, Hastings-Tolsma, & Sakraida, 2015). RAM is potentially helpful for health educators, researchers, and nursing practice. RAM supports increasing patient adaptation levels through nursing activities in health and disease (Akyil & Erguney, 2013). Patients who are diagnosed with cancer goes through the adaptation process of the environment, in relation to the disease, treatment, and consequences.

Coping with and adapting to cancer is extremely difficult. With the addition of high blood sugar, the possibility of maladaptation is intensified (Borzou et al., 2015). The life of patients with cancer can change drastically. Additionally, following the RAM, hyperglycemia (behavior) becomes part of the integrated compromise response to the compensatory stimuli (steroids).

Patients with cancer struggle with a variety of health problems that occur related to the extensive treatment the patients with malignancies require. One of these struggles or consequences of the treatment is hyperglycemia (Derr et al., 2010). As previously discussed, hyperglycemia may cause poor patient outcomes when poorly treated and managed. Additionally, some cancer nondiabetic patients must deal with the possibility of becoming diabetic after surviving cancer. Nurses using RAM identify maladaptation in the patients who are dealing with cancer and the side effect of hyperglycemia.

Furthermore, nurses who care for patients with cancer also experience adaptation periods. In the role as healthcare providers, nurses and the interdisciplinary team, such as physicians, pharmacists, and dietitians, among others, adapt to a change in the paradigm of caring for patients with malignancies presenting hyperglycemia. There is a need for interdependence interventions to provide a change in the physiological responses of patients with malignancies undergoing treatment with steroids.

### **Significance of the Project**

This project may support nursing practice and healthcare by reducing potential risk factors for cancer patients with malignancy that is treated with high doses of steroids. Healthcare professionals may benefit from understanding the association of poor cancer treatment outcomes when hyperglycemia is not controlled appropriately. Additionally, treatment outcomes for patients with diagnosed with diabetes and later diagnosed with cancer will benefit patients further with the new hyperglycemia clinical process. Healthcare providers, to include nurses who care for patients with malignancies and hyperglycemia, need to be involved and educated in the new adopted process. Additionally, this project will provide understanding of the healthcare team's (nurses,

dietary, and pharmacy, nursing assistants, among others) adaptation to the new evidence-based guidelines in treating hyperglycemia in patients with malignancies.

### **Nursing Practice**

This project may impact nursing practice by providing evidence-based best practices for nurses to care for and manage hyperglycemia in patients with malignancies. To meet the challenges and demands of these two chronic and costly diseases, diabetes and cancer, nurses gain knowledge in evidence-based practice and place it in practice. Nurses caring for patients with malignancies play an important role in the identification of complications and improvement of treatment management (Schmeltz, 2011).

An early detailed nursing assessment and nursing interventions following a change in the process of caring for this patient population can improve patients' outcomes and quality of life. Advanced practice nurses identify the need to implement a new process in nursing practice to improve the nursing management of patients with steroid-induced hyperglycemia. Cancer and diabetes are two devastating challenging conditions for both the patients and nurses. Nurses may be more prepared and adapt to care for patients with these two challenging diseases with the implementation of the new steroid-induced hyperglycemia process.

### **Healthcare Outcomes**

The project may impact healthcare outcomes by enhancing nursing knowledge in managing hyperglycemia in patients with malignancies. With the implementation of a specific process to control hyperglycemia in patients with cancer, patients will have better outcomes, fewer hospital readmissions, and fewer complications related to uncontrolled hyperglycemia. Diabetes is already known as a costly disease that causes

many complications and hospitalizations (Harris et al., 2013). When diabetes is added to a cancer diagnosis, and patients undergo surgery and chemotherapy along with high doses of steroids, the outcomes are gravely compromised.

The adoption of a new process in caring for patients with cancer and hyperglycemia may decrease infection rates, mortality, and length of stay; reduce readmissions; and possibly increase survival rates for patients with malignancies. To meet the healthcare outcomes, advanced practice nurses address the problem in a multifaceted manner. Components include pharmacy and laboratory work and the interdisciplinary team through effective communication and collaboration.

### **Healthcare Delivery**

The project may impact healthcare delivery by changing the nursing practice process of members of a current oncology unit in a local hospital in South Florida with regard to hyperglycemia induced by high doses of steroids. The delivery of care for patients with malignancies and hyperglycemia may improve with the use of the evidence-based clinical guidelines that lead the new process. Patients admitted to the oncology unit and treated with steroids are identified. Diagnostic blood samples change in frequency and importance. Diet delivery is also readdressed to follow the new process of care. Discharge patients' education also changes, and new evidence-based findings are included to improve patient delivery of care.

This project may also impact not only the oncology unit but also other medical or surgical units that may adopt this new process. The adaptation process can be modified for other units. The integration of evidence-based practice to treat the various patient populations assures an efficient and best practice delivery of healthcare.

## **Healthcare Policy**

This project may impact healthcare policy locally at the outset. The oncology unit at the local hospital will be the initiating unit for implementation of the process in caring for patients with malignancies and hyperglycemia. The treatment will include postprandial basal bolus insulin. The oncology nurses will be the group of providers using the new process in their nursing practice. Eventually, the new process may be used throughout the health system to treat hyperglycemia in patients with other diagnoses treated with high doses of steroids.

## **Summary**

The local medical center gathered data that support the need for a new evidence-based practice process to treat and manage steroid-induced hyperglycemia in patients with malignancies. Research confirms that the use of oral insulin and sliding scale insulin may help but do not manage postprandial hyperglycemia appropriately. Stevens, Dinkel, and Catanzaro (2011) concluded that a new evidence-based practice process needs to be established to assist providers in meeting the challenges of treating and managing patients with cancer and hyperglycemia. Umpierrez et al. (2011) recommended the use of basal insulin and insulin nutrition therapy as the key to manage steroid-induced hyperglycemia.

Nursing practice is always based on a theoretical framework. RAM has been utilized in different aspects of nursing to include research, education, and nursing practice (Akyil & Erguney, 2013; Borzou et al., 2015). Use of RAM to support the paradigm change in this quality improvement project entails positive effects on patients' outcomes, greater control of blood sugar levels, and less prolonged hospitalizations, also reducing readmissions. Patients with malignancies should experience positive effects on their

physical adaptation, self-concept, interdependence, and role function adaptation. Nurses and the healthcare team will be also able to adapt to a new evidence-based process of caring for patients with malignancies and presenting steroid-induced hyperglycemia. Use of RAM as the theoretical framework supports the change process of recovery from a cancer or potential diabetes prognosis.

The implementation of an evidence-based process to manage steroid-induced hyperglycemia in patients with malignancies may further assist in healthcare policy and improve healthcare delivery, nursing practice, and patient outcomes. Coping with cancer and its treatment side effects as well as diabetes is a struggle for patients in many ways. Recognition of the need for the quality improvement issue will help nurses care for these patients and the patients' outcomes and prevent further complications in the future.

## Chapter 2

### **Review of the Literature**

Diabetes and cancer are diseases with great impact on health globally (Giovannucci et al., 2010). Some epidemiologist reports have indicated that people with diabetes are significantly at risk of cancer (Giovannucci et al., 2010). In the United States, an estimated 8% of the population has diabetes (CDC, 2011a), and in England, about 7% of the population has diabetes (Morganstein & Feher, 2013). When cancer is also diagnosed, the treatment and management pose challenges in managing diabetes, whether it is preexisting to cancer or induced by high doses of steroids.

Some of the challenges that patients with cancer and diabetes face may include altered appetite, loss of weight, nausea, and vomiting (Morganstein & Feher, 2013). High glucose levels can induce the proliferation of cancer cells; thus, controlling blood glucose levels would be beneficial for patients with cancer (Duan et al., 2014). Further, recent studies disclosed an association between metastasis and hyperglycemia (Duan et al., 2014).

For this project, a systematic literature review was conducted. Databases included Cumulative Index to Nursing and Allied Health Literature (CINAHL) Complete, MEDLINE, EBSCOHost, other complete databases, professional, private, and public associations, and governmental agencies. Multiple articles were reviewed from 2010 to 2015, with the only exception class literature, such as Roy's original adaptation model.



The search was limited to peer-reviewed and evidence-based research articles on the relationship between diabetes and cancer. Keywords used included but were not limited to *cancer, cancer standards of care, diabetes, diabetes guidelines, diabetes standards of care, hyperglycemia, hyperglycemia in patients with malignancies, inpatient hyperglycemia management malglycemia, and steroid-induced hyperglycemia.*

The articles reviewed included English-language articles, meta-analyses, literature reviews, research publications, and studies with human participants. Some articles selected that supported the need for the quality improvement project were also from Europe, South America, and Central America. The overarching themes noted in the literature reviewed related to hyperglycemia, including management of hyperglycemia and management of steroid-induced hyperglycemia. In addition, multiple articles reported in detail on the major complications of hyperglycemia, such as infection, mortality and survival rates, toxicity, resistance to chemotherapy, and length of stay.

### **Management of Hyperglycemia**

Literature supports the negative impact of hyperglycemia on hospitalized patients, in the increase of inpatient complications and mortality as well as on the economy (Schmeltz, 2011). A multifactorial link exists between hyperglycemia and adverse patient outcomes (Collins, 2014; Schmeltz, 2011). Hospitalized patients with diabetes are acknowledged to stay longer due to the complications of postsurgery, infections, and other factors (CDC, 2011b). More control of blood sugar levels has been shown to improve outcomes in patients with cardiovascular diseases, such as myocardial infarctions and strokes (Schmeltz, 2011).

