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An Educational Intervention to Improve Nurses' Knowledge Towards Timely Pain Management in the Emergency Department for Patients Arriving with Sickle Cell Crisis: A Quality Improvement Project

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Abstract

Sickle Cell Disease (SCD) is common genetic blood disorder that predominantly affects African Americans. In the United States, this disease accounts for a large amount of Emergency Department (ED) visits annually, with pain being identified as the chief complaint upon arrival. Such high ED utilization could signify lack of proper outpatient care or poor quality of care in the ED. A complication of SCD is known as sickle cell crisis or vaso-occlusive crises (VOC). A VOC is caused by deoxygenation which results in red blood cells (RBCs) to become sickle-shaped and adhere to each other in the blood vessel walls. As the RBCs adhere to the vessel walls, there is blockage of blood flow and decreased circulation throughout the body. As a consequence, individuals can develop irreversible organ damage and further health complications due to systemic inflammation and pain.

In order to improve SCD care provision, it is imperative to understand and identify factors causing a delay in medication administration for this target population. VOC episodes presenting to the ED remain inadequately managed. Patients report negative hospital experiences, delay in pain control, stigmatization, negligent care, and lack of empathy from health care providers. A crucial factor contributing to pain relief in the ED is lack of provider SCD knowledge. Patients commonly report that nurses do not fully understand the disease pathology, complications, and management; contributing to analgesic delay, lack of empathy, and pain disbelief. Nurses' lack of knowledge has potential to impose personal beliefs and attitudes which often do not reflect the patient's current condition. It is crucial to understand that patients with SCD crisis often arrive with specific requests to the ED as they are the content experts and are actively involved in self-care for their pain management. Nurses must work with patients to understand the reason for their behaviors in order to provide optimal patient care.

To help address the educational gap seen in nurses caring for patients arriving with sickle cell crisis to the ED, a quality improvement project was implemented at a large county hospital in South Florida. Participants took a pre-test survey, an educational PowerPoint presentation was given, and a post-test survey was completed to assess if knowledge was improved. The results revealed a statistically significant change in knowledge between the pre-test and post-test. In conclusion, an educational intervention regarding timely pain management proved to increase nurses' knowledge regarding timely pain management for patients arriving with sickle cell crisis to the ED. The findings support the use of an educational intervention for ED nurses in order to improve analgesic administration and help improve clinical outcomes.

Keywords: sickle cell anemia, sickle cell crisis, sickle cell crisis education, emergency department sickle cell.

Table of Contents

Chapter I

Introduction

Sickle Cell Disease (SCD) is commonly known as an inherited genetic blood disorder; it is an autosomal recessive disorder that is caused by a substitution of the amino acid glutamine to valine on the beta globin gene (Matthie & Jenerette, 2015). Such mutation of the gene causes an alteration of the hemoglobin structure and triggers red blood cells to become sickle shaped. The sickle shaped cells collect and adhere to the blood vessel walls causing blockage of blood flow and decreased circulation throughout the body (Matthie & Jenerette, 2015). The sickling process causes complications known as sickle cell crisis or vaso-occlusive crises (VOC). These crises are described as painful episodes triggered by dehydration, weather changes, fatigue, overexertion with pain onset, and long periods of uncontrolled pain management (Matthie & Jenerette, 2015). The individual with a sickle cell crisis episode will experience pain anywhere in the body but most commonly where the bone marrow is located, such as extremities and lower back (Glassberg, 2017). Such painful episodes can lasts from days to weeks.

SCD is a complex and multifactorial blood disorder affecting mostly the African American population (Crego et al., 2021). This particular disease encompasses a plethora of complications that result in frequent Emergency Department (ED) visits. Frequent SCD complications that arrive to the ED include: priapism, acute chest syndrome, embolism, stroke, infection, heart disease, pulmonary hypertension, and acute pain crisis (Crego et al., 2021). Approximately 200,000 patients with sickle cell crisis present annually to the ED (Crego et al., 2021; Wachnik et al., 2022). Such high ED utilization could signify lack of proper outpatient care or poor quality of care in the ED.

Adults presenting to the ED with sickle cell crisis usually undergo an unfavorable experience. Patients often report delay in pain medication administration, lack of empathy from the nurses, high patient turnover, long wait times, and lack of continuity of care (Matthie & Jenerette, 2015; Puri Singh et al., 2016). Patients report that nurses often do not display compassion, dignity, or respect towards their sickle cell pain crisis. Some patients mention that they feel stigmatized as drug seekers when they request a specific pain medication known to adequately relieve their symptoms, not to mention there is skepticism as to the veracity of the patient's report of pain (Puri Singh et al., 2016). These patients are often not involved in their plan of care and mention how nurses are not always educated on the topic and cannot provide answers to their questions. Such frustration felt by patients with sickle cell crisis presenting to the ED warrants further investigation. Nurses in the ED lack understanding of the pathophysiology and complexity of a sickle cell crisis. ED nurses can benefit from an educational intervention in order to improve clinical practice and deliver the adequate care that patients with sickle cell crisis deserve. Ultimately, as ED nurses become more knowledgeable with the prominent issues associated with SCD, there will be improved health outcomes for individuals suffering from SCD.

Background

It is crucial to understand the complexity of SCD. SCD began as a disease that was not recognized and often mistaken for infectious disease processes that were most prevalent at the given time. SCD is most prevalent in individuals of African, Caribbean, Central and South American, Saudi Arabia, Indian, and Mediterranean descent (Matthie & Jenerette, 2015). Luckily, testing for SCD is usually performed during the first trimester of pregnancy and is part of the newborn screening assessment. In order to understand the severity of the disease and the

hallmark symptom of pain, it is crucial to recognize the clinical features in the different stages of life. During the first year of life, there is a high mortality rate between 6 to 12 months due to the infant developing splenic sequestration, septicemia, dactylitis, and acute chest syndrome (Serjeant, 2013). It is imperative to provide parents with proper education in order for them to understand the urgency of certain manifestations and implement prophylactic measures during infancy.

During the early years of life, individuals with SCD commonly experience acute chest syndrome. Acute chest syndrome is best recognized as the individual experiencing chest pain, cough, and shortness of breath (Serjeant, 2013). Strokes are very common around the median age of 6 years old due to cerebral infarction secondary to stenosis of the brain vessels (Serjeant, 2013). Enlargement of the spleen is also very common in which the individual experiences a great amount of pain to the left side of the abdomen due to the blockage of blood flow and the red blood cells get stuck in the spleen. During the later childhood years and early adolescence, individuals experience nocturnal enuresis, bedwetting, which resolves on its own but causes embarrassment and affects social performance (Serjeant, 2013). Bone pain crisis is also prevalent due to avascular necrosis of the bone marrow and causes pain while walking and limited movement. Lastly, priapism, prolonged erection, is commonly known as an extremely painful erection not caused by sexual desire that can cause vascular damage and impotence if not treated urgently (Serjeant, 2013). During the later adult life, strokes become prevalent secondary to aneurysms and intraventricular hemorrhage. Acute chest syndrome also becomes a problem causing further chest pain associated with pulmonary fibrosis.

The history of SCD has had slow progression. In the early 1900s, SCD was easily misdiagnosed and often confused with fever, infections, and malaria (Wailoo, 2017). It was

commonly referred to as the disease of pain and treating the symptoms was challenging. As the disease gained more popularity, in 1972 President Nixon signed the Sickle Cell Disease Control Act which allowed funding for research, education, screening, and interventions for SCD (Serjeant, 2013). Although sickle cell disease has had great progression in regards to therapies that included antibiotics, hydroxyurea, and blood transfusions, pain still remains a battle to treat. Individuals with SCD experience excruciating pain during sickle cell crisis episodes. Such painful vaso-occlusive crises has caused patients to feel stigmatized, judged as pain seekers, and often not given timely medication administration (Glassberg, 2017). It is imperative to understand that many individuals with a sickle cell crisis will often report to the ED due to lack of a primary care provider or lack of education or employment (Matthie & Jenerette, 2015).

The ED's often lack the necessary equipment and resources to adequately treat a sickle cell crisis. A lot of patients experience biases from providers and educational gaps decrease quality of care by not having treatment protocols for a sickle cell crisis. Individuals need to understand that the complexity of SCD warrants proper knowledge and training from the nurses' perspective in order to properly meet the needs of patients enduring a sickle cell crisis. Nurses are in the best position to serve as the patient's advocate. Therefore, nurses need to understand the complexity of SCD and the importance of timely pain medication administration in order to improve quality of care and help decrease hospital admissions and disease complications.

Problem Statement

The main reason that patients with a VOC episode have a delay in pain medication administration has to do with knowledge gaps among nurses. Nurses often label this patient population as drug seekers and further create stigma. There is great disbelief of the level of pain described by the patient. In addition, there is a lack of understanding that the ED is usually the

last resort despite previous coping strategies. A delay in analgesic administration causes severe organ damage and increased mortality and admission rates. An educational intervention among nurses can prove to be effective in decreasing the knowledge gap and improving timely pain medication administration.

Problem Identification

A sickle cell crisis episode is primarily identified with the most common symptom of acute or chronic pain (Matthie & Jenerette, 2015). As patients present to the ED, they encounter longer delays in obtaining analgesic administration. Some patients report that characteristics such as age, race, gender, ED volume, and arrival time are all factors that serve as barriers to obtaining pain relief during a sickle cell crisis (Crego et al., 2021). The real problem arises when the patient encounters provider bias. Nurses often perceive these individuals as "drug seekers" and do not advocate for the patient when there is a delay in the first analgesia administration. Also, there is lack of empathy and high skepticism about the veracity of the pain the patient is reporting (Puri Singh et al., 2016). There is a need for ED nurses to better understand the pathophysiology and complexity of SCD in order to better advocate for these patients and help them obtain pain relief quicker during the sickling process.

Currently, the challenges faced by individuals presenting to the ED with sickle cell crisis hinders the therapeutic relationship between the health care provider and the patient. As the nurse mistakenly associates a patient with sickle cell crisis as a high ED utilizer due to opioid seeking behavior, this can further affect the patient's physical and emotional well-being (Glassberg, 2017). There are several challenges that contribute to lack of timely pain medication administration. One challenge in managing pain during a sickle cell crisis includes the lack of objective signs. The hemoglobin level does not necessarily have to be elevated in order for the

patient to experience pain (Matthie & Jenerette, 2015). Some patients have low hemoglobin levels and still endure a lot of pain. Many nurses lack proper pain assessment and do not understand that pain manifests differently in every individual. Nurses' lack of understanding can serve as a barrier to effectively assess, manage pain, and advocate for the patient.

Furthermore, another barrier that affects timely pain medication administration includes nurses' expectations of how pain is manifested in individuals. Nurses have the belief that pain is manifested through crying, grimacing, groaning, or expressing agony. However, not all individuals express pain in the same manner. SCD is a chronic disease, therefore, many patients learn to adapt to coping mechanisms that help them endure such sickle cell episodes. For example, some patients may engage in phone calls, listen to music, spend time on the computer, watch videos, laugh, or use hot/cold therapy for pain management (Matthie & Jenerette, 2015). Also, some patients have a great support system and it enables them to obtain a high level of resiliency. Consequently, when they present to the ED with sickle cell crisis episodes and use coping mechanisms while waiting to be assessed, some nurses fail to believe that the patient is experiencing pain. Nurses cannot rely on what their expectations of pain consist of because it becomes an obstacle in their pain assessment and triggers lack of empathy and compassion towards the sick individual (Matthie & Jenerette, 2015). The nurse must believe the patient and accept their pain report despite their coping mechanisms.

Lastly, another challenge encountered by patients enduring a sickle cell crisis is being labeled as a "drug addict." SCD is such a complex disease that unfortunately high doses of potent analgesics are needed to properly address the pain experienced by these individuals (Matthie & Jenerette, 2015). Since high doses of narcotics are needed to properly manage their pain, some patients request specific medications to be included in their plan of care. Being that

SCD is a chronic disease, individuals may become tolerant to specific medications or develop tolerance over time. Such specific requests in regards to narcotics enables the nurse to perceive the patient as a drug seeker or opioid dependent. However, nurses' lack of knowledge blinds them into understanding that the patient is a content expert in their own disease process and are involved in their own self care for pain management (Matthie & Jenerette, 2015). SCD education is crucial in the ED for nurses to understand that specific requests for pain medication do not correlate with opioid dependency. Nonetheless, further education on sickle cell crisis can help the nurse to understand the differences between addiction, pseudo-addiction, tolerance, and physical dependence. Proper educational intervention can help promote adequate patient care without judgement and personal beliefs.

Scope of the Problem

SCD affects individuals from all over the world. It is estimated the SCD affects approximately 100,000 people in the United States (Centers for Disease Control and Prevention [CDC], 2022). SCD occurs in about 1 out of 365 African Americans and in 1 out of 16,300 Hispanic Americans (CDC, 2022). The mortality rate of SCD has decreased due to the availability of vaccines and newborn screenings. However, management of pain during a sickle cell crisis remains a problem. The nature of SCD and VOC result in frequent ED visits and hospital admissions.

Lack of timely analgesic administration affects organs, increases mortality rates, and increases hospital costs and admission rates (Glassberg, 2017). SCD crisis attributes to high ED utilization rates. Approximately 197,000 to 230,000 patients visit the ED on an annual basis (Crego et al., 2021). Therefore, high ED utilization rates contribute to higher hospital costs. For example, in 2006 there was an estimate of $356 million spent on SCD ED visits (Crego et al.,

2021). Not to mention, the ED may not be the most ideal setting to treat a sickle cell crisis due to ED overcrowding, staff shortage, and lack of a consistent model of care (Wachnik et al., 2022).

Improved ED experience for patients undergoing a sickle cell crisis is crucial. There are several aspects of emergency care that cause frustration among patients with SCD. For example, educational gaps and biases from providers hinder communication and trust. Negative provider attitudes have been addressed in the past by utilizing educational videos describing SCD patient experiences and using a comprehensive assessment to determine factors attributing to high ED utilization rates (Glassberg, 2017). There is also a need to improve the time for the first analgesic dose during a sickle cell crisis in the ED. Individuals with SCD experience 25% longer wait times than individuals with other conditions (Glassberg, 2017). For example, the implementation of released protocols such as the National Heart, Lung, and Blood Institute (NHLBI) guidelines for SCD care provide a pain management plan for rapid pain administration (Yawn et al., 2014). However, due to the complexity of the ED such as overcrowding or lack of provider education, these guidelines become difficult to achieve. Another challenge present in the ED is the lack of timely assessments beyond the first analgesic dose. The NHLBI recommends repeated assessments of opioids every 15 to 30 minutes after medication administration until pain is controlled (Yawn et al., 2014). However, the mechanisms of the ED such as overcrowding, patient emergencies related to increased acuity, or increased patient to nurse ratios may limit the opportunity for frequent assessments. Strategies attempted in the past to overcome this barrier include individualized SCD dosing plans in which a SCD physician expert manages their home opioid doses. The home dosages tend to be higher, therefore, the ED doses would also be high, reducing the need for repeated doses (Glassberg, 2017). Management of SCD crisis in the ED is

challenging, and further strategies are needed to improve timely pain medication administration in order to improve patient outcomes and patient satisfaction.

Consequences of the Problem

Achieving adequate analgesic administration during a sickle cell crisis has proven to be challenging in the ED setting. Lack of medication administration can lead to serious health complications. VOC pain episodes are usually triggered by dehydration, stress, infection, weather changes, overexertion, or drug use. Severe pain episodes require immediate intervention by arriving to the ED and possible hospitalization. Intravenous fluids and analgesic medications are the usual interventions in the ED that relieve such pain crisis and prevent further complications (Bender & Carlberg, 2017).

However, timely pain medication administration remains an issue in many ED's. Due to the mechanics of the ED such as overcrowding, lack or resources, staff shortage, and provider bias, medication administration can be delayed. Therefore, health complications arise. For example, as patients with a VOC wait hours in the ED waiting to be assessed, they can develop splenic sequestration, worsening of fever/infection, acute chest syndrome, stroke, priapism, and negative impact on mental health (Bender & Carlberg, 2017). Splenic sequestration occurs when there is pooling of red blood cells in the spleen that obstruct blood flow. The patient may experience hemodynamic instability and possibly die. In these cases emergency blood transfusion is necessary. When an infection or fever is present, the patient may deteriorate further by experiencing long wait times. The consequences include the patient developing pneumonia or acute chest syndrome if not treated promptly by collecting a complete blood count (CBC), blood cultures, IV fluids, and corresponding antibiotics (Bender & Carlberg, 2017). Acute chest syndrome is evident when the patient develops cough, chest pain, fever, and respiratory

compromise. The patient requires rapid assessment, chest x ray, oxygen, analgesics, and antibiotics. Delay in treatment may cause intubation, mechanical ventilation support, blood transfusion, and death.