The American Diabetes Association (ADA) and the American Association of Clinical Endocrinologists (AACE) in a consensus statement recommended insulin as a first-line therapy for hyperglycemia. Furthermore, hyperglycemia for critically ill patients should be treated intravenously with an algorithm of basal, nutritional, and correctional doses of insulin. This treatment applies as well to noncritically ill patients (Schmeltz, 2011).

The literature further supports the development of evidence-based practice guidelines to treat hyperglycemia for hospitalized patients with other morbidities as necessary and critical (Stevens et al., 2011). Common recommendations were revision of guidelines regarding the management of inpatient hyperglycemia as well as education of healthcare providers and nurses (Stevens et al., 2011). Hyperglycemia treatments are an important therapeutic implication for patients with cancer (Duan et al., 2014).

### **Management of Steroid-Induced Hyperglycemia**

Glucocorticoids are known to cause hyperglycemia. Glucocorticoids are also used as adjuvant therapy for the management and treatment of patients with malignancies. About 11% of patients with malignancies without a prior history of diabetes experience hyperglycemia (Brady, Grimes, et al., 2014). These patients require insulin therapy while on steroids. Hyperglycemia in patients with malignancies has been demonstrated to precipitate a multitude of treatment complications, such as increased toxicity from chemotherapy (Brunello, Kapoor, & Extermann, 2011), increased resistance to chemotherapy (Li et al., 2011), increased risk of metastasis (Li et al., 2011), and worsened overall survival (Derr et al., 2010; Mayer et al., 2014).

Hyperglycemia also leads to extended hospital stays, delayed wound healing, and an increase in infections and mortality rates (Schmeltz, 2011). Oral agents have limited utility for patients with malignancies (Brady, Grimes, et al., 2014). Better control of hyperglycemia during chemotherapy improves cancer patients' outcomes (Duan et al., 2014).

### **Infection**

Patients with cancer, regardless of age, are at a significantly higher risk of acquiring an infection and developing sepsis than other patients (Nazer, AlNajjar, AlShaer, Rimawi, & Hawari, 2015). Dare et al. (2013) found that patients, including pediatric critical care patients, with overt hyperglycemia, had significantly higher rates of infections than those who presented normal blood glucose levels. Nazer et al. (2015) also found alarming results with regard to the high incidence of infections related to the administration of steroids in patients with cancer. Therefore, interventions to effectively manage hyperglycemia may decrease the risk for infection (Storey & Von Ah, 2012).

### **Mortality and Survival**

Patients with cancer who have uncontrolled hyperglycemia have a higher risk of mortality (Storey & Von Ah, 2012). Certain chemotherapeutic agents, as well as adjuvant agents, have a hyperglycemic effect, worsening the survival probabilities (Hershey et al., 2014). Some studies found that colorectal cancer patients show a higher incidence of death than patients with other solid tumor cancers, such as prostate, breast, and lung cancer (Hershey et al., 2014). In contrast, other studies found that patients with cancer who do not develop hyperglycemia have a relatively longer survival period (Storey & Von Ah, 2012).

**Toxicity**

Brunello et al. (2011), among other researchers, pointed out that the main contributors to drug toxicities are organ dysfunction, such as renal and liver dysfunctions; increased inflammatory markers; peripheral neuropathy; diarrhea; and mucositis. Patients with moderate to severe hyperglycemia had a significantly higher incidence of one or more of the toxicities mentioned; hypercreatininemia, hyperbilirubinemia, and C-reactive protein markers increased. Brunello et al. (2011) also reported that patients with non-Hodgkin lymphoma presented an increase in toxicity severity when hyperglycemia was uncontrolled. These findings suggest that the presence of hyperglycemia either at baseline or during treatment exacerbates toxicity, worsening in the more elderly population (Brunello et al., 2011).

**Resistance to Chemotherapy**

In the results of a study by Li et al. (2011), the process of perineural invasion in pancreatic cancer was aggravated by the presence of poorly managed hyperglycemia. Patients with pancreatic cancer and higher levels of glucose levels had higher death rates compared to those who maintained normal fasting glucose levels. Diabetes has been known as an independent predictor of pancreatic cancer (Li et al., 2011). Thus, diabetes destroys pancreatic nerves, creating an ambiance for tumor growth, especially if the blood glucose is out of control. Additionally, because of the aggressiveness of pancreatic cancer, management and treatment of symptoms such as pain increase the risk of hyperglycemia; the survival rate of this population decreases.

Duan et al. (2014) concluded that hyperglycemia promotes perineural invasion in some cancers, especially in pancreatic cancer. Similar results were described in a

retrospective analysis of glioblastoma multiforme (GBM) patients. Frequent hyperglycemia episodes correlated with poor patients' prognoses by 50% (Mayer et al., 2014). Furthermore, Derr et al. (2010) found that newly GBM diagnosed patients with a preexisting diabetes diagnosis who underwent glucocorticoids therapy had a shorter survival life span.

### **Length of Stay**

There is an association between hyperglycemia and poor neurological outcomes in patients with brain cancer, and a greater association if patients have diabetes (Guo, Chandran, Palmer, & Bruera, 2011). Corticosteroids are used before neurosurgery because of their anti-inflammatory action. However, an excess of corticosteroids increases blood glucose levels, aggravates patients' outcomes, and extends the length of stay (Guo et al., 2011). Guo et al. recommended that diabetic patients should be on a strict blood sugar monitoring regimen to avoid longer hospital stays and delayed rehabilitation.

### **Hyperglycemia Management Strategies**

Hyperglycemia is a common adverse effect of glucocorticoids treatment in patients with cancer. Steroid-induced hyperglycemia may be a side effect that can lead to poor patient outcomes. An evidence-based management strategy needs to be addressed and implemented. Nurses caring for patients with cancer must be educated about the importance of a dynamic and effective management of the blood glucose levels in patients treated with glucocorticoids. Literature shows that fasting blood glucose levels are not as affected as are postprandial glucose levels (Brady, Thosani, et al., 2014).

Recommendations include performance of random blood glucose finger sticks 4 to 6 hours after the glucocorticoids dose (Harris et al., 2013). Patient education also needs to be included in the development of newly improved guidelines. Diet education about carbohydrate control of 30 to 45 grams per meal is recommended (Schmidt & Dilworth, 2011).

Nurses need to be proactive and begin glucose monitoring on the second day of treatment with glucocorticoids (Schmidt & Dilworth, 2011). Part of nurses' continuous assessment and monitoring is the identification of patients who may require an endocrinologist follow-up after treatment is completed. Additionally, the literature shows basal-bolus insulin is more effective than use of sliding-scale insulin (Brady, Thosani, et al., 2014). Recommendations are to manage hyperglycemia with 25% basal and 75% prandial for safe and effective management of hyperglycemia (Brady, Thosani, et al., 2014).

Safe, effective, and intensive therapeutic strategies are the best way to control hyperglycemia (Brady et al., 2014). Strategies such as strict monitoring of blood glucose levels, patient and nursing education by well-trained interdisciplinary healthcare professionals, and rational individualized pharmacological approaches are the best ways to promote adequate blood glucose level management (Pimazoni-Netto & Zanella, 2014).

### **Summary**

Caring for patients with cancer and hyperglycemia is very complex. Many factors exist and must be considered for nurses to manage appropriate treatment and doses of insulin to control patients' blood sugar levels. Hyperglycemia is linked to poor patient outcomes, high mortality rates, infections, and length of hospital stay. This review of

literature demonstrated that the risk of hyperglycemia in cancer patients receiving steroids is high and an ongoing problem. Thus, strategies were reviewed and a need was identified to implement an evidence-based process to manage hyperglycemia in patients with cancer who are treated with high doses of steroids.

## Chapter 3

### Methods

Hyperglycemia is a problem for most diabetic patients and especially for patients with cancer who were not diabetic before cancer treatment. Hyperglycemia can be a preexisting problem or can be steroid-induced as part of the cancer treatment. The AACE and the American College of Endocrinology (ACE) updated their consensus statement for the comprehensive type 2 diabetes management algorithms STT (Garber et al., 2016). The founding principles in the statement, among others, include lifestyle optimization, hemoglobin A1C target, glycemic control targets by self-monitoring, minimization of hypoglycemic episodes, cost of choice of medications, and stratified choice of treatment based on initial A1C level, among others. The statement, though, does not address hyperglycemia in patients with cancer or steroid-induced hyperglycemia. The Endocrine Society Task Force (ESTF) formulated practice guidelines on the management of patients in clinical settings other than critical care, including patients treated with steroids (Umpierrez et al., 2012).

The Joint British Diabetes Societies for Inpatient care (JBDS-IP) published a series of guidelines in the management and treatment of hyperglycemia (Roberts, James, & Dhatariya, 2014). The latest, in 2014, focused on steroid-induced hyperglycemia. Primarily evidence-based, the guidelines also include professional knowledge and a consensus agreement between the Association of British Clinical Diabetologists (ABCD),



the Diabetes Inpatient Specialist Nurse (DISN) UK Group, the Training Research and Education for Nurses in Diabetes (TREND-UK), and the Primary Care Diabetes Society (PCDS).

Steroid-induced hyperglycemia is poorly managed, decreasing patients' outcomes and health improvement in patients with cancer. Therefore, the purpose of this quality improvement project was to implement evidence-based practice guidelines for management of steroid-induced hyperglycemia, with a focus on the interdisciplinary team and adaptation of nurses who care for and monitor patients with malignancies receiving high doses of steroids before, during, and after chemotherapy treatment to improve patients' outcomes.

### **Project Design**

This project used a clinically-based mixed-method quality improvement approach with a concurrent triangulation design. This method facilitates better understanding of both the qualitative and quantitative findings. The method also allowed for the detailed analysis of the small sample and validation of the quantitative findings. (Creswell, Klassen, Plano Clark, & Smith, 2011).

### **Setting**

The setting for this project was the oncology unit at a private hospital in South Florida. The 36-bed oncology unit provides care for patients diagnosed with cancer. The oncology unit has a total of 45 registered nurses, a charge nurse, and a manager director. Patients who receive care in this unit may be recently diagnosed, undergoing chemotherapy or radiotherapy, or having post-treatments to manage complications.

**Inclusion Criteria**

The project included registered nurses who cared for patients with cancer and who were treated with steroids. Registered nurses had to have worked a minimum of 12 months on the oncology unit providing patient care. Registered nurses had to be able to speak, understand, and read English. The project also included the interdisciplinary team of nurses, nursing assistants, dietary staff, and pharmacist staff who supported the change of process to manage the targeted population.

**Exclusion Criteria**

Exclusion criteria for this project included nurses and members of the interdisciplinary team who did not work on the oncology unit. In addition, nurses were excluded who did not speak, read, or understand English.

**Ethical Considerations**

Approval by the Nova Southeastern University (NSU) Institutional Review Board (IRB) was applied for, and exemption was granted on February 8, 2017, for this project, as it did not affect human subjects directly (Appendix A). It was anticipated that during the project, patients' records would not be involved and reviewed. No information would be identified to protect the individuals' privacy and follow the HIPAA Privacy Rule (Grove, Burns, & Gray, 2013). The performance improvement committee chair at the hospital did approve and support the project (Appendix B).

**Project Phases/Objectives**

This project was carried out in different phases to meet the objectives, as follows:

**Objective 1:** Identify evidence-based practice guidelines associated with nursing management to control high-dose steroids hyperglycemia in patients with malignancies.

A review of literature was completed to include the AACE and Endocrine Society recommendations for the treatment of hyperglycemia induced by the use of steroids. The facility's actual process was reviewed, and this step helped identify evidence-based practice guidelines already in place. The literature review provided key content data that supported a need for changes in the management of hyperglycemia in the patient population identified, more specifically, the nondiabetic cancer population.

**Objective 2:** Design an interdisciplinary process to promote the paradigm shift of treatment of hyperglycemia in patients with malignancies.

This objective included discussion with nurses and nurse leaders involved in the care of patients with malignancies who presented hyperglycemia related to the use of steroids. Meetings with the interdisciplinary team were planned to review the process as was created. The interdisciplinary team included nurses, nurse leaders, dietary staff, pharmacist staff, and a pharmacist doctoral student. To properly create a change in the paradigm of care of this patient population, a review of the process was completed. Questions included the following: When are the blood sugars monitored? How do these patients receive their meal trays? Upon the change, are meal trays delivered centrally to this population only? How will this population be identified for proper delivery of meal trays?

**Objective 3:** Communicate information about the paradigm shift process on the treatment of hyperglycemia in patients with malignancies to all healthcare team members.

Conversations with information technology (IT) personnel were part of the plans to meet this objective. Discussion was held with regard to creation of a notification or alert in the patients' electronic health records to remind the nurse about the new process.

Flyers were developed and posted throughout the oncology unit and presented in staff meetings. Posters were developed as well, with the purpose of presentation to the organization. Flyers and brochures were used to inform healthcare team members throughout the facility.

**Objective 4:** Examine the interdisciplinary team adaptation to the evidence-based process of the paradigm shift on the treatment of hyperglycemia in patients with malignancies.

During this phase, a survey developed by the primary investigator was used to identify the perceptions of the nurses and interdisciplinary team members about implementation of the new paradigm of care for this population. The survey used a Likert scale and was sent out to the interdisciplinary team involved in the process of changing the care and management of hyperglycemia in patients with malignancies.

### **Timeline**

A timeline was of major importance in a quality improvement project of this nature. Table 1 illustrates the timeline based on days for a completion date of approximately 6 months. Objective 1 took a maximum of 4 weeks. Objective 2 was ongoing and took longer, to be completed within 12 weeks of the completion of Objective 1. The approval of the IT alerts addition to the patients' electronic health records met Objective 3. The alerts in the electronic health records were operating approximately 6 to 8 weeks after the development of the new process. Informational posters and flyers were also available during this timeframe. Data were gathered for 4 weeks to meet Objective 4.

Table 1

*Timeline*

<b>Objective</b>	<b>Time</b>
One	Day 1 to 30
Two	Day 31 to 120
Three	Day 121 to 150
Four	Day 151 to 180

**Resources/Budget**

The projected budget included fuel for traveling to the facility twice weekly and incidentals, such as thank you items and edibles. Statistical services, office supplies, and other services were provided by the facility at which the project was implemented. Included in the budget were also the costs for a web designer and printing materials for flyers, brochures, and posters. The projected budget is displayed in Table 2.

**Outcome Measures**

The outcome of this project was evaluated with the measures listed below. Additional information on these outcomes is discussed further in Chapter 4.

**Objective 1:** Identify evidence-based practice guidelines associated with nursing management to control high-dose steroids hyperglycemia in patients with malignancies. This objective was measured by development of a literature review matrix that supported the change of paradigm in the management of steroid-induced hyperglycemia in nondiabetic cancer patients (Appendix C). This matrix of literature was shared with the interdisciplinary team involved in the project.

Table 2

*Project Resources and Budget*

<b>Category</b>	<b>Description</b>	<b>Total</b>
Fuel/mileage	18 miles round trip \$0.56 per mile \$10.08 a day Twice a week for about 20 weeks	\$403.20
Gratitude items for staff	Edibles Gifts Lunches	\$300.00
Web designer	Theoretical Framework Design	\$100.00
Printing of materials from www.miamiflyers.com	10 Posters 11 x 17 \$12.00 each Flyers 8 x 10 1000 x \$312.00 Brochures 8.5 x 11 500 x \$174.00	\$606.00
Projected total costs		\$1409.20

**Objective 2:** Design an interdisciplinary process to promote the paradigm shift of treatment of hyperglycemia in patients with malignancies.

This objective was measured by gathering of data of the actual process in place, if any. Data gathering in this small study to identify a problem is explained in Appendix D. These data guided the decisions made in the use and implementation of an evidence-based process to treat and manage steroid-induced hyperglycemia for this population. As qualitative measures, monthly interdisciplinary team meetings (Appendix E) and nursing, dietary staff and CNA focus group transcripts were executed. Participation letters were

sent out electronically to all 45 members of the healthcare team (Appendix F). Focus group transcripts were executed (Appendix G).

**Objective 3:** Communicate information about the paradigm shift process on the treatment for hyperglycemia in patients with malignancies to all healthcare team members.

This objective was measured by approval from the institution of the addition of an alert in the electronic health record (EHR). Meetings with IT confirmed the appropriate alert in the EHR. Posters, brochures, and flyers also received approval and were used in education for the nurses, staff, patients, visitors, and others in the oncology unit (Appendix H).

**Objective 4:** Examine the interdisciplinary team adaptation to the evidence-based process of the paradigm shift on the treatment of hyperglycemia in patients with malignancies.

A quantitative team survey, the SIH Protocol Adaptation Survey, was posted on SurveyMonkey (Appendix I) and used to measure this objective. Nurses and interdisciplinary team members were questioned about the use of the new process. The survey also included a question about their perceptions of the change in the process of caring for this patient population.

### **Summary**

This project involved the implementation of a new evidence-based process to treat and manage hyperglycemia in primarily nondiabetic patients with cancer. Ethical considerations and protection of human rights were not considerations in this project because it did not involve human subjects. NSU IRB granted exempt status, and the

project was approved by the facility. The project was completed in phases, with accomplishment of each of the four objectives generally within the planned timeline.



## Chapter 4

### **Results and Discussion**

Steroid-induced hyperglycemia has been associated with poor outcomes in hospitalized patients regardless of the reason or underlying cause (Stevens et al., 2011). Nondiabetic patients placed on steroid therapy presented high blood sugar levels in a Florida's hospital oncology unit. This project considered the implementation of new evidence-based guidelines to check glucometer readings and administer insulin coverage after meals, rather than the usual standard of care or practice of before meals, in patients with steroid-induced hyperglycemia. Permission for the initiation of this project was obtained (Appendices A and B). The Endocrine Society recommended basal and bolus insulin therapy after meals to treat this population (Umpierrez et al., 2012). Recommendations included all patients in steroid treatments to have a baseline blood sugar tested upon admission. This chapter reviews the process of the interdisciplinary team's adaptation to the new clinical guidelines and discusses the results of the interdisciplinary team meetings, staff in-service education sessions, focus groups, and staff surveys.