As VOC episodes occur, patients are prone to developing strokes. Neurologic assessment is crucial upon entering the ED. Emergent evaluation includes a CBC with a non-contrast computerized tomography exam. Delay in treatment can cause the patient to develop cerebral hemorrhage. Furthermore, priapism is another complication of a sickle cell crisis that warrants immediate intervention including analgesics, hydration, aspiration and irrigation by a urologist (Bender & Carlberg, 2017). Delay in care can cause ischemia, necrosis, and loss of function. SCD has a big impact on mental health. Stigmatizing social experiences can affect the individual by creating social isolation, anxiety, depression, and suicidal ideation (Bulgin et al., 2018). Stigmatization causes the individual to experience high stress levels during their stay in the ED due to being perceived as drug seekers when they arrive with a sickle cell crisis. Quality of life is greatly deteriorated when individuals have to miss work or school due to painful VOC episodes. The stress negatively impacts their overall well-being and mental state. Individuals with SCD VOC episodes have waited 25% longer than the general population in the ED waiting to be treated (Bulgin et al., 2018). Consequently, a delay in assessment and analgesic medication administration causes serious health complications, it also affects the hospital's financial costs. VOC episodes cause increased utilization of medical care as many patients present to the ED frequently and often require admission (Shah et al., 2019). A VOC can last approximately 10 days and the episodes may occur weekly or monthly. Individuals with SCD crisis experience high mortality rates as the number of hospitalized days increase per year (Matthie & Jenerette, 2015). Greater efforts must take place in order to decrease stigmatization of SCD and further

advocate for timely pain medication administration in order to prevent SCD health-related complications.

Knowledge Gaps

Although SCD is primarily recognized as a "painful" disease, there is so much more to understand about the complexity of SCD and its VOC episodes. There is a knowledge gap present among nurses and providers in regards to SCD pathophysiology, assessment, management, complications, and treatment (Glassberg, 2017). This knowledge gap affects the delivery of healthcare as providers lack understanding and compassion toward the urgency of a VOC episode. The deficit in understanding a SCD crisis leads to a delay in assessment and timely pain medication administration.

Due to the nature of the ED, there is high turnover among providers and nurses. As new providers enter the ED, they may not have enough expertise about the treatment of SCD. There is not enough educational modules present to teach providers about the treatment of SCD crisis and the complications that arise through the sickling process. Nurses are not aware that individuals with SCD are usually on pain medication regimen such as oxycodone, morphine, and hydromorphone as well as nonopioid analgesics such as ibuprofen and Tylenol (Matthie & Jenerette, 2015). Furthermore, these individuals usually take hydroxyurea as a prophylactic measure to help reduce levels of Hgb S, a component responsible for the sickling process. These measures usually help with coping their day to day pain. However, they do not completely eliminate the pain present during a VOC. Patients are educated to avoid extreme temperatures, hydrate, avoid alcohol and drugs, rest, and have a balanced diet. Unfortunately, when individuals experience a SCD VOC episode, they arrive at the ED to seek care when their self-care strategies

are no longer effective. The usual ED management of a VOC episode is IV hydration analgesics, and oxygen (Matthie & Jenerette, 2015).

The knowledge gap is evident when there is a delay in treatment. A delay in the administration of analgesia can cause SCD health complications such as acute chest syndrome, stroke, pulmonary embolism, priapism, splenic sequestration, and sepsis (Glassberg, 2017). Consequently, due to the lack of timely pain medication administration and SCD management, hospital admissions increase as well as SCD related adverse events.

Furthermore, not many individuals understand how patients enduring SCD receive stigma and disbelief which is impacted by racism and health equity disparities (Bulgin et al., 2018). When patients arrive to the ED requesting pain medications for their VOC episode, they face stigma related to disease status, socioeconomic status, race, and disbelief in pain level. There is lack of funding necessary to improve access to care and treatment alternatives for individuals living with SCD. On the other hand, Cystic Fibrosis, a disease that affects less individuals than SCD and is primarily seen in the White population has received more funding (Bulgin et al., 2018). The knowledge needed to resolve this problem is education for nurses, as their role also entails advocating for patient needs. Nurses need to comprehend the importance of timely analgesic administration and decrease their stigma and disbelief towards patients enduring a VOC episode. It is crucial for nurses to have a comprehensive knowledge base and ability to think critically when providing care to patients with sickle cell crisis.

Proposed Solution

A proposed solution to improve nurses' knowledge about SCD VOC episodes would be an educational intervention of a sickle cell crisis pain algorithm PowerPoint presentation along with SCD pathophysiology, assessment, management, treatment, and complications. Creating an

evidence based algorithm for acute pain management in the ED has the potential to reduce confusion and facilitate offering consistent care among this patient population. A study by Kim et al. (2017) used the NHLBI guideline for SCD acute pain care with the goal to assess, evaluate, and administer analgesics within 30 minutes of triage. This study was performed in an urgent care center which utilized the standard of care SCD pain algorithm which included triage order sets that included IV insertion, collection of labs, and initiation of IV fluids. The algorithm explained the interventions for low, moderate, and severe pain levels. Assessments were performed at 30, 60, and 90 minutes. If pain control would not be achieved during the third re-assessment, the patient would be admitted to inpatient service. The study achieved a decrease in analgesic administration, increased patient satisfaction, and a decrease in mean time to disposition from triage by utilizing a pain algorithm in the ED.

Another study Tanabe et al. (2017) also utilized the existing NHLBI guideline for SCD acute pain care to help with rapid and aggressive treatment of SCD VOC episodes. The study modified and implemented changes to their existing protocols that were rarely adhered to at two Level 1 Trauma EDs. Ultimately, the study was able to improve the time of arrival to first analgesic administration by following a protocol.

Lastly, another study by Duroseau et al. (2021) implemented an algorithm order set for acute pain. This order set enabled nurses to triage adequately and classify the patient as a level 2, assess vital signs at initial encounter, perform targeted evaluation and order labs, initiate analgesic therapy, perform re-assessments, and discharge or admit the patient. The goal of the study was to implement an evidence based algorithm in order to educate nurses and provide timely analgesic administration.

Chapter II

Literature Review

Sickle cell disease (SCD) is a common genetic blood disorder prevalent among the African American population worldwide (Crego et al., 2021). SCD causes red blood cells to turn into a sickle shape in which they start to adhere to the vessel walls, causing blockage of blood flow and decreased circulation throughout the body (Matthie & Jenerette, 2015). The sickling process is commonly referred to as vaso-occlusive crises (VOC). These crises are described as painful episodes triggered by dehydration, weather changes, fatigue, overexertion with pain onset, and long periods of uncontrolled pain management (Matthie & Jenerette, 2015).

With decreased circulation of blood flow, organ damage and health related complications can occur. Such complications include: stroke, acute chest syndrome, priapism, pulmonary embolism, and splenic sequestration (Crego et al., 2021). VOC episodes can occur throughout the body but primarily in bony areas where bone marrow is present such as lower back and extremities (Glassberg, 2017). These VOC episodes may last from a few days to weeks, such intense painful episodes cause individuals to seek emergency care.

SCD is a complex and multifactorial blood disorder. This disease is responsible for increased Emergency Department (ED) visits. Approximately 200,000 patients with sickle cell crisis present annually to the ED (Crego et al., 2021; Wachnik et al., 2022). Such high ED utilization could signify lack of proper discharge planning and proper follow up care. Although ED's are complex systems, they have limited resources to meet the demands of this patient population. Challenges within the ED include provider bias, nurses' lack of disease knowledge, and lack of treatment protocols. Such challenges serve as barriers to provide optimal care and increase patient frustration (Crego et al., 2021; Glassberg, 2017).

Lack of nurses knowledge about SCD has detrimental effects. Nurses need to serve as better patient advocates for this patient population. As patients enter the ED requesting specific pain medications for their VOC, patients are approached with stigma, disbelief, and labeled as drug seekers (Crego et al., 2021). Timely pain medication administration remains an issue in many ED's. Due to the mechanics of the ED such as overcrowding, lack or resources, staff shortage, and provider bias, medication administration can be delayed. Such delay in administering analgesia can cause health complications and increase patient frustration as they wait hours in the ED to be assessed and treated. A delay in treatment can cause splenic sequestration, worsening of fever/infection, acute chest syndrome, stroke, priapism, and negative impact on mental health (Bender & Carlberg, 2017).

The challenges in managing pain for a patient with a SCD VOC remains an issue that warrants immediate intervention. Delays in pain medication administration often are caused by the provider's disbelief due to lack of objective signs from the patient (Matthie & Jenerette, 2015). Every individual copes differently in response to pain. Some individuals may have a great support system and enables them to have increased resiliency. Therefore, nurses must not rely on what their personal expectations of pain look like in their assessments. Also, there is lack of knowledge in regards to tolerance, physical dependence, and addiction. Patient care is affected when the nurse depends on stereotypes and personal beliefs.

A proposed solution that can help decrease the educational gap among nurses is the development of an evidence based pain algorithm along with SCD education to help decrease the delay of pain medication administration. The implementation of an evidence based algorithm for acute pain management in the ED has the potential to reduce confusion and facilitate offering consistent care among this patient population. By creating a evidence based algorithm, nurses

will be able to understand how detrimental a SCD VOC can be and will be prompted to advocate for timely pain medication administration and timely assessment in order to prevent threatening complications.

Literature Search Process

A search was performed using the Cumulative Index to Nursing and Allied Health Literature (CINAHL), Medline, PubMed, Google Scholar, and ClinicalKey. These specific databases were chosen as they have a strong foundation of nursing content and evidenced based information related to patient care. Databases were searched using the timeline of 2013-2023 for informational articles and studies relating to SCD pathophysiology and complications, VOC, and interventions increasing nurses' knowledge and protocols for timely pain medication administration. Key search terms included: sickle cell disease, sickle cell crisis, pain management, emergency department sickle cell pain protocol, nurses' sickle cell education, sickle cell pain management.

Inclusion and Exclusion Criteria

Inclusion and Exclusion Criteria were taken into consideration when a literature review was performed. The inclusion criteria for the search included scholarly peer-reviewed and evidenced based articles in the English language from 2013. The exclusion criteria included editorial reviews, articles in another language other than English, and articles dating earlier than 2013.

Characteristics of the Included Studies

A study by Kim et al. 2017 was conducted with the purpose of improving timely pain management for patients with sickle cell crisis by using evidence based guidelines. The study took place in an urban urgent care center that included a sample of 58 patients in two separate

groups measuring initial time of pain medication administration and length of stay to disposition. The sample consisted of adults 18 years and older presenting with VOC episode. A prospective pre-/post evaluation design was used for comparison of post implementation outcomes. A retrospective review of the electronic medical record was also conducted for comparison after the intervention. The results determined that the implementation of a evidence based algorithm significantly decreased the mean time of first analgesic administration, increased patient satisfaction, and decreased mean length of stay. Strengths included significant improvements in pain management. Limitations included small sample size and a difference in sustainability due to this urgent care being different from the other EDs where patient flow may differ. According to the evidence level and quality guide provided by Dearholt and Dang (2017), this article is considered a Level II quasi experimental study.

A study by Hanik et al. 2014 was conducted with the goal of improving nurses' education toward SCD and the importance of timely interventions through a nurse led educational module. The quasi experimental study was conducted in a hematology/oncology unit in the Southeastern part of the United States. The sample size included 39 healthcare personnel. A PowerPoint Presentation about SCD was offered at various occasions to fit the schedules of the individuals participating in the study. Individuals completed a pre and posttest using the Medical Condition Regard Scale (MCRS) and an evaluation form to assess if knowledge was extended. The results revealed that although there was no statistically significant change, 86.7% of participants discussed a change in attitude toward patients with SCD, which can improve their overall approach to timely assessment, evaluation, and analgesia administration. The strength included a change in provider attitude. Limitations included a small sample size and unknown idea if the presentation will sustain a prolonged change in attitude given that this was a one-time

presentation. According to the evidence level and quality guide provided by Dearholt and Dang (2017), this article is considered a Level II quasi experimental study.

A study by Tanabe et al. 2018 was conducted to assess a knowledge gap by utilizing two EDs that implemented a weight based versus patient specific treatment protocol developed by the National Heart, Lung, and Blood Institute (NHLBI) guidelines for VOC episodes. The goal was to assess which protocol would achieve a greater reduction in pain. A two-site prospective randomized controlled trial was conducted with 52 patients randomized to patient specific or weight based protocol. The results indicated that the utilization of patient specific guidelines achieved a greater reduction in pain and hospital admissions compared to the weight based protocol. The strength of the study included adherence to the protocols by the ED physicians. Limitations included a small sample size which can limit generalizability. According to the evidence level and quality guide provided by Dearholt and Dang (2017), this article is considered a Level I randomized controlled trial study.

A quality improvement study by Wachnik et al. 2022 was conducted with the purpose of improving care and analgesia management among patients presenting with sickle cell crisis to the ED. The goal consisted of customizing an ED order set to address care concerns. A multidisciplinary team that consisted of medical providers collaborated to create an order set for SCD crisis pain. The order set consisted of a three step specific dosing strategy for non-opioid and opioid strategies to manage pain. Additionally, the order set included labs, tests/imaging, vital signs monitoring, antiemetics, IV fluids, and admission criteria. The order sets were integrated into the electronic health record for provider use. The results of the QI study included an overall 67% decrease in hospital admissions and time to first non-opioid medication was decreased by 71 minutes. The overall decrease in hospital admissions and length of stay resulted

in a decrease of $792 per hospital admission. The strengths of the QI study included improved patient outcomes and financial savings. Limitations included the COVID-19 pandemic that changed clinical practices and affected health care access. According to the evidence level and quality guide provided by Dearholt and Dang (2017), this article is considered a Level V. Although the evidence level is V, the article is classified as high quality with clear objectives and definitive conclusions.

Duroseau et al. 2021 used a modified Delphi panel method that systematically and quantitively combined multidisciplinary panelist expert opinion on how to best manage SCD pain in the ED. The goal was to develop an order set to help standardize care and provide optimal outcomes in the ED. The multidisciplinary team consisted of eight medical doctors and one nurse practitioner practicing in New York City with approximately 11 years of Emergency Medicine experience specialized in caring for patients with SCD. The panelists developed and reviewed the National Heart, Lung, and Blood Institute guidelines to create an order set on how to best treat SCD in the ED. An extensive literature review was performed and a list of items were developed to be included in the order set. The final order set included a triage protocol, an initial medical encounter, a targeted evaluation with collection of labs, initial pain management with the goal of less than 30 minutes of administration, pain re-assessment, preventative care, and discharge from ED.

The order set was based on existing evidence with median ratings >7 in which all panelists strongly agreed on. Strengths include the implementation of an order set which can help standardize care to improve health outcomes and patient satisfaction. The study had a limitation which included that the order set was developed by NYC clinicians which may not be generalizable across the United States. Also, implementation of the order set has yet to be

demonstrated if it improves outcomes. According to the evidence level and quality guide provided by Dearholt and Dang (2017), this article is considered a Level IV. Although the evidence level is IV, the article is classified as high quality as it consisted of an expert panel that analyzed scientific evidence.

Puri Singh et al. 2016 conducted a study that consisted of a prospective cohort measuring pre-intervention and post-intervention providers' attitudes towards SCD patients. The purpose of this study was to assess if an educational video used as an intervention had the potential to improve providers' attitudes towards SCD patients, ultimately improving the quality of care. The study took place at a large, urban inner city ED. The sample included a total of 96 health care professionals: physicians, residents, nurse practitioners, physician assistants, and nurses. An eight minute video was created as the intervention which reflected challenges seen by the ED provider in caring for the SCD patient and the challenges perceived by the patient themselves. The video provided accurate experiences and characteristics of SCD patients. The link to the video was accessed via email. The participants were asked to complete a pre-test of their personal attitudes towards SCD patients. A week later participants were asked to view the video and complete a post-test. A re-assessment was provided 3 months later using the same post-test. The results were analyzed using simple and multivariable generalized equation analyses. The results from the pre/post-test reflected a decrease in negative scoring, an increase in improvement of positive attitudes, and a decrease in red flag behaviors. The strength of the study includes evidence confirming that an educational video has the potential to improve ED providers' attitudes towards SCD patients and help decrease barriers to pain management. Limitations include the intervention video included providers and patients from the same institution in which the study was conducted. Also, there was no control group for comparison

and there might have been selection bias present. According to the evidence level and quality guide provided by Dearholt and Dang (2017), this article is considered a Level II.

A cross-sectional, descriptive, comparative design study was conducted by Jenerette et al. 2015 to determine if there are significant differences in attitudes toward SCD patients in ED/ICU units versus medical-surgical units. The sample included 77 nurses, 36 from the ED/ICU and 41 from medical surgical units from two hospitals. The nurses utilized a the Qualtrics online questionnaire about nurse perceptions of patients with SCD. The attitudes were measured using General Perceptions about Sickle Cell Patients Scale measuring negative attitudes, positive attitudes, concern raising behaviors, and red flag behaviors. The nurses received the anonymous link to the survey via email from their nurse managers. The results did not reflect a statistically significant difference in attitudes between both work sites but nurses in the ED/ICU were more likely to show negative attitudes and concern/red flag behaviors towards patients with SCD. In conclusion, although differences in units may not matter much, there is stigma present among nurses that can influence the care received by SCD patients. A strength included it was the first study to assess nurses' attitudes based on different work units. Another strength of the study is that it highlights the importance of reinforcing education among nurses to enhance the quality of care towards SCD patients. A limitation was that the survey and comments were anonymous which did not provide an opportunity for follow-up to clarify comments. Another limitation included a small sample size consisting of mainly white women, which limits diversity. According to the evidence level and quality guide provided by Dearholt and Dang (2017), this article is considered a Level II.

A prospective, descriptive survey design by Jenerette et al. 2016 was conducted to compare health practitioners knowledge and attitudes towards SCD before, after, and two months

post attending a two-day SCD educational conference. The study sample consisted of nurses, nurse practitioners, pharmacists, social workers, and healthcare educators. The setting took place near two medical centers in the southwestern part of the United States. The healthcare providers attended a two-day conference that consisted of adults and children living with SCD as well as assessment, treatment of pain, and healthcare complications. A Qualtrics survey online survey was emailed to the participants before the conference, after the conference, and two months post the conference. The survey consisted of demographics, attitudes and knowledge questions. Attitude was assessed using the General Perceptions About Sickle Cell Patients Scale which included 4 independent subscales: positive attitudes, negative attitudes, concern raising behaviors and red flag behaviors. Knowledge was assessed using a 20 item survey that consisted of questions about pain assessment, treatment, and definition of terms. The results of the survey reflected an overall improvement in knowledge. However, some items were not retained at the two month post assessment. In regards to the attitude subscales, negative attitudes were lower across the three assessments. No significant changes were found in the remaining subscales: positive attitudes, concern raising behaviors, and red flag behaviors. A strength of the study included the content provided in the conference which allowed the participants to engage in open question and answers with individuals living with SCD. A limitation included the knowledge and attitudes questionnaires being anonymous, which limited the ability to track participants responses. Also, the sample size was small especially at the two-month post-conference assessment. According to the evidence level and quality guide provided by Dearholt and Dang (2017), this article is considered a Level III.

Synthesis of the Literature

The eight studies included in the literature review will be grouped in the following subsections based on common traits.

Pain Algorithm/Protocol

The study conducted by Kim et al. (2017) focused on improving timely pain management for patients with sickle cell crisis using evidence based guidelines. Additionally, the study by Tanabe et al. (2018) utilized two protocols, weight-based versus patient-specific opioid strategies to assess which protocol was more effective towards pain management. Both studies utilized pain algorithms/protocols to assess the effectiveness towards achieving pain control during a SCD crisis. The studies concluded that following a protocol allows for consistency and routinizing a standard of care by improving the quality of care for patients presenting with VOC.

SCD Educational Intervention

Hanik et al. (2014) developed a nurse led educational PowerPoint module that with the potential of changing provider's attitudes towards patients with SCD . Individuals completed a pre and posttest using the Medical Condition Regard Scale (MCRS) and an evaluation form to assess if there was a change in attitude. Similarly, Puri Singh et al. (2016) utilized an educational SCD video to assess if there would be an improvement in providers attitudes towards SCD patients. Both studies achieved a positive response. Providers attitudes towards SCD patients changed after education was provided.

SCD ED Order Sets

The study conducted by Wachnik et al. (2022) had the goal of improving analgesia management and reducing hospital admissions by using a multimodal ED order set. The multimodal ED set allowed for a decrease in hospital admissions, a decrease in time to first non-

opioid medication administration, and a decrease in hospital costs for admitted patients. Comparably, Duroseau et al. (2021) utilized an order set to help standardize care and improve outcomes in the ER for patients with VOC. A team of multidisciplinary panelists developed an order set that contained evaluation, assessment, labs, and pain control which helped improve health care and standardize care among SCD patients. Both studies reflect how an order set allows for consistent follow-up and continuity of care to help achieve pain control during a SCD crisis.

Healthcare Provider Attitudes

A study by Jenerette et al. (2015) assessed if there was a difference in nurses' attitudes towards SCD patients in a medical-surgical unit versus ED/ICU units. The study reflected how ED/ICU nurses show more negative attitudes towards SCD patients. Similarly, a study by Jenerette et al. (2016) compared healthcare providers attitudes and knowledge after attending a two-day SCD conference. The study revealed an overall increase in knowledge and a decrease in negative attitudes. Both studies reflect how negative attitudes exist in the ER and how providing education has the potential to change attitudes in order to provide better healthcare to patients enduring a SCD crisis.

Chapter III

Purpose/PICO Question/SMART Objectives/SWOT Analysis

The purpose of this DNP Project is to create, implement, and evaluate a Quality Improvement Project in order to improve nurses' knowledge about timely pain management for patients who arrive with sickle cell crisis to the ED. Undermedication and lack of timely pain medication administration has been a frequent issue prevalent in the ED setting for patients who arrive with sickle cell crisis (Puri Singh et al., 2016). The quality of care the patient receives can

be negatively affected due to provider bias, skepticism, lack of knowledge about the SCD process, and personal opinions about opioid tolerance. The goal of this quality improvement project is to increases nurses' knowledge about SCD and the importance of timely pain management, while promoting patient advocacy in order to provide a better health outcome and experience in the ED setting.

PICO Question

Can an educational intervention improve nurses' knowledge about timely sickle cell crisis pain management in the ED at a large county hospital in South Florida?

- **Population:** Registered Nurses at a large county hospital in South Florida
- **Intervention:** educational intervention of a sickle cell crisis pain algorithm and SCD pathophysiology, assessment, management, treatment, and complications via a PowerPoint presentation
- **Comparison:** none
- **Outcome:** improved nurses' knowledge regarding timely pain management for patients arriving with sickle cell crisis to the ED and increase patient advocacy

SMART Objectives

The main objective of this doctoral project is to improve nurses' knowledge concerning timely pain medication administration among patients arriving with sickle cell crisis to the ED. To support the main objective, the SMART criteria was utilized in setting goals for this DNP project. This mnemonic acronym helps delineate a set of objectives that are specific (S), measurable (M), achievable (A), relevant (R) , and time-bound (T) to successfully guide projects from planning to completion (Lewis, 2007).

- Educate nurses in the ED about timely pain medication administration during a sickle cell crisis within three months of starting the quality improvement project

  This goal is specific in regards to educating nurses about timely pain management; it is measurable using a pre and post quiz using a PowerPoint presentation and an acute pain algorithm; the implementation of the project is attainable as a presentation and quizzes will be provided to assess knowledge learned; the goal is relevant as it has potential to improve health outcomes for patients with sickle cell crisis; and is time bound with timelines and deadlines for successful completion.
- Educate nurses in the ED about the pathophysiology, assessment, management, treatment, and complications of a sickle cell crisis within three months of starting the quality improvement project; this goal is specific in regards to educating nurses about complications of sickle cell crisis; it is measurable using a pre and post quiz using a PowerPoint presentation and an acute pain algorithm; the implementation of the project is attainable as a presentation and quizzes will be provided to assess knowledge learned; the goal is relevant as it has potential to improve health outcomes for patients with sickle cell crisis, and is time bound with timelines and deadlines for successful completion.
- Implement an acute pain sickle cell crisis algorithm for nurses to utilize during a sickle cell crisis in the ED within three months of starting the quality improvement project

  This goal is specific in regards to educating nurses about an acute pain algorithm for sickle cell crisis; it is measurable using a pre and post quiz using a PowerPoint presentation; the implementation of the project is attainable as a presentation and quizzes will be provided to assess knowledge learned; the goal is relevant as it has potential to

improve health outcomes for patients with sickle cell crisis; and is time bound with timelines and deadlines for successful completion.

SWOT Analysis

To ensure the appropriateness and feasibility of this quality improvement project, a SWOT analysis was conducted to evaluate the pertinent strengths, weaknesses, opportunities, and threats at the target health system

Strengths

The main organizational strength of this health system is that it is the nation's largest public hospital and has the history of the world's greatest medical breakthroughs (Jackson Health System, 2023). This institution has an ED specialized in strokes, STEMI, and cardiac arrests. Not to mention, it accommodates to offering medical emergency services to Miami International airport, cruise ship terminals, and medivac transports from the Caribbean, Central, and South America (Miamiemresidency, 2023). Not to mention, this facility has strong academic affiliations that encourage students to participate and be a part of this major teaching facility. This DNP Quality Improvement Project is received with great support and encouragement with the hopes of improving health outcomes for patients arriving with sickle cell disease.

Weaknesses

One important weakness present in this healthcare organization is the volume of patients seen per day in the ED. The ED at this facility has a high census of patients checking in to the ED on a regular basis. Despite the amount of physicians and advanced practice providers it can be a challenge to assess and evaluate a patient in a timely manner. This is a disadvantage to patients who check in to the ED with a sickle cell crisis. There is a delay in assessment and pain

medication administration. As a consequence, patients may experience organ damage, increased emotional distress, tissue ischemia, and increased inflammation (Lee, 2019).

Opportunities

This Quality Improvement project offers improved health outcomes for the institution. Providing education to nurses caring for patients with sickle cell crisis can help address the knowledge gap that exists in this target population. Education about SCD, pathophysiology, assessment, complications, treatment, and management can help reduce time to first dose of medication by helping providers understand the urgency and prompt them to rapid evaluation and treatment (Glassberg, 2017). The addition of a sickle cell pain protocol algorithm can offer the institution consistency and promote a standard of care guideline to implement for patients who arrives with a sickle cell crisis. Overall, the implementation of this project can improve ED efficiency, benefit patients, and help reduce health disparities present in the ED.

Threats

A potential threat of the implementation of a sickle cell pain protocol algorithm is failure to achieve pain control due to the reduction of repeating opioid doses. The sickle cell pain protocol algorithm can improve the metrics of guideline adherence but has the possibility to fail since it reduces the repetition of opioid boluses. Patients with SCD are used to high doses of opioids for pain management. Thus, a reduction in IV opioid boluses may prove to be a challenge in an acute care setting.

Chapter IV

Definition of Terms

Important terms related to the quality improvement project are defined as follows:

Sickle Cell Disease (SCD) : is a group of inherited blood disorders. In SCD, the hemoglobin is abnormal and causes the red blood cells to become hard, sticky, and develop a C shape called "sickle" (CDC, 2022b).

Vaso-occlusive crisis (VOC): is the hallmark acute complication of sickle cell disease, the events are associated with ischemia/reperfusion damage to tissues that lead to pain and acute or chronic injury to organ systems (Bender & Carlberg, 2017).

Chapter V

Theoretical Framework/Conceptual Underpinning

Nursing is not only a practice based profession, it involves theories to help guide evidence based practices. Theoretical frameworks are essential to the nursing profession as they help nurses clarify their values and beliefs about human health processes (Younas & Quennell, 2019). Nursing theories allow nurses to reflect, reason, and critically think to better comprehend certain behaviors patients may display. It allows for nurses to plan care accordingly depending on the patient's behavior or response to nursing interventions in order to improve health outcomes. The theory that is applicable to this quality improvement project is Lewin's Theory of Planned Change.

Theory Overview

Kurt Lewin is known as the father of social psychology (Nursing Theory, 2023). He is the pioneer of force field analysis (FFA), in which he studied how factors or forces influence a situation (Shirey, 2013). Lewin believed that if one could identify forces that drive behaviors and enable humans or groups to act the way they do, then such forces can be diminished to bring about positive change (Shirey, 2013). This framework led to his development of Lewin's Theory of Planned Change.

Lewin's Theory of Planned Change is a three step process consisting of unfreezing, moving, and refreezing. The first stage of unfreezing involves getting ready for a change. This stage usually involves a nurse leader who identifies a problem and recognizes the urgency and need for change (Shirey, 2013). The nurse leader then increases awareness by illustrating the discrepancies and sharing the information with other stakeholders present in order to initiate change. This phase is usually recognized as a challenging step as it might be difficult for others to recognize the urgency and need for change in order to address the issue identified (Burnes, 2020).

The second stage of Lewin's theory is called moving. The moving phase is the stage of transition in which a reaction for change is made that involves unfreezing to a new way of being (Shirey, 2013). The individual or group realizes the need for change and create a plan of action to implement a proposed change. This phase is also challenging for the group or individual experiencing the change as they experience fear and uncertainty to try something new. The moving phase enables the overcoming of fear and welcomes new behaviors for an improved reality (Shirey, 2013).

The third stage of Lewin's theory is called refreezing. Refreezing involves the permanence of an established change (Burnes, 2020). This phase requires the change to be embedded in the system such as cultures, policies, and practices. An essential component of this stage involves the nurse leader to assess obstacles that may hinder the permanence of the new behavior. During this stage, it is crucial for members to institutionalize change in order to sustain a new level of performance over time (Shirey, 2013).

Theory/Clinical Fit

Lewin's Theory of Planned Change is most ideal for this quality improvement project. SCD is a very complex and debilitating disease. Usually, when individuals experience a sickle cell crisis episode, they have no choice other than to visit the ED. The ED can be a challenging place to meet the needs of all patients experiencing medical emergencies due to the high volume of patients and long wait times. There exists educational gaps and biases among nurses caring for patients with SCD crisis. As a result, this issue created barriers to communication and trust which harm the patient-provider experience. A lack of standardized care treatment protocols leads to confusion and variability in the quality of care a patient receives, which causes frustration for both the patient and the nurse. Lewin's Theory of Planned Change can best fit this project.

The first stage of Lewin's theory is unfreezing. In this stage, the nurse is able to reflect and clarify the values and beliefs they hold about patients experiencing a sickle cell pain crisis. The nurse is able to acknowledge the need for change in the way we treat patients with SCD crisis. During this stage the nurse can reflect about his/her beliefs about tolerance and addiction to opioids and recognize the stigma and disbelief present in many of the providers. By recognizing knowledge gaps and stigma, the nurse is able to understand that a behavior change can lead to a more favorable health outcome for the patient enduring a sickle cell crisis.

The second stage of Lewin's theory is called moving. During this stage, a plan of action is created and there is collaboration between health care professionals for a change to be implemented. During this stage education can be provided to nurses concerning SCD pathophysiology, assessment, symptoms, treatment, and complications. Education can also lead to implementing a sickle cell pain protocol which can help establish adherence and consistency in the way we treat patients arriving with sickle cell crisis to the ED. The moving phase ensures

that nurses make the necessary changes to foster a new behavior that leads to improved health outcomes.

The last stage of Lewin's theory is refreezing. This stage involves the permanence and sustainability of the new adopted behavior. During this stage, the change becomes stabilized by the nurses. The nurse will accept a new approach towards this patient population and will eliminate the stigma, disbelief, and stereotypes. The education provided will help the nurse advocate for this patient population and comprehend the urgency of timely pain relief. This stage is often difficult as obstacles can prevent the sustainability of a new adopted approach or behavior.

Theory Evaluation

Lewin's Theory of Planned Change adequately addresses the topic it claims to address. For example, the theory is a linear process of unfreezing, moving, and refreezing. It is seen as a very simple theory one can utilize to make a change for a better health outcome. There are no gaps or holes needed to be filled in order to refine the theory. The theory accounts for the matter under consideration as it emphasizes the need for SCD education for nurses in order to provide the best care possible when patients arrive with sickle cell crisis.

The theory clearly states the main components. Lewin's Theory of Planned Change is a linear process that describes how behavior is a dynamic process of forces working in opposite directions. The driving forces enable the person to make a change and restraining forces can cause a shift in equilibrium to oppose the change (Nursing Theory, 2023). This theory is easily understood by the reader as it describes the process of realization that change is needed, an action plan is implemented, and the change is then sustained to establish a new habit leading to positive outcomes.

The description of the theory addresses the three main key concepts. The key concepts represent the three stages of the theory which include: unfreezing, moving, and refreezing. The theory is not that broad to include interpretations, principles, and methods. The three stages are concise and describe a linear process of human psychology and behavior (Burnes, 2020).