### **Discussion**

The problem identified and performance improvement project began after the primary investigator received the letter of support from the institution (Appendix B). Because this performance improvement project utilized confidential focus group

meetings and anonymous surveys of the healthcare team rather than patients, NSU IRB granted exempt status (Appendix A). The process for IRB approval and exemption took approximately 16 to 18 weeks, requiring multiple revisions of the project plan, and approval was received on February 8, 2017.

This project was divided into three phases: planning, implementation, and analysis of data. The completion of each project objective followed the timeline, with some exceptions and limitations. The meeting of each objective is discussed in this section.

**Objective 1:** Identify evidence-based practice guidelines associated with nursing management to control high-dose steroids hyperglycemia in patients with malignancies.

This objective was met by completion of an extensive systematic literature review of scholarly works published from 2010 to 2015. The search was performed in Cumulative Index to Nursing and Allied Health Literature (CINAHL) Complete, MEDLINE, EBSCOHost, complete databases, and professional, private, and public associations, and governmental agencies. The search was limited to peer-reviewed and evidence-based research articles with regard to diabetes and cancer and how they relate to each other. The American Cancer Society and American Diabetes Association websites were also included in the literature review. The keywords used in the search included but were not limited to *cancer, cancer standards of care, diabetes, diabetes guidelines, and diabetes standards of care, hyperglycemia, and hyperglycemia in patients with malignancies, inpatient hyperglycemia management malglycemia, and steroid-induced hyperglycemia.*

Literature was extensive on these topics, and over 100 articles were identified in each search. The completion of this objective took 2 extra weeks from the planned timeline. A matrix was created and considered with the healthcare team (Appendix C). The diabetes task force committee already existing in the facility became part of the project during this process through the oncology unit's director of nursing (DON), who was the committee's chairperson and part of the healthcare team working on the project. Discussion about the literature found during the search prompted the decision of which guidelines to use.

Once a week, for a total of 6 weeks, the healthcare team of the primary investigator, oncology unit DON, pharmacy staff, and a physician met. Evidence-based guidelines from the British Diabetes Societies (Roberts, James, & Dhatariya, 2014) and the Endocrine Society (Umpierrez, 2012) were chosen for the steroid-induced hyperglycemia (SIH) protocol. It was also decided during these meetings to narrow the focus of the project to nondiabetic patients based on the results from the prestudy in Appendix D. Objective 1 completed the planning phase.

**Objective 2:** Design an interdisciplinary process to promote the paradigm shift of treatment of hyperglycemia in patients with malignancies.

**Team meetings.** Every second Monday of the month, the interdisciplinary team met to continue making decisions with regard to the change (Appendix E). The dietary staff's concern was to identify an effective method in which the patients' trays would be delivered. Different methods were discussed, such as different colors of trays, different times of delivery, and different methods of delivery, among others.

The healthcare team agreed that choosing a different method of delivery was the answer. Trays for this targeted population were delivered centrally, not to patients' bedside as previously, but to the nurse's stations where a certified nursing assistant (CNA) delivered meals and was accountable for the time in which patients began eating. This process allowed for a glucometer check and insulin administration immediately after meals rather than before. Additionally, these trays were of a different color from those of the regular patients. The regular patients' trays were brown, and the SIH protocol patients' trays were red.

Participation letters were sent out electronically with the DON's working email to maintain possible participant anonymity (Appendix F). The participation letter was sent to all 45 members of the healthcare team, to include registered nurses (RNs) and CNAs in the oncology unit. Additionally, the letters were sent to the dietary staff, pharmacy staff, and several physicians chosen by the DON. Five days were allowed for participants to receive, read, and respond to the participation letter.

**Focus groups.** Before the start of the focus group sessions, staff needed to be educated regarding the new approach to treat this population, and so in-service education meetings were planned for implementation (Appendix J). The focus groups then addressed the discussion of the three to four questions that were created to learn about the perceptions of the healthcare team with regard to the SIH protocol (Appendix K). In addition, Objectives 2 and 3 became concurrent. While the primary investigator worked on developing focus groups, the questionnaires and staff education material were being created with flyers and poster boards (Appendix H).

Focus groups began after three sessions of staff in-service on February 27, 2017. To be able to complete the focus groups, the plan was to attend the change of shift in the morning and the afternoon on different days of the week. The oncology unit director's private office was used to provide the privacy required for the 5-minute interviews. One focus group meeting was planned for 4 weeks from February 27, 2017, to March 18, 2017 (Appendix G). A large number of participants was not available on the assigned days and times for focus groups, and this part of the implementation phase concluded. One session of focus groups had no attendees.

**Objective 3:** Communicate information about the paradigm shift process on the treatment of hyperglycemia in patients with malignancies to all healthcare team members.

**Team meetings.** Immediately after IRB approval, a web designer was hired to create the web design that would become the flyers and poster boards. Meeting with a web designer ended in a colorful, informative flyer (Appendix H). The flyer was posted in strategic places in the oncology unit such as the break room, both sides of the nursing station, hallways, close to the elevator, and outside the manager's office.

In the meantime, the primary investigator met with IT and pharmacy. Two meetings during March were needed to present the healthcare team with a solution to communicate to others using the EHR about the patients who were in the SIH protocol. The patients undergoing steroid treatment on this oncology unit received a significant change in their EHR. Their EHR would be in the color red, and the other patients' EHR would continue to be blue. A pop-up alert would also be included in the EHRs of the patients undergoing steroid treatment as a reminder to the nurses caring for this population.

**Staff in-services.** Communication about the protocol was disseminated by providing staff in-services. Staff in-services were scheduled for weekdays and weekends, and different shifts: days, evenings, and nights from February 13, 2017, to March 3, 2017. The purpose was to present the SIH protocol to as many staff as possible who might be involved in the care of patients with malignancies presenting hyperglycemia, and to address any concerns with the paradigm shift. A total of six staff in-services were conducted in the 3-week period. Two sessions were during weekday mornings (February 13 and February 20), two were on the weekend mornings (February 18 and February 25), and two were during the change of shift at night on different weekdays (February 27, March 3). The plan was to provide the in-service to the majority of the healthcare team. The implementation phase ended upon completion of both Objectives 2 and 3 concurrently.

**Objective 4:** Examine the interdisciplinary team adaptation to the evidence-based process of the paradigm shift on the treatment of hyperglycemia in patients with malignancies.

Objective 4 was met through the analysis of the interdisciplinary team's perceptions of the SIH protocol from analysis of the focus groups and the results of the survey. Detailed notes were transcribed following the focus group meetings, and a constant comparison approach was used to analyze the qualitative data (Creswell et al., 2011). Three themes were identified, as follows: Adaptable, Best for Patient and Difficult (Appendix G).

The SIH Protocol Adaptation Survey was mounted on Survey Monkey, which incorporates Statistical Package for the Social Sciences (SPSS) for data analysis. After

the implementation phase had concluded, a link to the SIH Protocol Adaptation Survey was sent electronically to the oncology unit and interdisciplinary healthcare team (Appendix I). Survey Monkey was made available on April 17, 2017, and closed on July 10, 2017.

The first eight responses were not posted until 5 weeks after the data collection and analysis stage started. Weekly reminders to complete the survey were sent to participants via electronic mail using the DON email as a sender to maintain participants' anonymity. Additionally, the primary investigator visited the oncology unit frequently during different times of the day as a reminder of the SIH protocol in place. A total of 45 participation letters was emailed, with a response rate of 64%.

The survey consisted of nine questions with a Likert scale, from *Strongly disagree* to *Strongly agree*. The survey response scale also included *Not applicable* and *Other comments* selections. Two questions were numerical, asking about the number of patients the participant cared for with hyperglycemia in a weekly basis, and how many had needed coverage using the SIH protocol. One question was about participants' perceptions in adapting to the change, and another question pertained to their discipline (Appendix I).

Demographic data were also collected (Appendix L). Items included age, gender, race, nationality, primary language, years working at the facility, and years of healthcare experience. Additional items requested experience working with cancer patients and with diabetic patients.

## Findings of the Project

### Focus Groups

Focus groups allowed the emergence of opinions and discussion among the healthcare team participants. Four sessions for focus groups were scheduled. Table 3 shows the discipline characteristics of the participants. The last focus group had no attendance. Several factors could have resulted in this outcome. First, planning was for a Saturday. Second, the meeting was scheduled for the evening. Third, the oncology unit was busy. Nurses and CNAs could not leave patients' bedsides, and no one from the dietary staff was available on this day and time to take their places.

Twelve participants shared their thoughts and perceptions about the new SIH protocol during the focus groups. All attendees were assigned codes for their roles: registered nurse, certified nurse assistant, or dietary team, e.g., RN1, CNA1, DT1. Participants were then grouped into the three categories. Table 3 displays the groups.

Table 3

*Focus Groups Participants (Total N = 12)*

Discipline	Focus Group A	Focus Group B	Focus Group C
RN	3	2	2
CNA	1	1	1
DT	1	1	0
Total	5	4	3



Responses from all attendees were transcribed, crossanalyzed, and subjected to common questions to identify participants' perspectives on the SIH protocol. Similar keywords were identified in the thematic analysis that expressed the feelings and perspectives of each group. This process helped the development of themes for identification of participants' perspectives on the adaptation to change. The primary investigator highlighted keywords in the focus group transcripts for each focus group session and identified the three themes of Adaptable, Best for Patients and Difficult (Appendix G).