Lewin's Theory of Planned Change follows a logical development. Kurt Lewin's area of expertise focused on group dynamics and organizational development (Shirey, 2013). He developed the FFA which served as a framework that examined factors or forces that influence a situation. The framework specifies that such forces can be either helping or restraining towards a goal (Shirey, 2013). Therefore, from the development of the FFA, Lewin's Theory of Planned Change was formed. Lewin believed that if one was able to identify such restraining or helping forces, then such forces can be used to change a specific behavior to bring about a positive change in an individual or at an organizational level.

Lewin's Theory of Planned Change is not considered a middle range theory. A middle range theory is considered less abstract but has several concepts and propositions (Peterson, & Bredow, 2017). Lewin's theory is a linear process of change that occurs when one recognizes the driving or restraining forces that lead to organizational change.

Chapter VI

Methodology

This section describes the DNP project plan. The goals and objectives, setting and design, sample, procedure, variables and instrumentation, theoretical framework, and the project timeline are discussed within this section.

Primary DNP Project Goal

The purpose of this DNP Project is to create, implement, and evaluate a Quality Improvement Project in order to improve nurses' knowledge about timely pain management for patients who arrive with sickle cell crisis to the ED by utilizing an evidence based pain algorithm. The overall goal to accomplish is for nurses' to become more knowledgeable with the prominent issues associated with Sickle Cell Disease (SCD). As we address the knowledge deficit, there will be improved health outcomes for individuals suffering from SCD. The implementation of an evidence based pain algorithm will help reduce confusion and facilitate offering consistent care among this patient population.

Jackson Memorial Hospital (JMH) is an accredited, non-profit, tertiary care hospital; it is the major teaching facility for the University of Miami (Jackson Health System, 2023). JMH is a hospital with specialized care as it is home to a Level 1 Ryder Trauma Center specialized in emergency care and Miami Burn Center as it is the only center in South Florida verified by the American Burn Association (Jackson Health System, 2023). JMH is also known for the largest transplant program for adults and children, the most comprehensive heart program, and a multidisciplinary neuroscience team with diagnostic capabilities (Jackson Health System, 2023). JMH is a referral and magnet center for research that houses approximately more than 1,550 beds, employs roughly over 1,000 full time employees, and more than 600 doctors in medical practice (Jackson Health System, 2023). JMH's mission is to provide optimal healthcare to the residents of the Miami-Dade community. The vision is to be considered a national and international recognized medical center. JMH values are to provide excellent care by demonstrating compassion, accountability, respect, and expertise (Jackson Health System, 2021). Being that JMH is a non-profit medical system, this medical center ensures that all residents are able to obtain medical care regardless of their ability to pay. This practice site is ideal for my

DNP project. JMH provides medical care to all residents including those individuals without insurance. Unfortunately, a lot of patients presenting with sickle cell crisis to the ER do not have insurance but still receive care. JMH is located downtown, and there are a lot of homeless and African American patients with SCD that present to the ER. SCD is highly prevalent among the Black population and racial disparities exist. Blacks are more likely to have lower incomes compared to Whites, which can be a barrier drug affordability and access to medical care during a VOC episode (Pokhrel et al., 2023).

At JMH there is a knowledge deficit among nurses in regards to the pathophysiology, assessment, complications, treatment, and pain control of SCD. Patients presenting to the ED with a SCD VOC crisis experience long wait times, a delay in pain control, and experience provider bias. Currently, at JMH there is an existing physician ED order set that enables to the provider to select which labs to collect, IV solutions for hydration, x rays, and pain medication according to pain level. However, there is not an existing ED SCD pain algorithm that is followed in triage upon the patient checking in the ED. The literature suggests that the implementation of an SCD pain algorithm initiated at triage improves pain management, hospital revenue, and compliance with standard practice patterns in order to improve health outcomes of SCD (Kim et al., 2017)

My project sponsor is John A. Esin, MD. The role that the sponsor will play in the development of my project includes sharing their ED expertise in the clinical area concerning the management and treatment of sickle cell anemia crisis. Dr. Esin has 20 years of Emergency Medicine experience including patient management, and supervision of mid-level practitioner, residents, and students. Dr. Esin has been the medical director of various emergency rooms in which he has been able to plan and participate in the development of hospital programs,

protocols, procedures, and policies. Several key stakeholders also play an important role in the development of this project. Alphonso Williams, the ED nurse educator, is able to share guidance about teaching, patient interaction, decision-making, and health assessment concerning sickle cell crisis. Additionally, Dr. Dana Sherman, Clinical Assistant Professor, is able to provide me with academic support in laying the groundwork for this doctoral project.

The sample for this doctoral project will include 25 Registered Nurses (RNs) with diverse cultural backgrounds ranging from 20-60 years of age in the emergency room of a large county hospital in South Florida. This population of RNs is essential to this doctoral project because nurses serve as patient advocates as they spend most of the clinical time with the patient and can discuss their health concerns to the medical doctor in charge of their care. Unfortunately, nurses perceive patients with sickle cell disease as drug addicts and generally display disbelief when patients express severe pain. Nurses are an essential aspect to this doctoral project as they need to be educated about SCD and integrate the knowledge obtained into practice in order to provide appropriate and timely care for patients living with SCD. Educating nurses on SCD and timely pain management can help nurses understand the complexity of SCD and helps highlight prominent issues associated with SCD in order to improve clinical practice.

Setting and Participants

The proposed site for the quality improvement project is Jackson Memorial Hospital located in Miami, Florida. This facility is considered one of the nation's largest hospitals and is recognized for the world's greatest medical breakthroughs in South Florida (Jackson Health System, 2023). This institution has various centers of excellence which include: a Miami Transplant Institute, Ryder Trauma Center, Miami Burn Center, Jackson Heart Institute, and a neuroscience team at the Neurology and Neurosurgery center (Jackson Health System, 2023).

The participants for the quality improvement project will include 25 Registered Nurses (RNs) with diverse cultural backgrounds ranging from 20-60 years of age working in the ED. The participants will also include novice nurses with less than 1 year of ED experience. This sample size and diversity is relevant as it can provide findings that can be generalized. Not to mention, it can provide an accurate assessment if knowledge was improved across various cultures, ages, and years of ED experience.

Procedures

The quality improvement project is a pre-/post intervention design. This particular design is ideal for nurses working in the ED. Nurses lack SCD knowledge and this serves as an obstacle to understanding and managing pain during a sickle cell crisis (Crego et al., 2021). Since the ED is such a complex system, they are limited in resources or capabilities to treat some medical emergencies (Glassberg, 2017). Therefore, some ED's lack institutional treatment protocols, such as one designed for sickle cell crisis which can result in patient and provider frustration due to the inability to treat the pain during a VOC (Glassberg, 2017). Nurses in the ED will be provided with a pre-quiz to assess knowledge about SCD pathophysiology, complications, treatment, and provider attitude. Education will be provided through a SCD pain algorithm PowerPoint presentation and a post quiz will then be administered to assess if knowledge about SCD improved.

Participant Recruitment

Nurses in the ED will be recruited via email. The DNP student will obtain emails of full-time, part-time, and per-diem emergency department nurses that will provide care to emergency department patients. It would be ideal to recruit nurses with diverse cultural backgrounds ranging

from 20-60 years of age. The inclusion of novice nurses will also be beneficial to help close the knowledge gap. Participation will be voluntary and confidential.

Data Collection

A pre-quiz will be given to 25 RNs in the ED. The pre quiz will assess knowledge about SCD pathophysiology, assessment, complications, management, and treatment. Education will be provided through an SCD ED pain algorithm via PowerPoint presentation. A posttest will be provided to assess if knowledge was improved. The pre and post quiz will be collected via Qualtrics.

Data Analysis

Data from the sample will remain anonymous and confidential. The statistical method being utilized will be inferential statistics. A paired sample t-test will be utilized to obtain the statistical data between pre and post test scores using SPSS Statistics 26 software. Descriptive statistics were used as demographic data.

Protection of Human Subjects

The Institutional Review Board (IRB) will approve the quality improvement project of Florida International University before implementing the project. The goal of the quality improvement project is to improve nurses' knowledge and advocacy in regards to timely pain medication administration for patients who arrive with sickle cell crisis to the ED. There is no risk of adversely affecting the participants physically, mentally, or economically. Participation is voluntary. Withdrawal from the project or refusal to participate is acceptable for the sample of the study. Informed consent will be obtained.

Data Management

Data for this quality improvement project will remain confidential and findings would be analyzed to see if they can be generalized. There will be no patient identifiers for the final report or any publications. The data collected would only be used for future nursing implications and to improve patient health outcomes.

Chapter VII

Results

The purpose of this quality improvement project was to improve nurses' knowledge about timely pain management for patients who arrive with sickle cell crisis to the ED through an educational intervention. Twenty-five registered nurses were invited to participate in this study. A total of twenty-five registered nurses completed the pre-test survey, educational presentation, and post-test survey. SPSS 26 software was utilized for the analysis of the data. The demographic data was presented using descriptive statistics presented as frequencies and percentages. Results on the pre-test and post-test were obtained through a paired sample t-test.

Sample

Twenty-five registered nurses successfully responded to the project's invitation to participate. Therefore, the project's final analysis was a total of twenty-five registered nurses (N=25). Table 1 displays the age groups of the participants for the sample population. The majority of the sample, a total of 40%, included nurses within the age group of 20-30 years.

Table 1

Sample: Age

Age Group	Frequency	Percentage
20-30 years	10	40%
31-40 years	6	24%
41-50 years	4	16%
>50 years	5	20%
Total	25	100%

Table 2

Sample: Years of Nursing Experience

Years of Nursing Experience	Frequency	Percentage
< 5 years	9	36%
6-10 years	8	32%
11-20 years	5	20%
> 20 years	3	12%
Total	25	100%

Table 2 describes the sample's years of nursing experience. The majority of the sample ranged from 1-10 years of nursing experience. Approximately 36% of the sample has less than 5 years of nursing experience and 32% of the sample has less than 6-10 years of nursing experience.

Table 3

Sample: Ethnicity

Ethnicity	Frequency	Percentage
White	5	20%
Black	6	24%
Hispanic	13	52%
Asian	0	0%
Other	1	4%
Total	25	100%

Table 3 displays the sample's demographics. The majority of the sample, 52% were Hispanics. The minority of the sample included Asians, with 0%.

Project Variables: Paired Sample Statistics

A two-tailed paired sample t-test was utilized to determine if the mean difference of knowledge of sickle cell pain management from pre- and post- intervention scores was statistically different from zero. The result of the two-tailed paired sample t-test is considered to be statistically significant based on the alpha value of 0.05, a t-value of -10.047, and a p-value of .001. Additionally, the findings suggest that the mean difference from the pre- and post- test (-3.160) was statistically significantly different from zero. Therefore, we can conclude that there is a statistically significant difference between the pre- and post- test scores, indicating a significant change in knowledge post intervention. The results are presented in Table 4 and Table 5.

Table 4

Paired Samples Test

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Pre - Post	-3.160	1.573	.315	-3.809	-2.511	-10.047	24	.000

Table 5

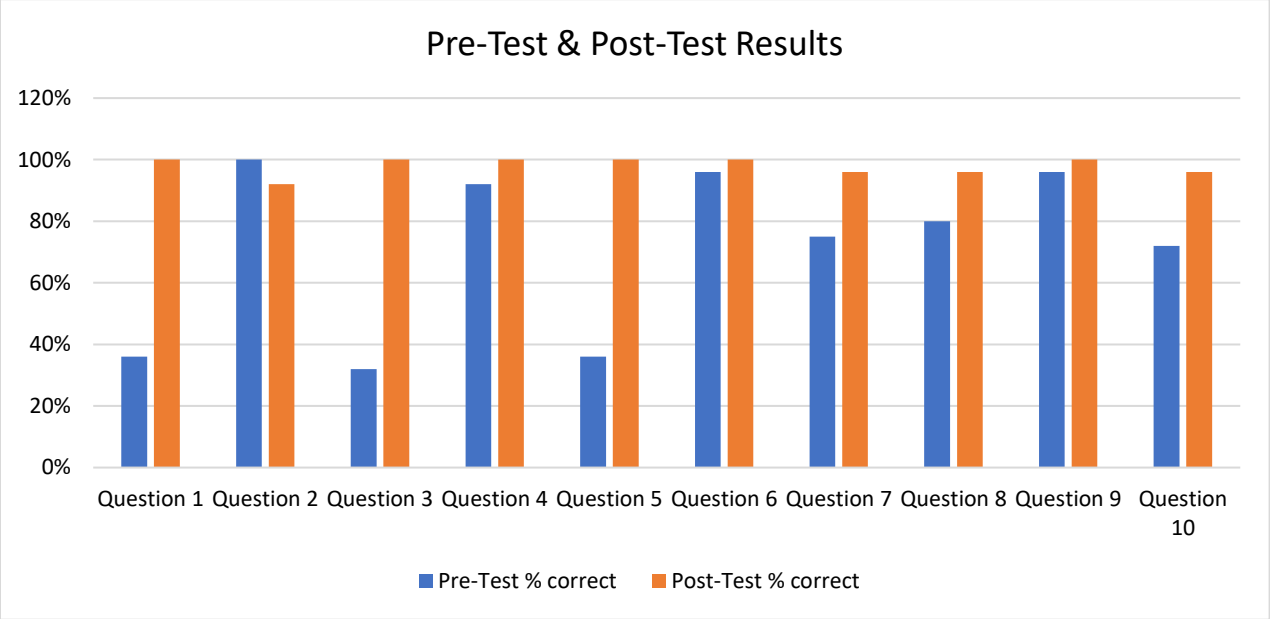
Paired Samples Statistics

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre	6.68	25	1.492	.298
	Post	9.84	25	.554	.111

Table 6

Pre-Test and Post-Test Results



The table above displays the Pre-Test and Post-Test results in percentages correct for the sample size of 25 Registered Nurses (n=25). Pre-intervention, nurses scored lowest in the following domains: pathophysiology, assessment, management and treatment. When asked about what type of hemoglobin disorder SCD is classified as, 36% (n=9) of nurses answered the question correctly. Question 3 and 5, consisted of assessing how fast should pain management be addressed upon arrival to the ED and triage level for SCD crisis, 32% (n=8) and 36% (n=9) of nurses answered the question correctly respectively. Question 7 and 8 assess pain management of SCD crisis, 75% (n=18) and 80% (n=20) of nurses answered the question correctly respectively. Lastly, the question assessing treatment for SCD, only 28% (n=7) answered the question correctly. Post-intervention, approximately 96-100% of nurses answered the questions correctly. Overall, there was a significant improvement in the scores after nurses received the educational presentation.

Table 7

Pre-Test and Post-Test Questions

Question 1	Sickle Cell Disease is what type of hemoglobin disorder?
Question 2	Sickle Cell Disease primarily affects which population?
Question 3	According to the National Heart, Lung, and Blood Institute (NHLBI), rapid pain management for patients arriving with a sickle cell crisis to the ED should be within _____ of arrival time.
Question 4	What medications are typically given to patients arriving with sickle cell crisis to the ED?
Question 5	According to the National Heart, Lung, and Blood Institute (NHLBI), a patient arriving with a sickle cell crisis to the ED should be assigned an ESI level of _____ .
Question 6	Which of the following complications can occur if treatment is delayed to patients arriving with sickle cell crisis to the ED?
Question 7	Patients arriving with sickle cell crisis, experiencing a pain level of 1-3 (low pain), are given one of the following medications: Acetaminophen 1000 mg PO, Ketorolac 30 mg IM, Ketorolac 60 mg IM, or Ibuprofen 600 mg PO. When should the nurse re-evaluate the patient's pain?
Question 8	Patients arriving with sickle cell crisis, experiencing a pain level of 4-6 (moderate pain), are given one of the following medications: Morphine 4-6 mg IV or Hydromorphone 0.5-1 mg IV. When should the nurse re-evaluate the patient's pain?
Question 9	Which of the following factors trigger a sickle cell crisis?
Question 10	What is the cure for sickle cell disease?

Table 7 briefly displays the questions utilized in the Pre-Test and Post-Test Survey. Appendix G shows the complete answer choices for each question.

Chapter VIII

Discussion

The overall results of this quality improvement project reveal that nurses' knowledge regarding timely pain management can improve through the implementation of an educational intervention. The most significant change occurred in the level of knowledge post-intervention as

reflected in the post-test survey. Prior to the educational intervention, nurses scored low in the following domains of the pre-test: pathophysiology, assessment, management and treatment. Not much difference in knowledge was seen in Question 4,6, and 9. The questions assess typical medications given for SCD crisis, complications of SCD crisis, and factors triggering SCD crisis.