Upon the primary investigator's questioning of nurses and certified nurse assistants, both disciplines agreed the SIH approach was different and definitely needed. Although implementation might be a lot of work, they said, they were willing to try it and adapt to the change. Discussions centered around adaptation and whether the change was easy and understood. Table 4 describes the keywords among disciplines with regard to adaptation to the SIH protocol.

Table 4

*Focus Groups' Keywords by Disciplines*

Discipline	Keywords
RN 1	Difficult but will try
RN2	Want to know more
RN3	Change needed
RN4	Different but adaptable
RN5	Eventually all will adapt
RN6	Can adapt
RN7	Change needed
DT1	Time allotted for delivery
DT2	New delivery is confusing

The responses highlighted differences between representatives of the disciplines. Most of the bedside RNs agreed that the change was needed and that they would adapt with time. Most of the RNs were more interested in the change and in learning more about it. They noted that having two protocols was a difficult situation but that they could adapt with time. Most of them agreed that if it helped the patients' outcomes, they would try it. Representative comments follow:

When heard about the SIH protocol, immediately did a little research to learn more about it. (RN2)

I believe this paradigm shift is doable and needed, we will all adapt eventually, some faster than others. (RN5)

CNAs needed to organize the glucometer readings after meals and report to RNs for insulin administration. CNAs agreed that the change was needed but would require some adaptation and time, as revealed by this comment:

Changes are good; it will just require some time to adapt and make it happen. (CNA3)

For the dietary staff, the analysis revealed a strong resistance to the change and reluctance to adopt it. The SIH protocol patients' trays would be delivered to the nurse station for CNAs to bring to bedside. Dietary staff would continue to deliver trays to all other patients' bedsides. For this change to take place, the dietary staff would need to organize trays by colors—red trays for patients in the SIH protocol and brown for all other patients. The two dietary staff participants had similar responses: sorting the trays was time consuming and could produce confusion with the trays delivery, as indicated in the following extract:

It will be hard to follow, too many trays to deliver in such little time. (DT1)

I'll get confused having to pay attention to the different tray colors now besides the correct patient and room number. (DT2)

### **SIH Protocol Survey**

Data were analyzed with SPSS on the SurveyMonkey website. The survey response was slow, with a response rate of 64% from April 17, 2017, to July 10, 2017. The survey was meant to evaluate the healthcare team's adaptation to the paradigm shift. The discipline that participated primarily were the RNs (14.78%), who were bedside nurses providing direct care. Additional participants were one charge nurse (5.5%), one DON (5.5%), one unit director (5.5%), and one clinical educator (5.5%). Table 5 shows the distribution of participants.

Table 5

#### *Healthcare Team's Response Rates*

Discipline	<i>f</i> (%)
RN	19 (65.5)
CNA	5(17.2)
Dietary	1(3.5)
Pharmacy	1(3.5)
Medical	2(6.9)
IT	1(3.5)
Total	29(64)

*Note.* *f* = frequency; % = percentage.

## Demographics

**Age and gender.** A total of 29 participants responded to the survey. Table 6 illustrates the participation by age group. There were five age groups, ranging from 18 to 24 years old to 55 years old and above. The age with the highest participation was those from 35 to 44 years old, 41.4%. The group age with the lowest participation was 55 years and above, 6.9%. A significant factor that may have influenced the response to adaptation was that 72% of the participants were over 35 years old. A total of 79% were female and 21% were male.

Table 6

*Demographics: Age Groups*

Age Groups	<i>f</i> (%)
18 to 24	3 (10.3)
25 to 34	3 (10.3)
35 to 44	12 (41.4)
45 to 54	9 (31.0)
55 and above	2(6.9)

*Note.* *f* = frequency; % = percentage.

**Race and primary language.** The majority of participants was White, 45%; followed by Hispanics, 31%; Black, 17%; and Asian/Pacific, 7%. As speaking English was an inclusive criterion, all participants spoke English, but only 62% responded that English was their primary language. Spanish was the primary language for 24% of the participants, and neither English nor Spanish was the primary language for 14%.

**Experience.** Four different categories were requested in this section: time working for the facility, time working in healthcare, time working for cancer patients, and time working with diabetic patients. Table 7 summarizes the categories of experience. The highest percentage of participants had worked in the facility between 1 and 5 years, 37%. The highest experience in healthcare was 16 or more years, 41%; 24% had 11 to 15 years of experience in healthcare, and 17% each had 1 to 5 years and 6 to 10. The majority of the participants, 59%, had 6 to 10 years of experience working with cancer patients; and 31% had 1 to 5 years; and 10% had 11 to 15 years of experience.

To understand the healthcare teams' adaptation to the SIH protocol, it was important to know if participants had cared for and managed hyperglycemia in diabetic patients and for how long. The number of years using the bolus sliding scale for hyperglycemia may have also influenced adaptation to new clinical guidelines. As expected, 18% of the less experienced participants and 39% of the most experienced healthcare team members, mostly nurses, had cared for diabetes patients. Additionally, the more experienced participants held leadership positions, such as charge nurse, director of nursing, and clinical educator; their educational levels were beyond the RN.

### **Adaptation**

The SIH protocol adaptation survey consisted of nine questions on a Likert scale from *Strongly disagree* to *Strongly agree*. Twenty-nine members of the healthcare team who cared for patients with cancer directly or indirectly responded. Table 8 summarizes their responses. A total of 48% strongly agreed that the new SIH protocol was relevant and applicable to their patients.

Table 7

*Demographics: Experience in Nursing*

Years of Experience	Facility <i>f</i> (%)	Healthcare <i>f</i> (%)	Cancer <i>f</i> (%)	Diabetes <i>f</i> (%)
1-5 years	11(37.9)	5(17.2)	9(31.0)	5(17.9)
6-10 years	7(24.1)	5(17.2)	17(59.0)	5(17.9)
11-15 years	10(34.5)	7(24.1)	3(10.3)	7(25.0)
16 or more years	1(3.4)	12(41.4)	0(0.0)	11(39.3)

*Note.* *f* = frequency; % = percentage.

A total of 45% participants strongly agreed that the protocol was easy to use and understand. The participants also noted that patients in the SIH protocol were effectively responding to the new management of hyperglycemia. Most of the bedside nurses agreed that they noticed a change in patients' outcomes, with less insulin required.

Twenty-four participants responded to the questions with regard to the amount of patients and amount of coverage of insulin when the SIH protocol was used. The DON reported that there were 38 patients on the SIH protocol from March 18, 2017, to May 18, 2017. The DON also reported that 35 patients required insulin coverage.

Table 8

*Healthcare Team's Adaptation to SIH Protocol*

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
	<i>f</i> (%)	<i>f</i> (%)	<i>f</i> (%)	<i>f</i> (%)	<i>f</i> (%)
Relevant and applicable	14 (48.9)	12 (41.4)	3 (10.3)	0	0
Easy to understand and explain	13 (44.9)	11 (37.9)	5 (17.2)	0	0
Effectiveness	11 (37.9)	13 (44.9)	4 (13.8)	0	0
New meal tray process	10 (34.5)	12 (41.4)	5 (17.2)	0	0
EHR reminder/alert	14 (48.9)	10 (34.5)	5 (17.2)	0	0

*Note.* *f* = frequency; % = percentage.

The most significant findings were as follows. Seven nurses (29%) reported caring for six or more patients in the SIH protocol in a 10-day time frame and adapting very easily to the change. Six nurses (25%) accepted treatment of their patients with the SIH protocol insulin coverage. Nurses also reported covering fewer times with use of the new protocol, treating patients after meals rather than before, as with the previous method.

The IT alert helped nurses as a reminder. Patients' EHRs of a different color also helped nurses identify the change in the patient management. Almost half of the participants (48%) strongly agreed that the reminder/alert pop-up in the EHR was very

beneficial. Considering that the reminder/alert was a tool for the interdisciplinary healthcare team, the 17% who neither agreed nor disagreed may have been from the disciplines not in direct care. Even more significant was that none of the participants disagreed to the SIH protocol. This outcome may indicate great success and adaptation to the change. For such a change to take place, the adaptation of the healthcare team was of extreme importance. It was also significant that RNs, nurse leaders, and others who held leadership positions from other disciplines adapted more easily to the change but did not provide direct patient care.

The majority of the participants, 52%, agreed that the protocol is important and beneficial and should continue, as shown in Figure 2. Additionally, bedside nurses, 41%, observed that adaptation would take time: “adapting to the protocol will take time, especially for all the healthcare team,” but that adaptation was doable. Two participants, 7%, a CNA and a dietary staff member, when responding to what they felt about the protocol, said that “adapting to a new way of doing things is too much work, especially in meal times.”

The small sample size makes inferences difficult, as results might have shown wider differences in the categories (Table 8). However, as Figure 2 shows, it may be concluded that 93.1% of the participating healthcare team will adapt to the new protocol. Appendix M presents a graphic illustration of the complete SIH Protocol for Nondiabetic Patients.



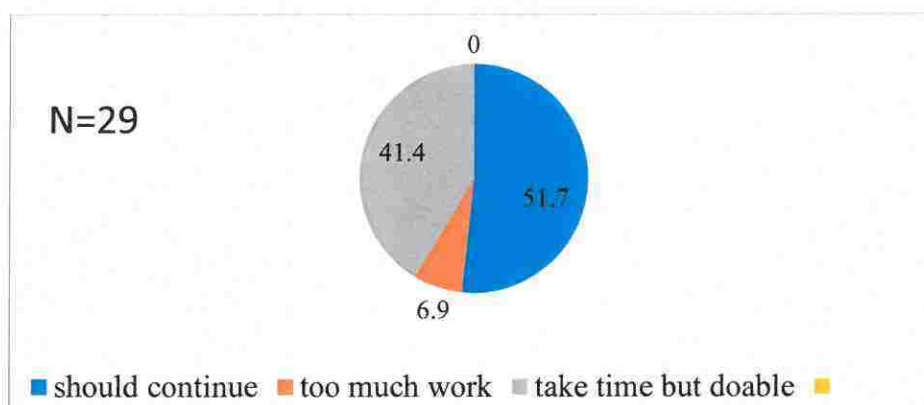


Figure 1. Qualitative healthcare team's adaptation to SIH protocol.

### Strengths and Limitations

The strengths of the project included the collaboration and support of the diabetes task force team and the healthcare team involved. Review of the literature as a team resulted in speedier acceptance rather than the primary investigator attempting to convince the team of best practices and need for the change. Another strength was the unilateral study of patients' responses to the change of treatment that the pharmacy staff desired to begin. The SIH protocol is continuing with the pharmacy staff collecting data regarding blood glucose trends in these patients. If a significant improvement is noted, the facility may consider using the SIH protocol throughout the institution.

A significant limitation was the slow response from participants. Findings demonstrated that the dietary staff was reluctant to change, but it was also an important limitation that only two dietary staff members participated in the focus groups. Professional nurses understood the change and were willing to adapt to it. The other unlicensed groups, the CNAs and dietary staff, may need more education as to patients' benefits and outcomes from the change. Implementation also did not consider patients' coping with the change and the potential to contract steroid-induced diabetes.

### **Implications for Nursing and Healthcare**

The findings from this project can impact nursing practice, healthcare outcomes, healthcare delivery, and healthcare policy by the creation of changes in the care of this population. The project demonstrated that use of the new evidence-based clinical guidelines to treat steroid-induced hyperglycemia was effective in the management of hyperglycemia in patients with malignancies. The project may impact healthcare outcomes by enhancing nursing knowledge and their abilities to manage hyperglycemia in patients with malignancies. Patients will have better health outcomes, fewer hospital readmissions, and fewer complications related to uncontrolled hyperglycemia.

With regard to healthcare delivery, the findings also showed that the interdisciplinary team was adaptable to change and recognized the paradigm shift was necessary for better healthcare delivery. The use of the SIH protocol should become best practice in all other clinical areas that admit patients who are prescribed long-term steroids and present hyperglycemia. Healthcare institutions should take into account the benefits of the SIH protocol change and mandate the protocol as policy.

### **Future Research**

The findings of this project can lead to various types of future research. With the SIH protocol in place, an investigation or internal study should be conducted to gather data that would prove that the new evidence-based clinical guidelines are useful. Future research may include data collection from the pharmacy staff in the appropriate use of the protocol and from its implementation whether patients require less coverage with insulin after meals. Additional studies of the nursing staff could be conducted after extended use

of the protocol to gain insight and understanding into their views on the benefits and possible drawbacks of the protocol.

Future research may be conducted with patients as well. Educational interventions should be delivered for home-care use of steroids not only for patients with cancer but for other patients who receive long-term steroids. Outcomes could be tracked in longitudinal studies. Studies could explore patients' point of view and how they cope with changes in their healthcare status because of steroid-induced hyperglycemia.

### **Summary**

The project has studied the adaptation of the healthcare team members who care for nondiabetic patients with malignancies who are treated with steroids at an oncology unit in a South Florida hospital. Literature has demonstrated that hyperglycemia may be a complex complication for patients with malignancies who are treated with steroids. Untreated hyperglycemia adversely affects patients' health outcomes.

The healthcare team's adaptation of new protocols is important when a patient population does not respond to standard approaches of treatment. Patients' outcomes depend on finding new evidence-based practice modalities and for the healthcare team to project adaptation through the care provided. With adaptation of the SIH protocol, this project has demonstrated that the healthcare team can adapt to changes and that changes may be difficult but are needed to improve patients' outcomes. The pursuit of evidence-based practice involves ongoing appraisal of current standards of care for more skilled delivery of nursing and more health-producing patient outcomes.

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## Appendix A

Nova Southeastern University Institutional Review Board

## Letter of Exemption

NOVA SOUTHEASTERN UNIVERSITY  
Institutional Review BoardMEMORANDUM

To: Miriam Saldoriga  
College of Nursing

From: Jo Ann Kleier, Ph.D., Ed.D.,  
Center Representative, Institutional Review Board

Date: February 8, 2017

Re: IRB #: 2017-87; Title, "Steroid-Induced Hyperglycemia In Patients With Malignancies: Health Care Team Adaptation to a Paradigm Shift"

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I have reviewed the above-referenced research protocol at the center level. Based on the information provided, I have determined that this study is exempt from further IRB review under 45 CFR 46.101(b) ( Exempt Category 2). You may proceed with your study as described to the IRB. As principal investigator, you must adhere to the following requirements:

- 1) **CONSENT:** If recruitment procedures include consent forms, they must be obtained in such a manner that they are clearly understood by the subjects and the process affords subjects the opportunity to ask questions, obtain detailed answers from those directly involved in the research, and have sufficient time to consider their participation after they have been provided this information. The subjects must be given a copy of the signed consent document, and a copy must be placed in a secure file separate from de-identified participant information. Record of informed consent must be retained for a minimum of three years from the conclusion of the study.
- 2) **ADVERSE EVENTS/UNANTICIPATED PROBLEMS:** The principal investigator is required to notify the IRB chair and me (954-262-5369 and Jo Ann Kleier, Ph.D., Ed.D., respectively) of any adverse reactions or unanticipated events that may develop as a result of this study. Reactions or events may include, but are not limited to, injury, depression as a result of participation in the study, life-threatening situation, death, or loss of confidentiality/anonymity of subject. Approval may be withdrawn if the problem is serious.



3) AMENDMENTS: Any changes in the study (e.g., procedures, number or types of subjects, consent forms, investigators, etc.) must be approved by the IRB prior to implementation. Please be advised that changes in a study may require further review depending on the nature of the change. Please contact me with any questions regarding amendments or changes to your study.

The NSU IRB is in compliance with the requirements for the protection of human subjects prescribed in Part 46 of Title 45 of the Code of Federal Regulations (45 CFR 46) revised June 18, 1991.

Cc: Diane H Esposito, PhD

3301 College Avenue • Fort Lauderdale, Florida 33314-7796  
(954) 262-0000 • 800-672-7223, ext. 5369 • Email: [irb@nova.edu](mailto:irb@nova.edu) • Web site: [www.nova.edu/irb](http://www.nova.edu/irb)

## Appendix B

## Letter of Approval and Support



Nova Southeastern University  
3301 College Avenue  
Fort Lauderdale, FL 33314-7796

**Subject:** Site Approval Letter

To whom it may concern:

This letter acknowledges that I have received and reviewed a request by *Miriam I. Silva* to participate in the performance improvement project entitled “*Steroid-Induced Hyperglycemia in Patients with Malignancies: Healthcare Team Adaptation to a Paradigm Shift*” at Memorial Regional Hospital and I approve of this research to be conducted at our facility.

When the researcher receives approval for her performance improvement project from the Nova Southeastern University’s Institutional Review Board/NSU IRB, I agree to provide access for the approved project. If we have any concerns or need additional information, we will contact the Nova Southeastern University’s IRB at (954) 262-5369 or [irb@nova.edu](mailto:irb@nova.edu).

Sincerely,

A handwritten signature in black ink, appearing to read 'L. Pollart', is written over a light blue horizontal line.

Leslie Pollart, RN OCN MSN MBA  
Director of Nursing  
[lpollart@mhs.net](mailto:lpollart@mhs.net)  
954-265-5250

3501 Johnson Street / Hollywood, FL 33021 / (954) 987-2000

*Memorial Healthcare System*

## Appendix C

## Review of Literature Matrix

Literature/Article	Association	Recommendation
Management of Hyperglycemia and Steroid (Glucocorticoid) Therapy (Roberts, James, & Dhatariya, 2014).	Joint British Diabetes Societies for Inpatient Care	<ul style="list-style-type: none"> <li>• HbA1C as a baseline</li> <li>• Check blood glucose (BG) four times a day when on steroids (post meals)</li> <li>• If BG consistently high, follow protocol</li> </ul>
Management of hyperglycemia in hospitalized patients in non-critical care setting: An endocrine society clinical practice guideline (Umpierrez, et al., 2012).	The Endocrine Society	<ul style="list-style-type: none"> <li>• Point of care BG testing initiated with or without diabetes diagnosis while on steroids</li> <li>• BG may be discontinued on nondiabetic patients if results show no increase without insulin therapy for 24 - 48 hours</li> <li>• Insulin therapy be initiated for patients with persistent hyperglycemia while on steroids</li> <li>• Continuous insulin infusion as an alternative to SC insulin therapy for persistent elevations of BG despite the use of basal insulin</li> </ul>

## Appendix D

## Data Gathering: Prestudy for Validation of Project

**Patients Who Experienced Hyperglycemia**

Patients with Diabetes	4 (12%)
Patients without Diabetes with overall average of FBG > 126 mg/dL	6 (18%)
Patients without Diabetes with overall average <126 mg/dL (at least one episode of hyperglycemia)	23 (70%)
Total patients with hyperglycemia	33

Thirty-three out of 37 patients (89% of targeted population) experienced some degree of hyperglycemia.