Following the educational intervention, results from the paired samples t-test revealed a statistically significant change. The results confirm that the educational presentation improved nurses' knowledge regarding timely pain management for SCD crisis presenting to the ED. The results from this quality improvement project are encouraging and demonstrate the potential for nurses' knowledge regarding timely pain medication management for SCD to improve and essentially increase patient satisfaction. Considering that nurses' knowledge gap improved in the domains of pathophysiology, assessment, management, and treatment, one can assume that nurses will advocate for this target population and help decrease the delay for analgesic administration. Additionally, the educational intervention displayed a SCD pain algorithm based on JMH ED sickle cell disease order set and the NHLBI's recommendations. This algorithm has the potential to be utilized within the facility to expedite analgesic administration and stress the importance of nursing assessment and re-assessment post pain medication.

This quality improvement project had various strengths. To begin with, although the project had a small sample size, the study achieved full participation (n=25). Also, the convenience and ease of accessing the pre-test link, educational PowerPoint presentation, and post-test link, allowed flexibility for participants to complete the survey and educational PowerPoint at their own leisure. Additionally, participant's demographics such as age, years of nursing experience, and ethnicity were obtained. The inclusion of demographics is beneficial as it can provide insight to knowledge gaps among the collected data. The DNP student was able to

complete the project in less than one month as the IRB approval and JMH's institutional permissions were obtained in a timely manner. Lastly, the project obtained a t-value of -10.047 and a p-value of .001; indicating that there is a statistically significant difference between the pre- and post- test scores, representing a significant change in knowledge post intervention.

On the other hand, this quality improvement project had several limitations. The educational intervention was brief and occurred as a one time basis. Perhaps, a more frequent educational in-service to the unit can prove to be beneficial for new hires and existing staff. Not to mention, the study could have included an assessment of nurses' perceptions and attitudes towards patients with SCD crisis. This could have provided insight to assess if provider bias and stigma delays pain management. Lastly, the study only focused on assessing knowledge for the sample of registered nurses. The addition of other healthcare disciplines such as medical doctors and nurse practitioners can provide further insight of barriers to timely pain management and provide solutions on how to collaborate as a team and address quality of care concerns in the ED.

Chapter IX

Implications for Advanced Nursing Practice

The profession of nursing goes beyond carrying out interventions for a patient with a medical diagnosis. Nursing requires compassion, empathy, veracity, and knowledge to provide adequate healthcare to those in need. SCD is a complex genetic blood disorder affecting many individuals around the world (Crego et al., 2021). SCD is the leading cause of ED visits and hospitalizations. Complications that arise from a SCD VOC include acute chest syndrome, stroke, embolism, and priapism (Crego et al., 2021;Glassberg, 2017). Unfortunately, during a VOC, pain is the hallmark of this disease. Pain can occur throughout the body and last from a few days to several weeks (Glassberg, 2017).

A common problem present in the ED is the delay to initial analgesic administration. Factors influencing long ED wait times include age, race, gender, ED volume, and provider bias (Crego et al., 2021). Another important obstacle to pain relief among patients with VOC include knowledge deficits among nurses. Patients presenting with VOC crisis express that providers lack an understanding of SCD and are not treated with dignity and respect (Matthie & Jenerette, 2015). This target population often report that they are stigmatized as drug seekers when seeking pain treatment at the ED and nurses do not provide clear answers to questions they seek concerning their diagnosis (Matthie & Jenerette, 2015). Considering that lack of knowledge is a barrier to providing adequate pain relief for patients with SCD VOC, education among nurses can improve the quality of care among these patients. Therefore, by providing education to ED nurses about proper timely pain management through a SCD pain algorithm, patient care can improve and provider bias can decrease (Kim et al., 2017; Matthie & Jenerette, 2015).

An increase in knowledge among nurses caring for SCD VOC patients has considerable implications for the nursing profession and education. By increasing nurses' knowledge regarding SCD pathophysiology, assessment, management, treatment, and complications, the nurse can better comprehend the disease process and advocate for pain relief on the patient's behalf (Matthie & Jenerette, 2015). As nurses are direct providers for the patient at the bedside, establishing rapport and displaying empathy is crucial for this patient population. Obtaining a good partnership with open communication allows the patient to feel understood, respected, and valued. As the nurse to patient partnership is strengthened, the nursing profession strengthens as clinical outcomes are improved.

The advantage of providing education to nurses from a SCD pain algorithm would be the importance of adhering to a consistent guideline for pain relief. The adherence to a SCD pain

algorithm in the ED has shown to improve significant outcomes for patients with SCD VOC (Kim et al., 2017). The advantages of following a consistent guideline includes improved pain management, hospital revenue, reduced admissions and length of ED stay (Kim et al., 2017). To provide the best care possible for this patient population, it is necessary for nurses to put aside their personal biases and obtain knowledge about SCD. Educated nurses will be able to properly advocate for timely pain relief when patients cannot advocate for themselves. Overall, quality of care and patient experience is improved when we treat patients with compassion and respect.

Chapter X

Conclusion

As SCD is a complex and multifactorial disease, it is crucial to help improve nurses' knowledge regarding pathophysiology, assessment, complications, treatment, and management. By providing an educational intervention to ED nurses, patient outcomes can be improved as well as the adherence to a SCD pain protocol. The outcomes of this quality improvement project will help nurses be better equipped to provide timely care to manage pain crises among patients presenting with SCD VOC in the ED. This quality improvement project provided the emergency department with awareness, highlighting certain aspects that may be under looked in managing SCD crises. Not to mention, it provided the opportunity to educate on a SCD pain algorithm which can be a useful tool to implement in order to provide consistent and standardized care across all patients suffering from a SCD crisis. In Conclusion, SCD education among nurses in the emergency department benefits the department and patients by reducing delays in analgesia administration, increases patient satisfaction, lowering hospital costs, improves communication, decreases stigma, and contributes to better healthcare outcomes for this target population.

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Appendix A

Timeline

- Spring 2023
    - Project topic developed
    - Recruitment of preceptor
    - Approval from Florida International University
    - Practicum hours
    - Formulation of clinical problem, literature review, organizational assessment
    - DNP Project Proposal
- Summer 2023
    - IRB approval
    - JHS Research and Evidence Based Council Approval
    - JHS CNO Approval
    - JHS Clinical Trials Office Approval
    - Revisions of DNP Report
- Fall 2023
    - Implementation
    - Data Collection
    - Data Analysis
    - Summary of data implementation and results
    - Dissemination of results
    - Project revisions
    - Presentation

Appendix B

Letter of Institutional Support

Jackson
MEMORIAL HOSPITAL

6/6/23

Dana Sherman, DNP, APRN, ANP-BC, FNP-BC
Clinical Assistant Professor
Nicole Wertheim College of Nursing & Health Sciences
Florida International University

Dear Dr. Sherman,

Thank you for inviting Jackson Memorial Hospital (JMH) to participate in the DNP Project of Alejandra Martinez. It is understood that Alejandra Martinez will be conducting this quality improvement project as part of the requirements for the Doctor of Nursing Practice program at Florida International University. After reviewing the proposal titled "*An Educational Intervention to Improve Nurses' Knowledge Towards Timely Pain Management in the Emergency Department for Patients Arriving with Sickle Cell Crisis: A Quality Improvement Project"* she has been granted permission to conduct the project in this organization.

The project will be implemented at JMH and will occur in two sessions, using a pre- and post-test questionnaire to assess impact. The Emergency Department unit is also aware of staff participation in supporting the student to complete this project, including allowing the student access to the facility, provide an informed consent, deliver the pre-test questionnaire, provide the educational intervention, and provide the post-test to the recruited participants.

The project intends to evaluate if a structured educational intervention targeting Emergency Department nurses will increase their knowledge in regards to timely pain management for patients arriving with sickle cell anemia crisis. The project will be conducted with an informed consent and volunteer participation of nurses working in the Emergency Department. Prior to the implementation of this project, the Florida International University Institutional Review Board will evaluate and approve the procedures to conduct this project. The educational intervention will be a sickle cell crisis pain algorithm via a PowerPoint presentation that will last approximately 20-30 minutes. Any data collected by Alejandra Martinez will be kept confidential. It is expected that Alejandra Martinez will not interfere with the normal hospital function, behaving in a professional manner, and following the hospital standards of care. I support the participation of JMH nursing staff in this project and look forward to working in collaboration with Florida International University.

Sincerely,

JOHN ESIN (Jun 6, 2023 23:13 EDT)

John A. Esin, MD, MHA, FACEP
Medical Director of Clinical Operations
Jackson Memorial Hospital
Emergency Services

Emergency Room | 1611 N.W 12 Ave Miami, FL, 33136 | 305.585.6910

Appendix C

FIU IRB Exemption Letter

FIU | FLORIDA INTERNATIONAL UNIVERSITY

Office of Research Integrity
Research Compliance, MARC 430

MEMORANDUM

To:	Dr. Dana Sherman
CC:	Alejandra Martinez
From:	Kourtney Wilson, MS, IRB Coordinator KMW
Date:	June 15, 2023
Protocol Title:	**"An Educational Intervention to Improve Nurses' Knowledge Towards Timely Pain Management in the Emergency Department for Patients Arriving with Sickle Cell Crisis: A Quality Improvement Project"**

The Florida International University Office of Research Integrity has reviewed your research study for the use of human subjects and deemed it Exempt via the **Exempt Review** process.

IRB Protocol Exemption #:	IRB-23-0328	**IRB Exemption Date:**	06/15/23
TOPAZ Reference #:	113277		

As a requirement of IRB Exemption you are required to:

1) Submit an IRB Exempt Amendment Form for all proposed additions or changes in the procedures involving human subjects. All additions and changes must be reviewed and approved prior to implementation.
2) Promptly submit an IRB Exempt Event Report Form for every serious or unusual or unanticipated adverse event, problems with the rights or welfare of the human subjects, and/or deviations from the approved protocol.
3) Submit an IRB Exempt Project Completion Report Form when the study is finished or discontinued.

Special Conditions: N/A

For further information, you may visit the IRB website at http://research.fiu.edu/irb.

KMW

Appendix D

JHS Nursing Research & Evidence-based Practice Council (NREBPC) and CNO Council Approval Letter

JHS Office of Research
Clinical Trials Office (Mail Room)
1611 NW 12th ave
Miami, FL 33136

August 23, 2023

Ms. Martinez (Alejandra),

The JHS Clinical Trial Office on August 22, 2023 reviewed the Non-Human Subject Research protocol approved by JHS Council and CNO Council. This quality improvement project is now approved and may commence at Jackson Health System.

Protocol Title: An Educational Intervention to Improve Nurses' Knowledge Towards Timely Pain Management in the Emergency Department for Patients Arriving with Sickle Cell Crisis: A Quality Improvement Project

Principal Investigator: Alejandra Martinez

Type of Study: Quality improvement project

Enrollment Target: Local Site: 25 RNs in the ED

Study Approved Time: 1 month

Study fees waived in support of Nursing Program

It is noted, the Office of Research Integrity Research Compliance, from Florida International University Evaluated a Non-Human Subjects Research Application

Principal Investigator must notify to the Research Integrity Division of Research at Florida International University and JHS Office of Research if the proposed activity changes and becomes human subject research.

- **A participant enrollment form must be submitted to Clinical Trials Office <ClinicalTrialsOffice@jhsmiami.org> on a timely basis.**

Appendix E

JHS Clinical Trials Office Approval Letter

JHS Office of Research
Clinical Trials Office (Mail Room)
1611 NW 12th ave
Miami, FL 33136

August 23, 2023

Ms. Martinez (Alejandra),

The JHS Clinical Trial Office on August 22, 2023 reviewed the Non-Human Subject Research protocol approved by JHS Council and CNO Council. This quality improvement project is now approved and may commence at Jackson Health System.

Protocol Title: An Educational Intervention to Improve Nurses' Knowledge Towards Timely Pain Management in the Emergency Department for Patients Arriving with Sickle Cell Crisis: A Quality Improvement Project

Principal Investigator: Alejandra Martinez

Type of Study: Quality improvement project

Enrollment Target: Local Site: 25 RNs in the ED

Study Approved Time: 1 month

Study fees waived in support of Nursing Program

It is noted, the Office of Research Integrity Research Compliance, from Florida International University Evaluated a Non-Human Subjects Research Application

Principal Investigator must notify to the Research Integrity Division of Research at Florida International University and JHS Office of Research if the proposed activity changes and becomes human subject research.

- **A participant enrollment form must be submitted to Clinical Trials Office <ClinicalTrialsOffice@jhsmiami.org> on a timely basis.**

Appendix F

Informational Letter

FIU | FLORIDA INTERNATIONAL UNIVERSITY

INFORMATIONAL LETTER
An Educational Intervention to Improve Nurses' Knowledge Towards Timely Pain Management in the Emergency Department for Patients Arriving with Sickle Cell Crisis: A Quality Improvement Project

Hello, my name is Alejandra Martinez, ARNP, MSN, DNP student. You have been chosen at random to be in a research study about timely pain management in the Emergency Department for patients arriving with sickle cell anemia. The purpose of this study is to increase nurses' knowledge regarding timely pain medication administration to patients arriving with sickle cell crisis to the Emergency Department, with the goal of improving care, advocacy, and preventing further organ damage. If you decide to be in this study, you will be one of the 25 people in this research study. Participation in this study will take four weeks of your time. If you agree to be in the study, I will ask you to do the following things:

1. Nurses' knowledge will be assessed with a pre-test questionnaire. An educational intervention will be delivered via PowerPoint. At the end of the presentation, nurses will be given a post-test questionnaire to assess if knowledge was improved.

2. The survey questions will be administered via Qualtrics. It is a data company that is used to design, send, and analyze surveys. The survey questions will be uploaded into Qualtrics. Qualtrics will generate a QR code that will be sent to the participants via email. Participants will be instructed to answer the survey questions and submit them back to the researcher.

There are no foreseeable risks or benefits to you for participating in this study. It is expected that this study will benefit society by increasing the health care provider's knowledge on timely pain control for patients arriving with sickle cell crisis to the Emergency Department and providing the health care provider with an evidence based guideline algorithm on how to treat sickle cell crisis with timely pain management, allowing for consistency and standard of care in the Emergency Department.

There is no cost or payment to you. If you have questions while taking part, please stop me and ask. You will remain anonymous.

If you have questions for one of the researchers conducting this study, you may contact the primary investigator Dana Sherman, DNP, ARNP, ANP-BC, FNP-BC at (305) 348-2247 or Alejandra Martinez ARNP, MSN, DNP student at (786) 863-3255.

If you would like to talk with someone about your rights of being a subject in this research study or about ethical issues with this research study, you may contact the FIU Office of Research Integrity by phone at 305-348-2494 or by email at ori@fiu.edu or by mail at 11200 SW 8th Street, AH3-522, Miami, Florida 33199.

Your participation in this research is voluntary, and you will not be penalized or lose benefits if you refuse to participate or decide to stop. You may keep a copy of this form for your records.

Qualtrics link:

Pre-test: https://fiu.qualtrics.com/jfe/form/SV_dhBGZghAsciRlgq

Appendix G

Pre-Test/Post-Test Survey

PRE-TEST/POST-TEST

An Educational Intervention to Improve Nurses' Knowledge Towards Timely Pain Management in the Emergency Department for Patients Arriving with Sickle Cell Crisis: A Quality Improvement Project

Introduction:

This questionnaire is an essential part of the quality improvement project aiming to increase the knowledge of Emergency Department nurses' in regards to timely pain management for patients arriving with sickle cell crisis to the Emergency Department.

Please answer to the best of your knowledge. Your response will help to understand gaps in knowledge and room for improvement. The questions are structured to assess your understanding of sickle cell disease, pathophysiology, assessment, pain management, treatment, and complications.

- ***Your answers are anonymous and will be kept confidential***
- ***Your participation is voluntary and will not have any bearing on your position***

Demographics:

D1 What is your Gender?

- ○ Male
- ○ Female
- ○ Other
- ○ I wish to not disclose

D2 What is your age?

- ○ 20-30 years
- ○ 31-40 years
- ○ 41-50 years
- ○ >50 years

D3 How long have you been a nurse?

- ○ <5 years
- ○ 6-10 years
- ○ 11-20 years
- ○ >20 years

D4 What is your ethnicity?

- ○ White
- ○ Black
- ○ Hispanic
- ○ Asian
- ○ Other

Questionnaire

Q1 Sickle Cell Disease is what type of hemoglobin disorder?

- ○ Autosomal Dominant
- ○ Autosomal Recessive

Q2 Sickle Cell Disease primarily affects which population?

- ○ Hispanic/Latino
- ○ Asians
- ○ Caucasian/White
- ○ African Americans/Black

Q3 According to the National Heart, Lung, and Blood Institute (NHLBI), rapid pain management for patients arriving with a sickle cell crisis to the ED should be within _____ of arrival time.

- 30 minutes
- 1 hour
- 2 hours

Q4 What medications are typically given to patients arriving with sickle cell crisis to the ED?

- Morphine IV
- Toradol IV
- Hydromorphone IV
- Both A and C

Q5 According to the National Heart, Lung, and Blood Institute (NHLBI), a patient arriving with a sickle cell crisis to the ED should be assigned an ESI level of _____ .

- ESI level 1
- ESI level 2
- ESI level 3

Q6 Which of the following complications can occur if treatment is delayed to patients arriving with sickle cell crisis to the ED?

- Cardiomegaly, Hypertension, and Diabetes
- Acute Chest Syndrome, Stroke, and Avascular Necrosis
- Cirrhosis, Arthritis, and Gout
- Diverticulosis, Cystic Fibrosis, and Asthma

Q7 Patients arriving with sickle cell crisis, experiencing a pain level of 1-3 (low pain), are given one of the following medications: Acetaminophen 1000 mg PO, Ketorolac 30 mg IM, Ketorolac 60 mg IM, or Ibuprofen 600 mg PO. When should the nurse re-evaluate the patient's pain?

- 30 minutes
- 1 hour
- 1 hour and 30 minutes
- 2 hours

Q8 Patients arriving with sickle cell crisis, experiencing a pain level of 4-6 (moderate pain), are given one of the following medications: Morphine 4-6 mg IV or Hydromorphone 0.5-1 mg IV. When should the nurse re-evaluate the patient's pain?

- 30 minutes
- 1 hour
- 1 hour and 30 minutes
- 2 hours

Q9 Which of the following factors trigger a sickle cell crisis?

- Stress
- Dehydration
- Fatigue
- Weather changes
- Alcohol
- All of the above

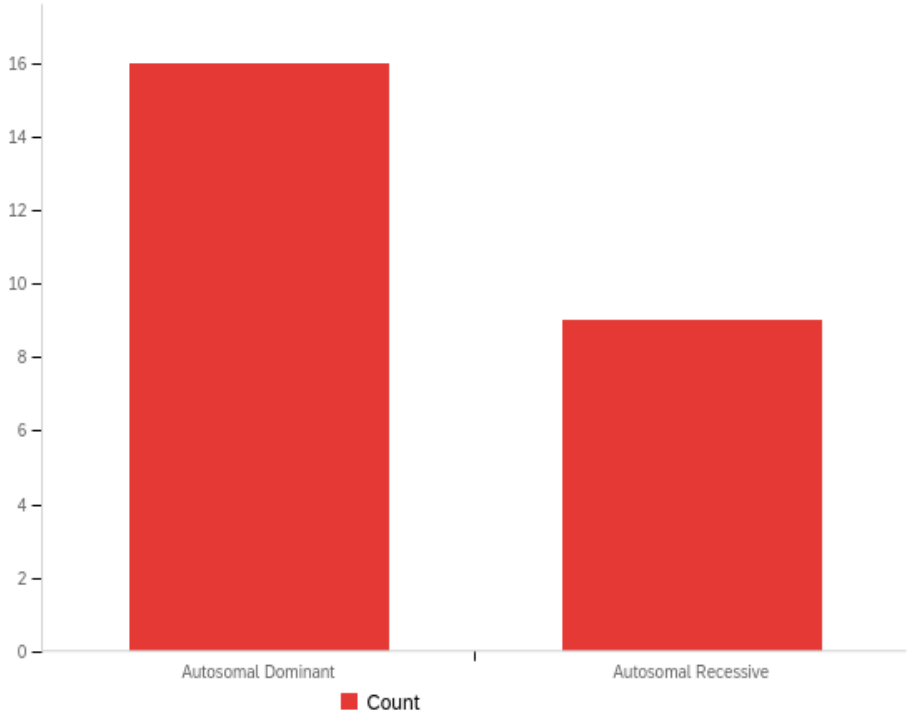
Q10 What is the cure for sickle cell disease?

- Blood Transfusion
- Bone Marrow Transplant
- Hydroxyurea and Folic Acid
- Sickle Cell Disease does not have a cure, it is a disease of chronic pain management through medications and preventative care.

Appendix H

Pre-Test Question Analysis

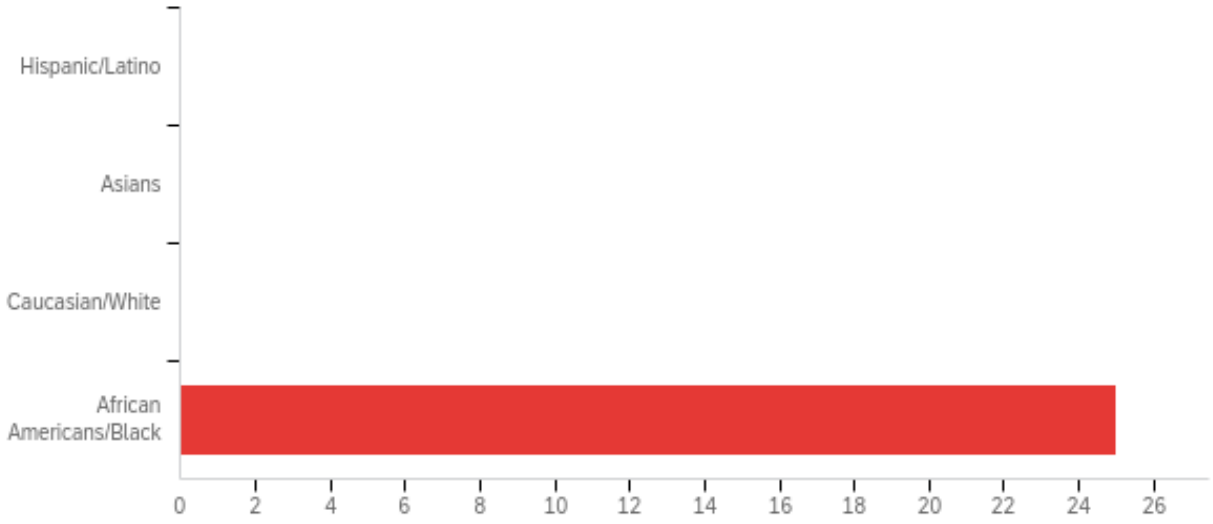
Q1 - Sickle Cell Disease is what type of hemoglobin disorder?



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Sickle Cell Disease is what type of hemoglobin disorder?	1.00	2.00	1.36	0.48	0.23	25

#	Answer	%	Count
2	Autosomal Recessive	36.00%	9
1	Autosomal Dominant	64.00%	16
	Total	100%	25

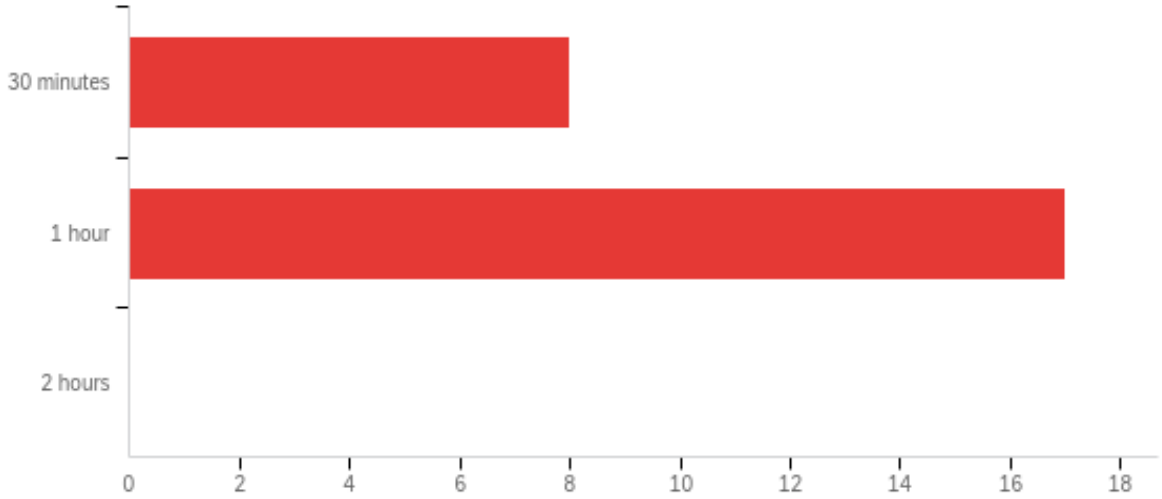
Q2 - Sickle Cell Disease primarily affects which population?



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Sickle Cell Disease primarily affects which population?	4.00	4.00	4.00	0.00	0.00	25

#	Answer	%	Count
1	Hispanic/Latino	0.00%	0
2	Asians	0.00%	0
3	Caucasian/White	0.00%	0
4	African Americans/Black	100.00%	25
	Total	100%	25

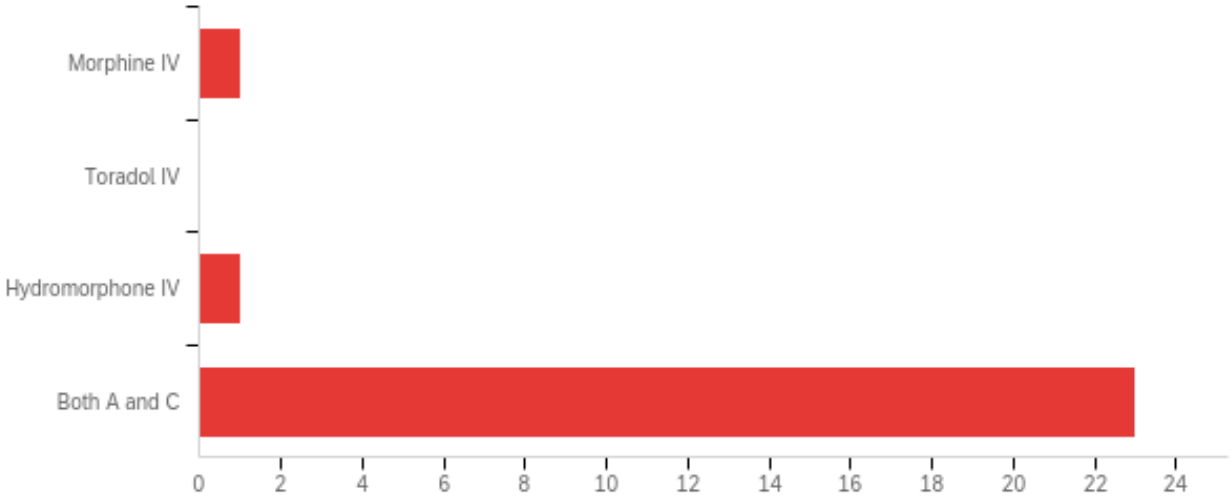
Q3 - According to the National Heart, Lung, and Blood Institute (NHLBI), rapid pain management for patients arriving with a sickle cell crisis to the ED should be within _____ of arrival time.



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	According to the National Heart, Lung, and Blood Institute (NHLBI), rapid pain management for patients arriving with a sickle cell crisis to the ED should be within _____ of arrival time.	1.00	2.00	1.68	0.47	0.22	25

#	Answer	%	Count
1	30 minutes	32.00%	8
2	1 hour	68.00%	17
3	2 hours	0.00%	0
	Total	100%	25

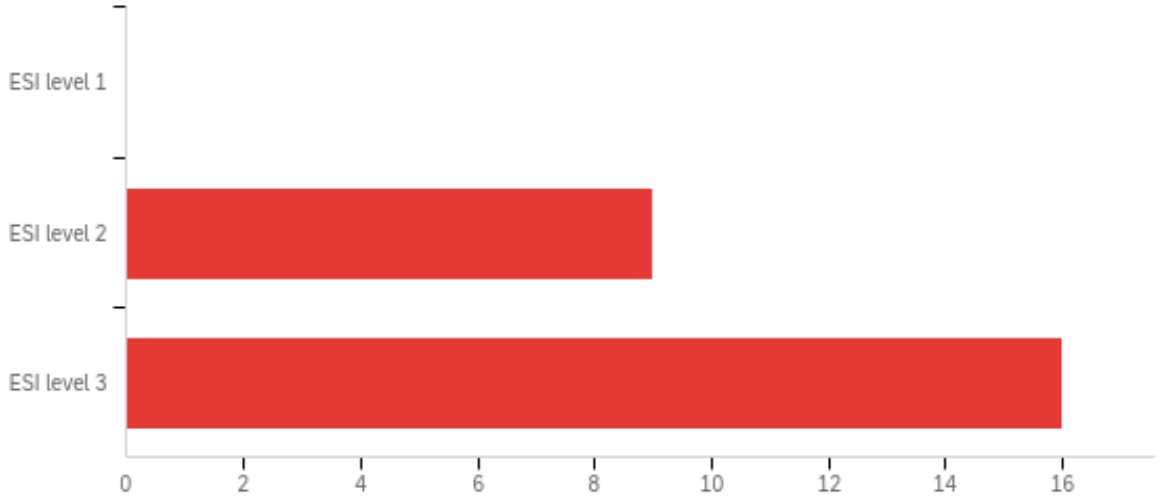
Q4 - What medications are typically given to patients arriving with sickle cell crisis to the ED?



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	What medications are typically given to patients arriving with sickle cell crisis to the ED?	1.00	4.00	3.84	0.61	0.37	25

#	Answer	%	Count
1	Morphine IV	4.00%	1
2	Toradol IV	0.00%	0
3	Hydromorphone IV	4.00%	1
4	Both A and C	92.00%	23
	Total	100%	25

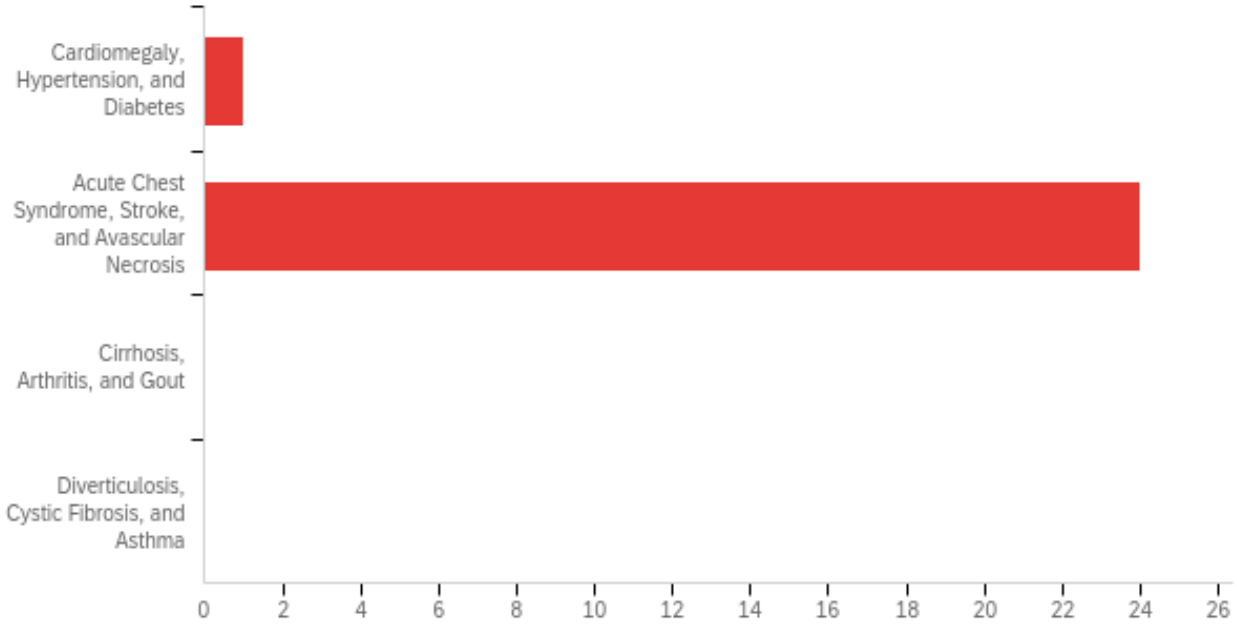
Q5 - According to the National Heart, Lung, and Blood Institute (NHLBI), a patient arriving with a sickle cell crisis to the ED should be assigned an ESI level of _____ .