## Appendix E

## Team Meeting Minutes Example

## Diabetes Task Force – Memorial Healthcare System

## Attendance:


## Meeting Minutes for January 16, 2017

Committee Chair:

Meeting Called to Order at: 12:05  
15:00

Meeting Ended:

Location: MRH Parlor B

Welcome &amp; Introductions - around the room as well as phone introductions took place

Reason for Meeting – L. P. explained the reason for meeting is to examine the management of the steroid-induced hyperglycemia patients throughout our healthcare system. Dr AA. Endocrinologist met with CNOs and shared some suggestions on how to improve the nutritional and clinical care for this type of patients. Dr. AA & Dr. JC will provide physician oversight and leadership for our task force. L.P. explained that team members were selected to be on this task force because of their expertise in this area. This task force has been formed to establish an action plan for improving care across the continuum and implement best practices across the system.

**Old Business**

## 1. Dietary Issues

## A. Alternative Options for Juices

1. A trial of Shasta flavored carbonated waters was done on 5 South & SCDH/SIC with negative results, Team members cited that patients did not like the “fizziness” of the water.
2. Options for bottled water being looked at by MRH – as well as flavoring packets to offer an alternative to carbonated beverage options
3. Joe D has only 100% juice for the pediatric population.  
Food & Nutrition Directors will research options of flavoring packets and provide information at the next meeting.

## B. Dessert Options

1. A discussion was held regarding the normal dessert options versus fresh fruit. At current time fresh fruit is only offered at breakfast meal. The group felt this should be an option for any meal and for all patients.

## C. Menu at a Glance

This is a menu that is included in the paperwork left by EVS for the incoming patients. The Menu at a Glance provides the carbohydrate count listed next to the menu items. Not certain that all campuses use this tool.

A discussion also took place regarding the incorrect diets being ordered on admission. It was suggested that a standard ADA diet with the caloric intake being adjusted based on the weight in EPIC be an automatic order on admission for diabetic patients. The diet then could be adjusted once the provider or dietician sees the patient

**New Business**

## 2. Designation &amp; timing of selected SIH protocol trays

A lengthy discussion was held about the protocol trays being marked in a special way to alert staff that the tray was a SIH protocol tray. Two questions were asked:

1. Are the trays marked in a special way?  
MRHS oncology unit – red tray mat
2. Are trays delivered at a different time as the others?  
Not across the system except for the oncology unit.

Also the timing of the tray with regard to the timing of the glucometer checks and insulin administration was discussed. All team members admitted that these were challenges at all campuses. Present issues include glucometer checks being performed by nursing sometimes 1-2 hours after meal trays being delivered.

## 3. Optimization of Insulin administration timing and glucometer checks

All attendees agreed this is an issue across the system. More discussion to take place regarding this.

## 4. Insulin order sets

Natalie Zilban discussed the proposed changes to the current sliding scale for insulin coverage. And the SIH protocol.

The basal-bolus dosing regime was discussed in little detail and will need more discussion at future meetings and education for the Physicians and staff.

## 5. Diabetes Education

All team members agreed that there is a significant need for education on Diabetes. Most facilities are utilizing some type of formal educational materials but nothing is standardized across the system. Discussion was held regarding the Tiger TV videos, the use of the translator system for those non-English speaking patients, face to face education, as well as nursing staff education.

The other two agenda items were tabled for future discussion.

It was decided to focus on some items that could make an impact quickly with little effort, these being:

1. How to provide Healthier food options for the patients/reduction of juices as part of pantry stock
2. Making the SIH protocol trays look different than the regular trays & establish delivery process
3. Glucometer check timing in relation to tray delivery & insulin administration
4. Patient Educational material standardization

Meeting was adjourned at 1500.

## Appendix F

## Participation Letter

Title of Study: Steroid-Induced Hyperglycemia In Patients With Malignancies:  
Healthcare Team Adaptation to a Paradigm Shift

## Principal investigator(s)

Miriam I. Silva, MSN, RN  
4225 SW 121 Lane Apt 110  
Miramar, FL 33025  
352-274-0344

## Co-investigator(s)

Diane Esposito, PhD, ARNP,  
PMHCNS-BC  
11511 N Military Trail  
Palms Beach Gardens, FL  
561-805-2232

## Institutional Review Board

Nova Southeastern University  
Office of Grants and Contracts  
(954) 262-5369/Toll Free: 866-499-0790  
IRB@nsu.nova.edu

## Site Information

Memorial Regional Hospital  
3501 Johnson Street  
Hollywood, FL 33021  
954-265-5250

**Description of Study:** Miriam I. Silva is a doctoral student at Nova Southeastern University engaged in a quality improvement project for the purpose of satisfying a requirement for a Doctor in Nursing Practice degree. The purpose of this project is to identify a best practice process to care for this population, and communicate the new process to healthcare team members. The project aims to examine the adaptation of the healthcare team members in the use of the new process. In accordance with these aims, participation in a focus group and an anonymous Internet survey method will be used.

If you agree to participate, you will be asked to answer the questions about your experience of the care of patients with Steroid-induced Hyperglycemia. The focus group meeting is scheduled to take about 5-10 minutes, after change of shift prior to the implementation of the project. The SurveyMonkey questionnaire is estimated to take no more than 5 minutes to complete after the implementation of the project. The data from this survey will be used to understand your adaptation to the paradigm shift as member of the team who cares for this population.

**Risks/Benefits to the Participant:** There may be minimal risk involved in participating in this project and is strictly voluntary. The only risk may be related to loss of confidentiality, or of information from focus groups or survey data being shared with supervisors. Steps taken to reduce this risk include the de-identification of all participants in focus groups, and use of numeric code, as well as use of privacy settings on survey software. There are no direct benefits to you for participating in the survey process, but your input may help with enhancing the quality improvement process. If you have any concerns about the risks/benefits of participating in this study, you can contact the investigators and/or the university's human research oversight board (the Institutional Review Board or IRB) at the numbers listed above.

**Cost and Payments to the Participant:** There is no cost for participation in this study. Participation is completely voluntary and no payment will be provided.

**Confidentiality:** Information obtained in this study is strictly confidential unless disclosure is required by law. All data will be secured in a locked filing cabinet. Your name will not be used in the reporting of information in publications or conference presentations.

**Participant's Right to Withdraw from the Study:** You have the right to refuse to participate in this study and the right to withdraw from the study at any time without penalty.

**I have read this letter and I fully understand the contents of this document and voluntarily consent to participate. All of my questions concerning this research have been answered. If I have any questions in the future about this study they will be answered by the investigator listed above or his/her staff.**

**I understand that the completion of this questionnaire implies my consent to participate in this study.**



## Appendix G

## Focus Groups Transcript

2/27/2017 7:45am FG A

“...difficult but can try. Changes always cause some problems to adapt.” (RN1)

“I want to know more. As long as is best for my patients, I want to know it.” (RN2)

“I agree the change is needed. At the long run, it will save me time and it is best for the patient.” (RN3)

“It will be hard to follow, too many trays to deliver in such little time” (DT1)

“I am fine with changes, I am adaptable.” (CNA1)

3/3/2017 7:45am FG B

“It is definitely a different protocol, but adaptable. As long as is best for the patients.” (RN4)

“Everyone likes to complain, but eventually all are adaptable. Everyone usually does what is best for the patients. We all know in healthcare things always change from time to time. We will all adapt. I believe this paradigm shift is doable and needed, we will all adapt eventually, some faster than others.” (RN5)

“I totally agree with the change. I can see how many high blood sugars we have in this unit. The change is definitely needed.” (CNA2)

“So what I hear is trays will be delivered different. I’ll get confused having to pay attention to the different tray colors now besides the correct patient and room number.” (DT2)

3/11/2017 7:45pm FG C

“I can adapt, I have no problem with that. I usually like changes.” (RN6)

“I definitely think the change is needed. I am usually given so much insulin coverage. It will probably decrease with these new guidelines. We will provide better care to patients.” (RN7)

“Changes are good, it will just require some time to adapt and make it happen.” (CNA3)

3/18/2017 7:45pm FG D

No attendance

Themes: 1) Adaptable 2) Best for patient 3) Difficult

Appendix H

Flyer and Poster Board

**Steroid-Induced Hyperglycemia (SIH Protocol)**

Doctor Nurse Nursing Assistant Pharmacist Dietician

**Join Us**

Cancer patients struggle with high blood sugars while on steroids. We want your feedback regarding new approaches in treating steroid induced hyperglycemia.

Join us in improving cancer patients outcomes.

*Presented by: Miriam Ingrid Silva, Doctoral Student  
Nova Southeastern University College of Nursing*

Date: dd/mm/yyyy Time: ##:## Location: put address here, city, state, zip

## Appendix I

## SIH Protocol Adaptation Survey

1. The new protocol for the management of hyperglycemia for patients with Cancer is relevant and applicable to my patients.