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	According to the National Heart, Lung, and Blood Institute (NHLBI), a patient arriving with a sickle cell crisis to the ED should be assigned an ESI level of _____ .	2.00	3.00	2.64	0.48	0.23	25

#	Answer	%	Count
1	ESI level 1	0.00%	0
2	ESI level 2	36.00%	9
3	ESI level 3	64.00%	16
	Total	100%	25

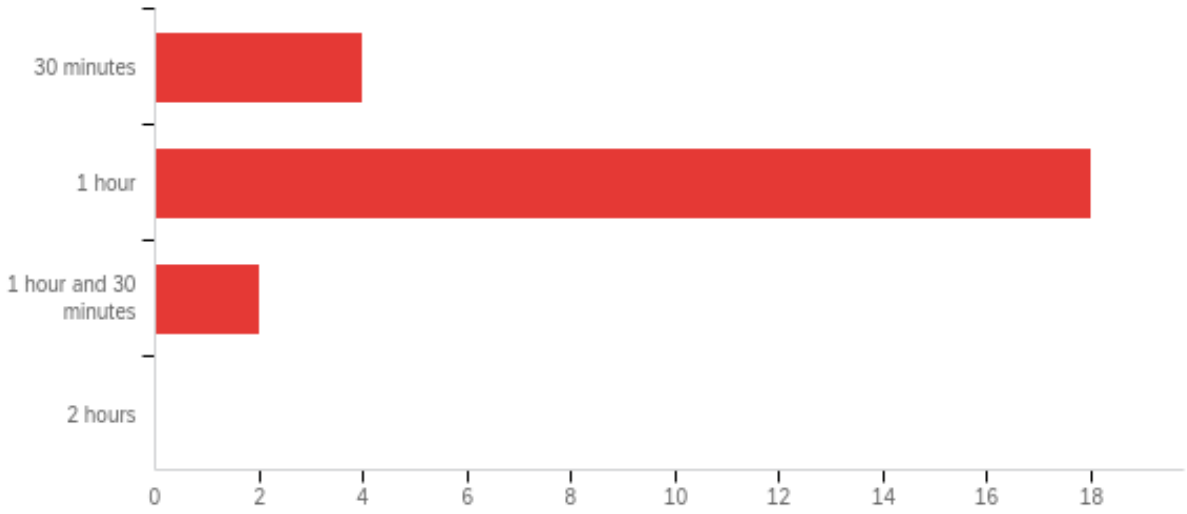
Q6 - Which of the following complications can occur if treatment is delayed to patients arriving with sickle cell crisis to the ED?



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Which of the following complications can occur if treatment is delayed to patients arriving with sickle cell crisis to the ED?	1.00	2.00	1.96	0.20	0.04	25

#	Answer	%	Count
1	Cardiomegaly, Hypertension, and Diabetes	4.00%	1
2	Acute Chest Syndrome, Stroke, and Avascular Necrosis	96.00%	24
3	Cirrhosis, Arthritis, and Gout	0.00%	0
4	Diverticulosis, Cystic Fibrosis, and Asthma	0.00%	0
	Total	100%	25

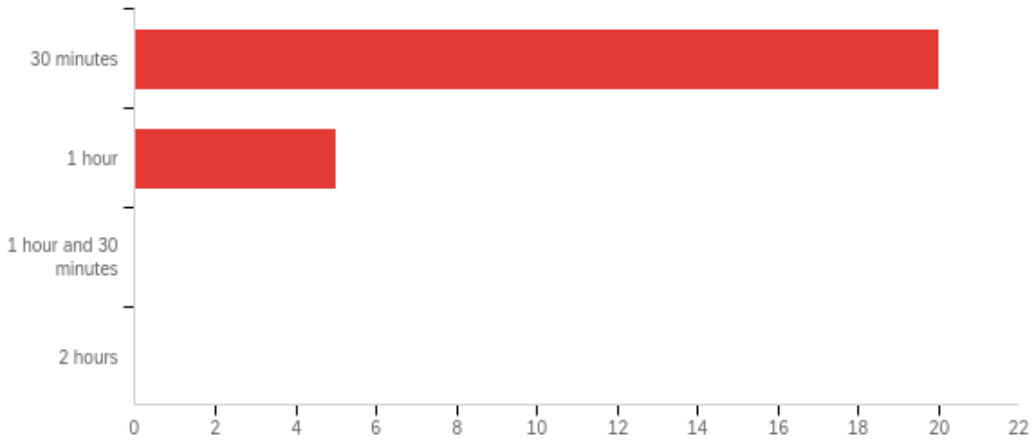
Q7 - Patients arriving with sickle cell crisis, experiencing a pain level of 1-3 (low pain), are given one of the following medications: Acetaminophen 1000 mg PO, Ketorolac 30 mg IM, Ketorolac 60 mg IM, or Ibuprofen 600 mg PO. When should the nurse re-evaluate the patient's pain?



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Patients arriving with sickle cell crisis, experiencing a pain level of 1-3 (low pain), are given one of the following medications: Acetaminophen 1000 mg PO, Ketorolac 30 mg IM, Ketorolac 60 mg IM, or Ibuprofen 600 mg PO. When should the nurse re-evaluate the patient's pain?	1.00	3.00	1.92	0.49	0.24	24

#	Answer	%	Count
1	30 minutes	16.67%	4
2	1 hour	75.00%	18
3	1 hour and 30 minutes	8.33%	2
4	2 hours	0.00%	0
	Total	100%	24

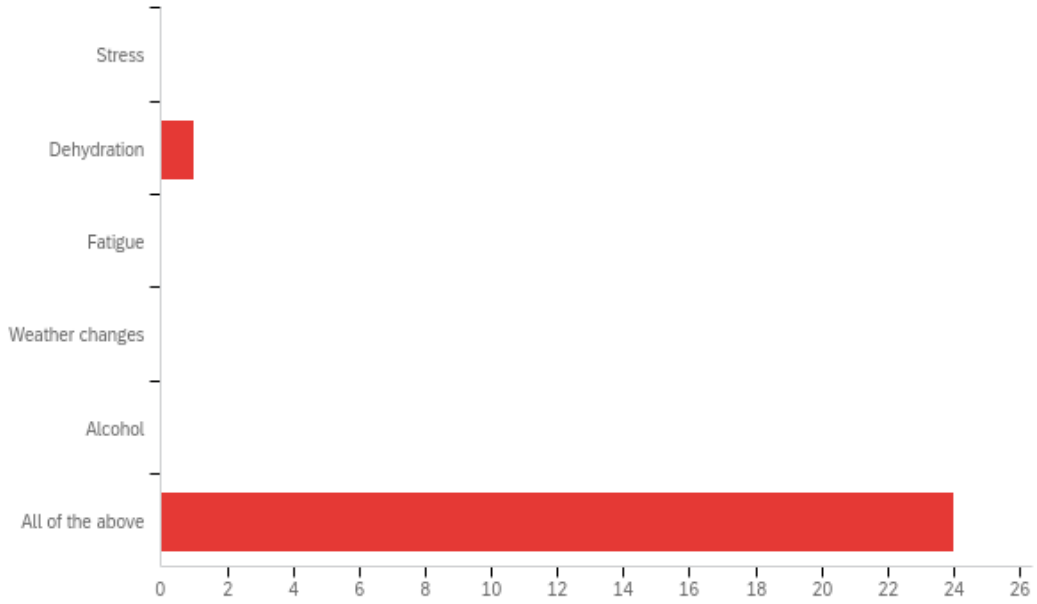
Q8 - Patients arriving with sickle cell crisis, experiencing a pain level of 4-6 (moderate pain), are given one of the following medications: Morphine 4-6 mg IV or Hydromorphone 0.5-1 mg IV. When should the nurse re-evaluate the patient's pain?



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Patients arriving with sickle cell crisis, experiencing a pain level of 4-6 (moderate pain), are given one of the following medications: Morphine 4-6 mg IV or Hydromorphone 0.5-1 mg IV. When should the nurse re-evaluate the patient's pain?	1.00	2.00	1.20	0.40	0.16	25

#	Answer	%	Count
1	30 minutes	80.00%	20
2	1 hour	20.00%	5
3	1 hour and 30 minutes	0.00%	0
4	2 hours	0.00%	0
	Total	100%	25

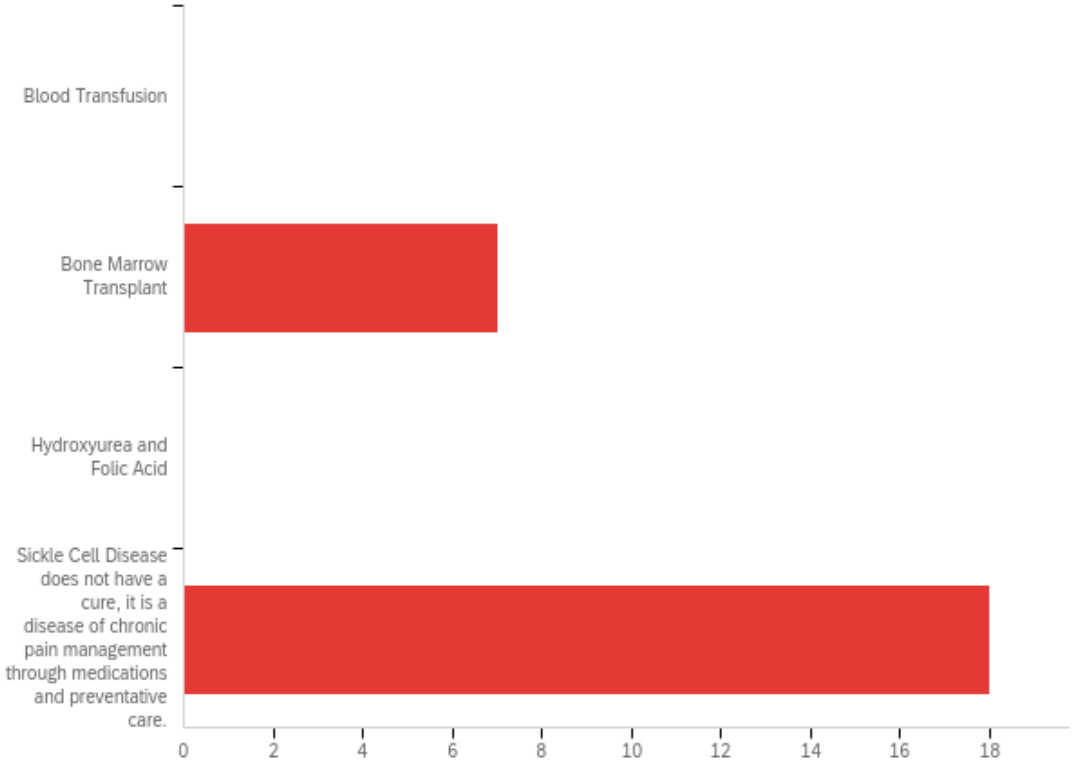
Q9 - Which of the following factors trigger a sickle cell crisis?



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Which of the following factors trigger a sickle cell crisis?	2.00	6.00	5.84	0.78	0.61	25

#	Answer	%	Count
1	Stress	0.00%	0
2	Dehydration	4.00%	1
3	Fatigue	0.00%	0
4	Weather changes	0.00%	0
5	Alcohol	0.00%	0
6	All of the above	96.00%	24
	Total	100%	25

Q10 - What is the cure for sickle cell disease?



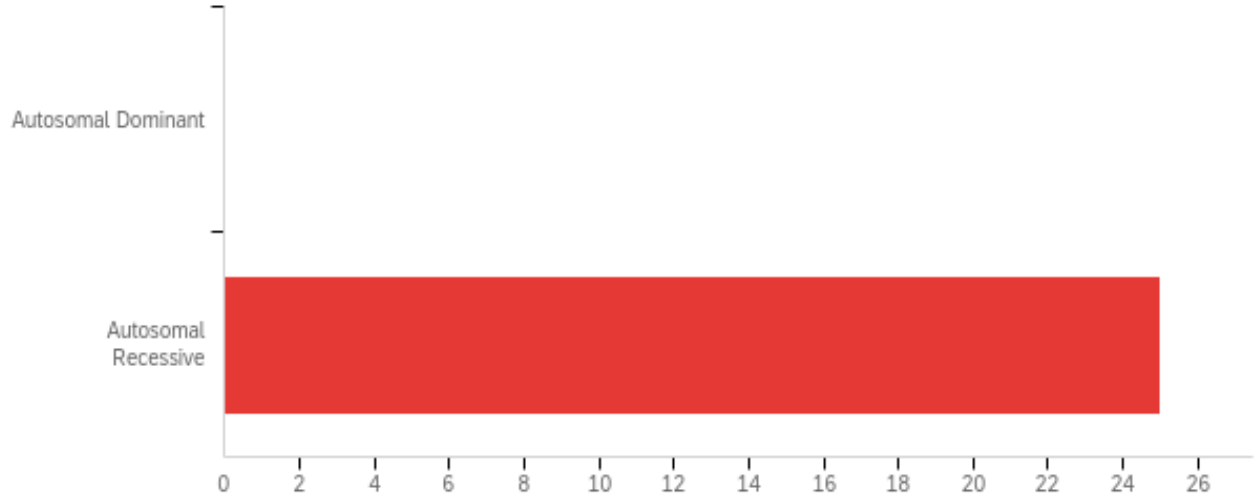
#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	What is the cure for sickle cell disease?	2.00	4.00	3.44	0.90	0.81	25

#	Answer	%	Count
1	Blood Transfusion	0.00%	0
2	Bone Marrow Transplant	28.00%	7
3	Hydroxyurea and Folic Acid	0.00%	0
4	Sickle Cell Disease does not have a cure, it is a disease of chronic pain management through medications and preventative care.	72.00%	18
	Total	100%	25

Appendix I

Post-Test Question Analysis

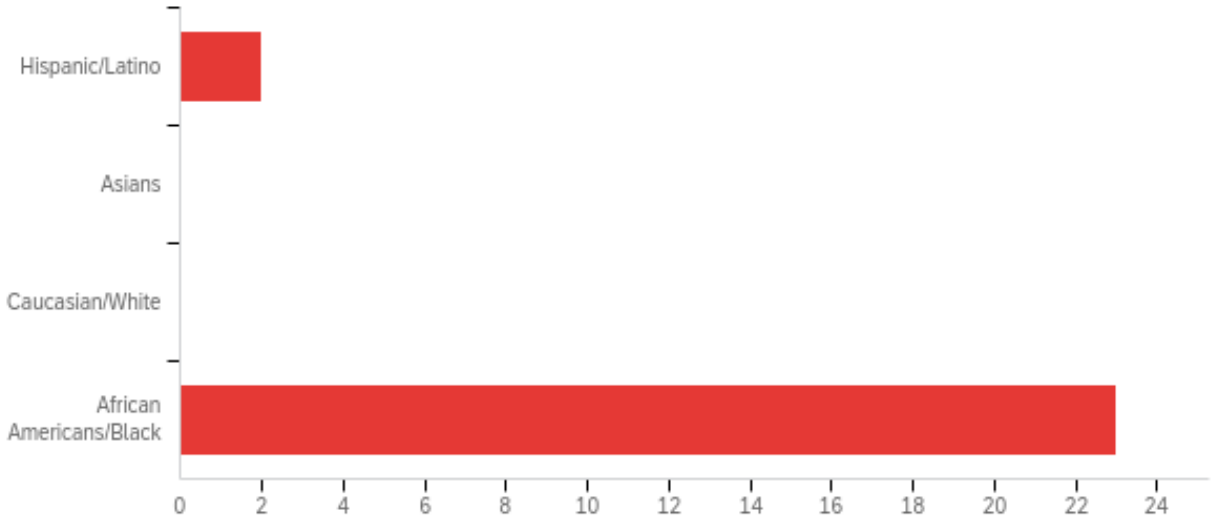
Q1 - Sickle Cell Disease is what type of hemoglobin disorder?