- Strongly Disagree
  - Disagree
  - Neither agree nor disagree
  - Agree
  - Strongly Agree
  - Not sure/not applicable
  - Other Comments (please specify)
- 
- 
- 

2. The new protocol for the management of hyperglycemia for patients with Cancer is easy to understand and explain to my patients.

- Strongly Disagree
  - Disagree
  - Neither agree nor disagree
  - Agree
  - Strongly Agree
  - Not sure/not applicable
  - Other Comments (please specify)
- 
- 
- 

3. The new protocol for the management of hyperglycemia for patients with Cancer is more effective at managing my patient's blood sugar.

- Strongly Disagree
  - Disagree
  - Neither agree nor disagree
  - Agree
  - Strongly Agree
  - Not sure/not applicable
  - Other Comments (please specify)
- 
- 
-

4. The new tray/meal delivery system for patients with hyperglycemia is effective.

- Strongly Disagree  
 Disagree  
 Neither agree nor disagree  
 Agree  
 Strongly Agree  
 Not sure/not applicable  
 Other Comments (please specify)
- 
- 
- 

5. The reminder/alert in the EHR is beneficial.

- Strongly Disagree  
 Disagree  
 Neither agree nor disagree  
 Agree  
 Strongly Agree  
 Not sure/not applicable  
 Other Comments (please specify)
- 
- 
- 

6. How many patients did you care for in the last 10 days that were diagnosed with hyperglycemia?

- 1-5  
 6-10  
 More than 10

7. How many times did you have to treat your patients with the new process for hyperglycemia?

- 1-5  
 6-10  
 More than 10

8. How do you feel about the SIH protocol in the management of hyperglycemia for patients with Cancer?

"I think this protocol should continue."

"I think is too much work adapting to such a change in meal times."

"I think it will take time for all the team members to adapt but is doable."

9. What is your discipline?

- Nursing
- Medical
- Pharmacy
- Dietary
- IT
- Other:

## Appendix J

## Educational Plan Outline

Time: 7:00 am/pm

Duration: 15 minutes

Place: Break room

- I. SIH protocol
  - a. Literature review
    - i. Expose the problem
    - ii. Discuss actual glucometer reading and insulin coverage process
  - b. Handout (Flyer)
    - i. Interdisciplinary team
- II. New EBP guidelines presentation
  - a. Handout
    - i. Discuss targeted population
    - ii. Discuss the process
    - iii. Discuss roles and responsibilities of each healthcare team member
      1. Dietary
        - a. Deliver red tray meals to centralized nursing station
      2. RN
        - a. Administer Insulin (Basal/Bolus) post meals
        - b. Ensures process success
      3. CNA
        - a. Delivers tray meal from nurse's station to bedside
        - b. Sets patient to eat
        - c. Assures patient has completed meal and documents
        - d. Glucometer reading immediately after meal
        - e. Notifies RN of completed process or any situation if not completed
      4. Pharmacy
        - a. Ensures targeted population is identified in eMAR
        - b. EHR identified as red
        - c. Ensures proper medication administration
      5. IT
        - a. Develops pop up alert in EHR as a reminder of the use of new SIH protocol for the selected population
      6. Nurse managers/educators
        - a. Ensures staff is following protocol appropriately
        - b. Reinforces education to staff
        - c. Collaborate with primary investigator

## Appendix K

### Focus Group Questions

#### **Nursing**

1. Do you see any problem when caring for patients with malignancies being treated with steroids?
2. When are blood sugars monitored?
3. What are your suggestions about adapting to a new after meals protocol?
4. Is there any difference between the hyperglycemia treatment now and the new SIH protocol?

#### **Dietary**

1. How do the patients receive their meal trays?
2. How do you feel about the meal tray delivery change in the new SIH approach?
3. Do you have any suggestions to track the delivery of trays and monitoring patient's mealtime?

#### **Certified Nurse Assistant**

1. How many blood glucose do you do in a daily basis?
  2. What time is the blood glucose monitoring done?
  3. Do you see any problems in adapting to a different schedule of blood glucose monitoring?
  4. Do you have any suggestions in how to monitor the time patients in the SIH protocol finish eating their meals?
-

## Appendix L

Demographic Survey

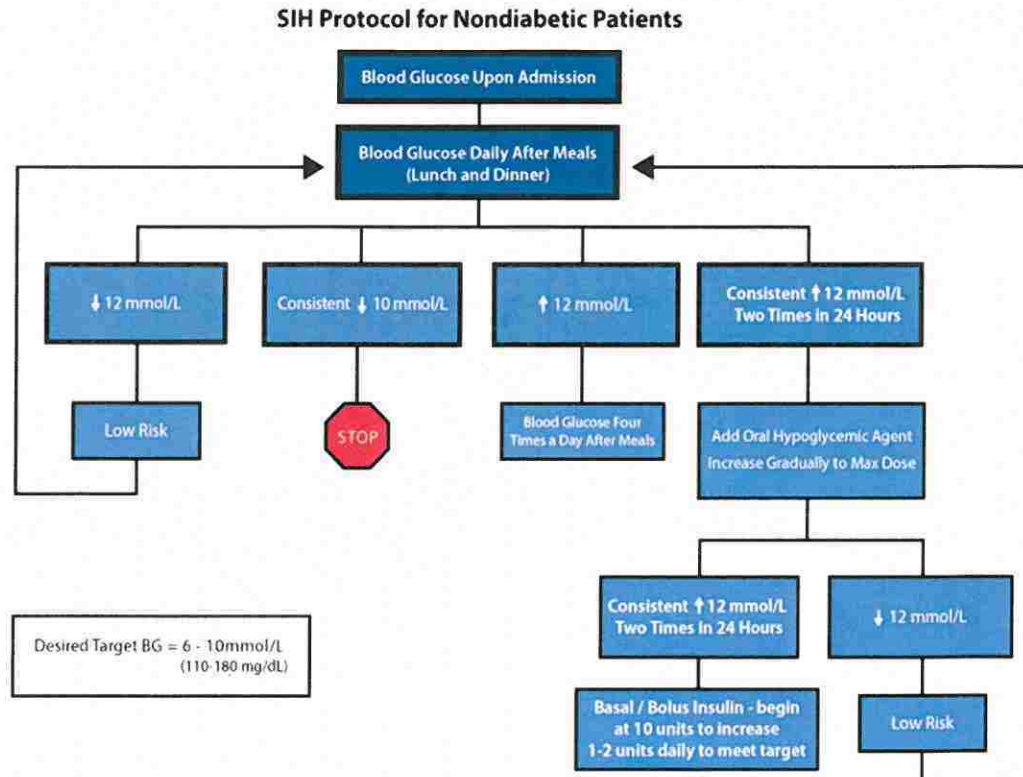
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1. Age:
    - a) 18 – 25 years old
    - b) 26 – 35 years old
    - c) 36 – 45 years old
    - d) 46 – 55 years old
    - e) over 56 years old
  
  2. Gender
    - a) Male
    - b) Female
  3. Race
    - a) White
    - b) Black
    - c) Hispanic
    - d) Non-Hispanic
    - e) Other \_\_\_\_\_
  
  4. Nationality \_\_\_\_\_
  5. Primary language \_\_\_\_\_
  6. How long have you worked in this hospital? \_\_\_\_\_
  7. How long have you been in healthcare? \_\_\_\_\_
  8. How long have you worked for cancer patients? \_\_\_\_\_
  9. Have you ever cared for patients with diabetes? \_\_\_\_\_
  10. What is your actual position?
    - a) \_\_\_\_\_ RN
    - b) \_\_\_\_\_ LPN
    - c) \_\_\_\_\_ CNA
    - d) \_\_\_\_\_ Dietary
    - e) \_\_\_\_\_ PT
    - f) \_\_\_\_\_ OT
    - g) \_\_\_\_\_ Pharmacy
    - h) Other: \_\_\_\_\_
  
  11. If you are a nurse, what is your area of specialization? \_\_\_\_\_
-



## Appendix M

## SIH Protocol for Nondiabetic Patients



## Editor Verification for Miriam I. Silva

Noelle Sterne, Ph.D.  
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October 6, 2017

By email:

To: Dr. Diane Esposito

From: Dr. Noelle Sterne

Cc: Miriam I. Silva

Dear Dr. Esposito:

As an approved professional editor for Nova Southeastern University, I have reviewed, edited, and provided corrections on grammar, format, and style conventions consistent with the *Publication Manual of the American Psychological Association* (6th edition) for the DNP Project which Miriam I. Silva has submitted to her committee at Nova Southeastern University College of Nursing.

Other than my editorial assistance to Ms. Silva as described above, I did not participate in the rewriting of her original work. I trust her DNP Project will be a significant and important contribution to academic scholarship in the professional nursing community.

A pleasure to serve.

Sincerely,

/s/ Noelle Sterne, Ph.D.

**\*\*Where we are is where we give.\*\***

Noelle Sterne, Ph.D.

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<https://rowman.com/ISBN/9781475815030/Challenges-in-Writing-Your-Dissertation-Coping-with-the-Emotional-Interpersonal-and-Spiritual-Struggles>

Author, *Trust Your Life: Forgive Yourself and Go After Your Dreams*. Unity Books, 2011.

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