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Sickle Cell Disease is what type of hemoglobin disorder?	2.00	2.00	2.00	0.00	0.00	25

#	Answer	%	Count
1	Autosomal Dominant	0.00%	0
2	Autosomal Recessive	100.00%	25
	Total	100%	25

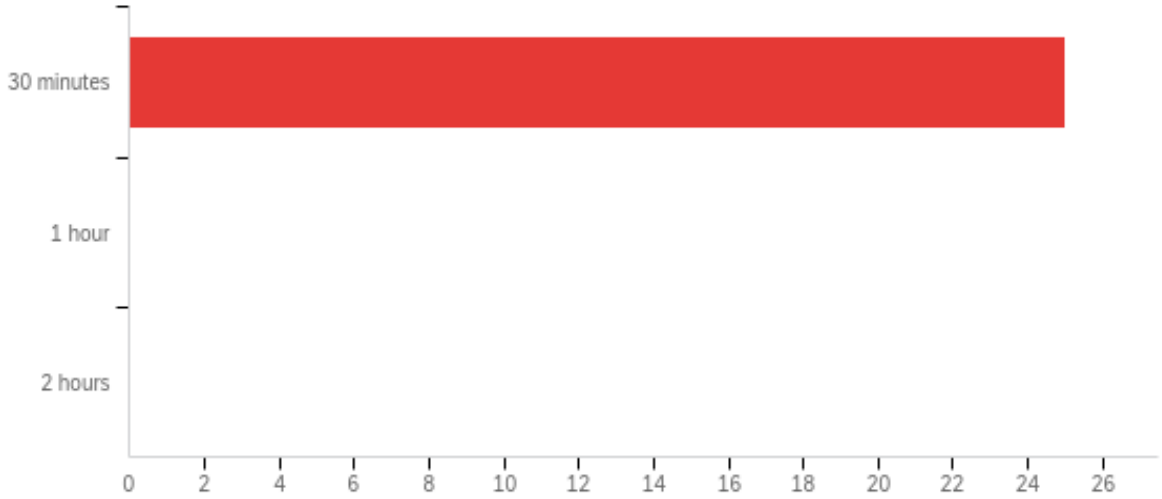
Q2 - Sickle Cell Disease primarily affects which population?



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Sickle Cell Disease primarily affects which population?	1.00	4.00	3.76	0.81	0.66	25

#	Answer	%	Count
1	Hispanic/Latino	8.00%	2
2	Asians	0.00%	0
3	Caucasian/White	0.00%	0
4	African Americans/Black	92.00%	23
	Total	100%	25

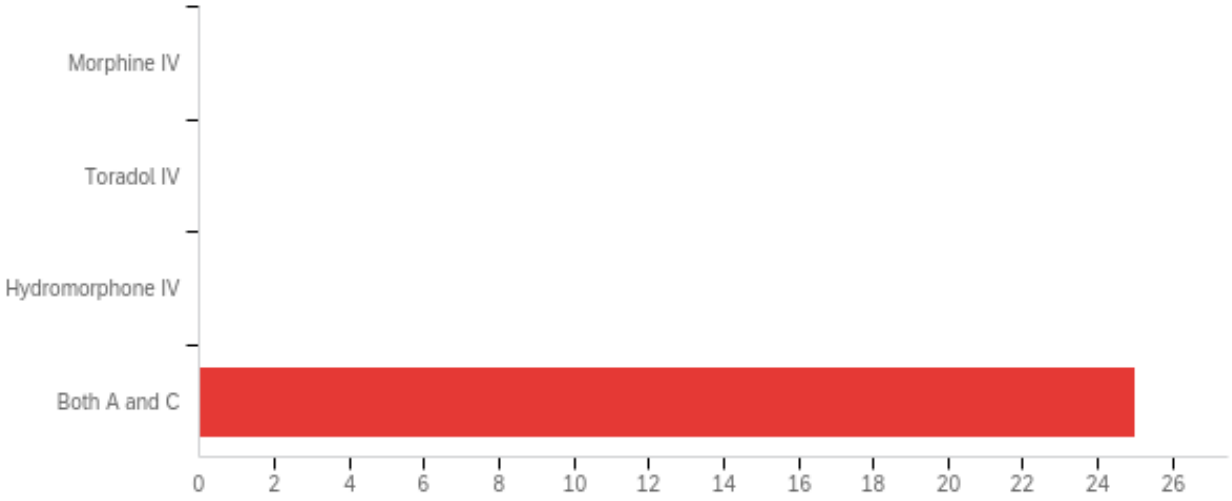
Q3 - According to the National Heart, Lung, and Blood Institute (NHLBI), rapid pain management for patients arriving with a sickle cell crisis to the ED should be within _____ of arrival time.



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	According to the National Heart, Lung, and Blood Institute (NHLBI), rapid pain management for patients arriving with a sickle cell crisis to the ED should be within _____ of arrival time.	1.00	1.00	1.00	0.00	0.00	25

#	Answer	%	Count
1	30 minutes	100.00%	25
2	1 hour	0.00%	0
3	2 hours	0.00%	0
	Total	100%	25

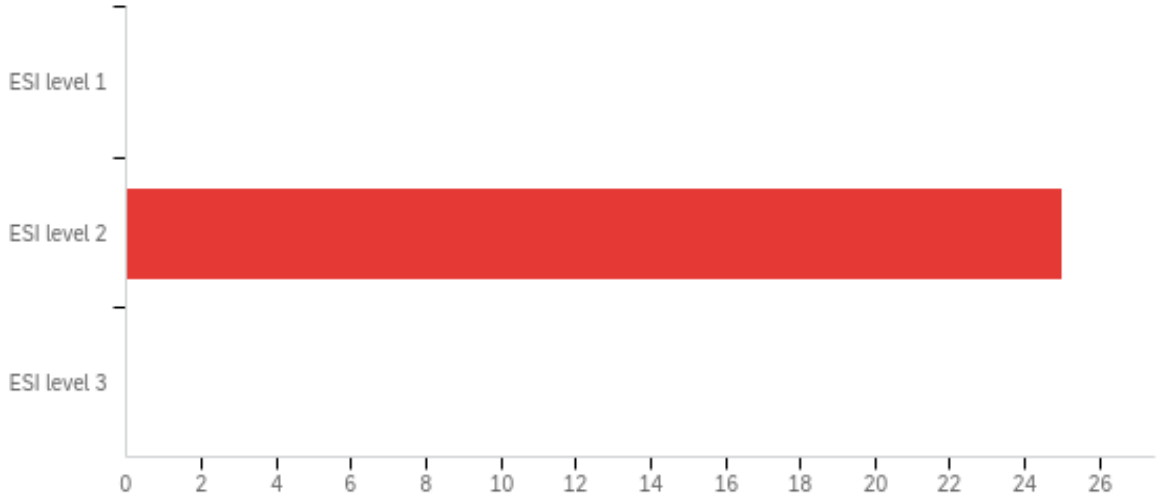
Q4 - What medications are typically given to patients arriving with sickle cell crisis to the ED?



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	What medications are typically given to patients arriving with sickle cell crisis to the ED?	4.00	4.00	4.00	0.00	0.00	25

#	Answer	%	Count
1	Morphine IV	0.00%	0
2	Toradol IV	0.00%	0
3	Hydromorphone IV	0.00%	0
4	Both A and C	100.00%	25
	Total	100%	25

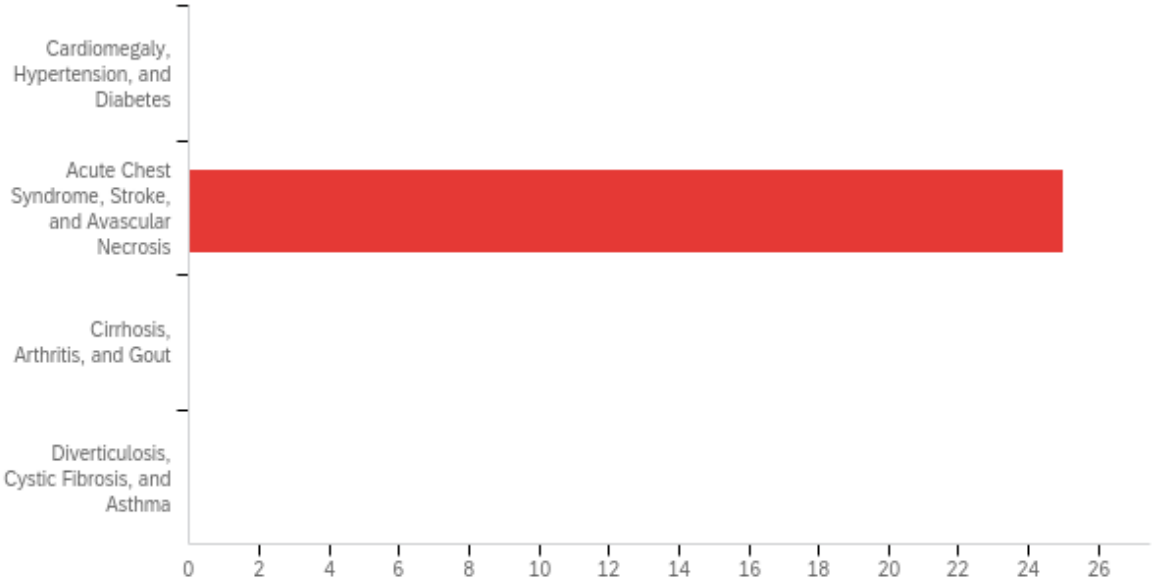
Q5 - According to the National Heart, Lung, and Blood Institute (NHLBI), a patient arriving with a sickle cell crisis to the ED should be assigned an ESI level of _____ .



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	According to the National Heart, Lung, and Blood Institute (NHLBI), a patient arriving with a sickle cell crisis to the ED should be assigned an ESI level of _____ .	2.00	2.00	2.00	0.00	0.00	25

#	Answer	%	Count
1	ESI level 1	0.00%	0
2	ESI level 2	100.00%	25
3	ESI level 3	0.00%	0
	Total	100%	25

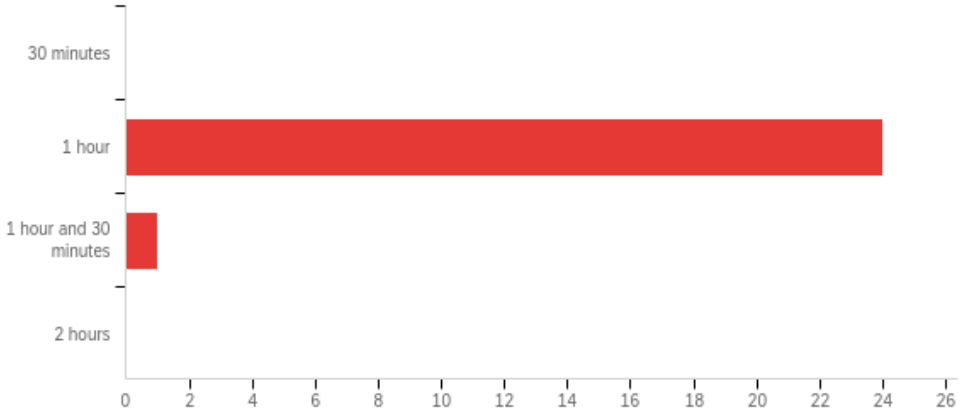
Q6 - Which of the following complications can occur if treatment is delayed to patients arriving with sickle cell crisis to the ED?



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Which of the following complications can occur if treatment is delayed to patients arriving with sickle cell crisis to the ED?	2.00	2.00	2.00	0.00	0.00	25

#	Answer	%	Count
1	Cardiomegaly, Hypertension, and Diabetes	0.00%	0
2	Acute Chest Syndrome, Stroke, and Avascular Necrosis	100.00%	25
3	Cirrhosis, Arthritis, and Gout	0.00%	0
4	Diverticulosis, Cystic Fibrosis, and Asthma	0.00%	0
	Total	100%	25

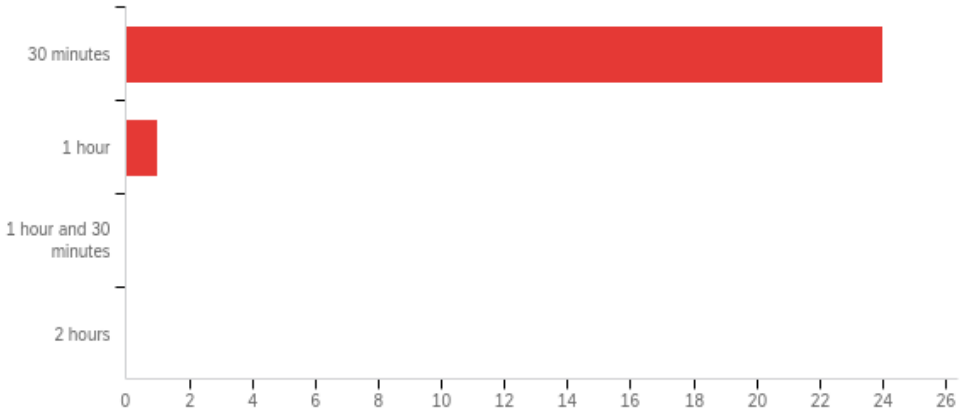
Q7 - Patients arriving with sickle cell crisis, experiencing a pain level of 1-3 (low pain), are given one of the following medications: Acetaminophen 1000 mg PO, Ketorolac 30 mg IM, Ketorolac 60 mg IM, or Ibuprofen 600 mg PO. When should the nurse re-evaluate the patient's pain?



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Patients arriving with sickle cell crisis, experiencing a pain level of 1-3 (low pain), are given one of the following medications: Acetaminophen 1000 mg PO, Ketorolac 30 mg IM, Ketorolac 60 mg IM, or Ibuprofen 600 mg PO. When should the nurse re-evaluate the patient's pain?	2.00	3.00	2.04	0.20	0.04	25

#	Answer	%	Count
1	30 minutes	0.00%	0
2	1 hour	96.00%	24
3	1 hour and 30 minutes	4.00%	1
4	2 hours	0.00%	0
	Total	100%	25

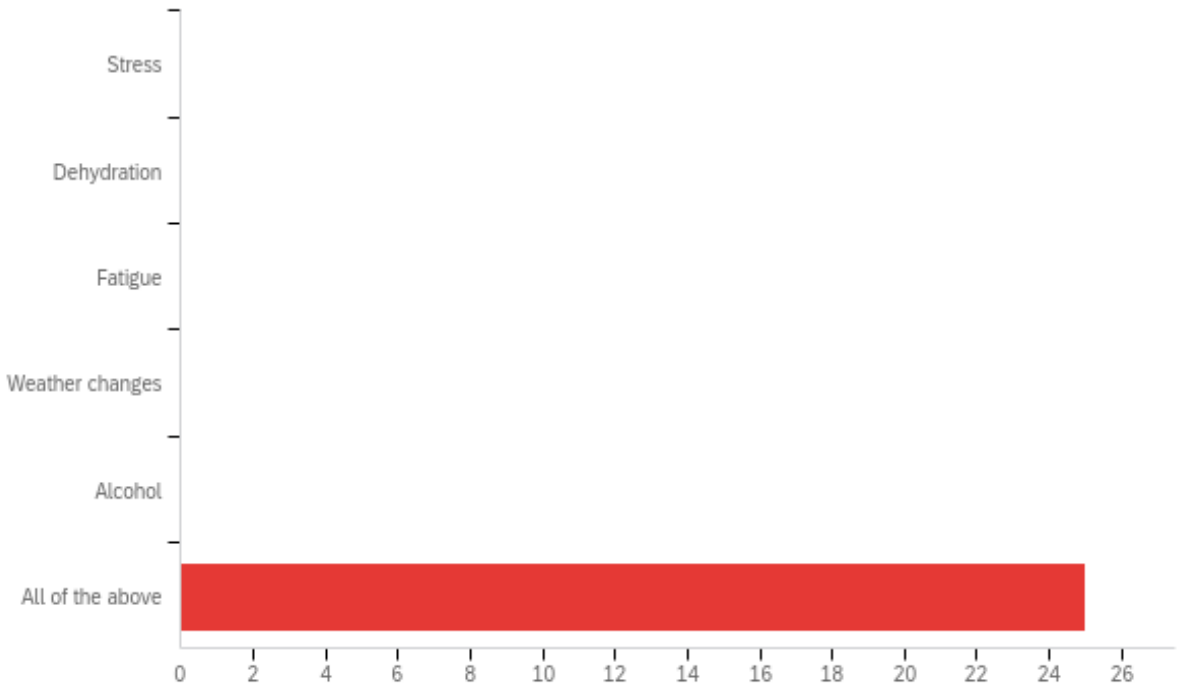
Q8 - Patients arriving with sickle cell crisis, experiencing a pain level of 4-6 (moderate pain), are given one of the following medications: Morphine 4-6 mg IV or Hydromorphone 0.5-1 mg IV. When should the nurse re-evaluate the patient's pain?



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Patients arriving with sickle cell crisis, experiencing a pain level of 4-6 (moderate pain), are given one of the following medications: Morphine 4-6 mg IV or Hydromorphone 0.5-1 mg IV. When should the nurse re-evaluate the patient's pain?	1.00	2.00	1.04	0.20	0.04	25

#	Answer	%	Count
1	30 minutes	96.00%	24
2	1 hour	4.00%	1
3	1 hour and 30 minutes	0.00%	0
4	2 hours	0.00%	0
	Total	100%	25

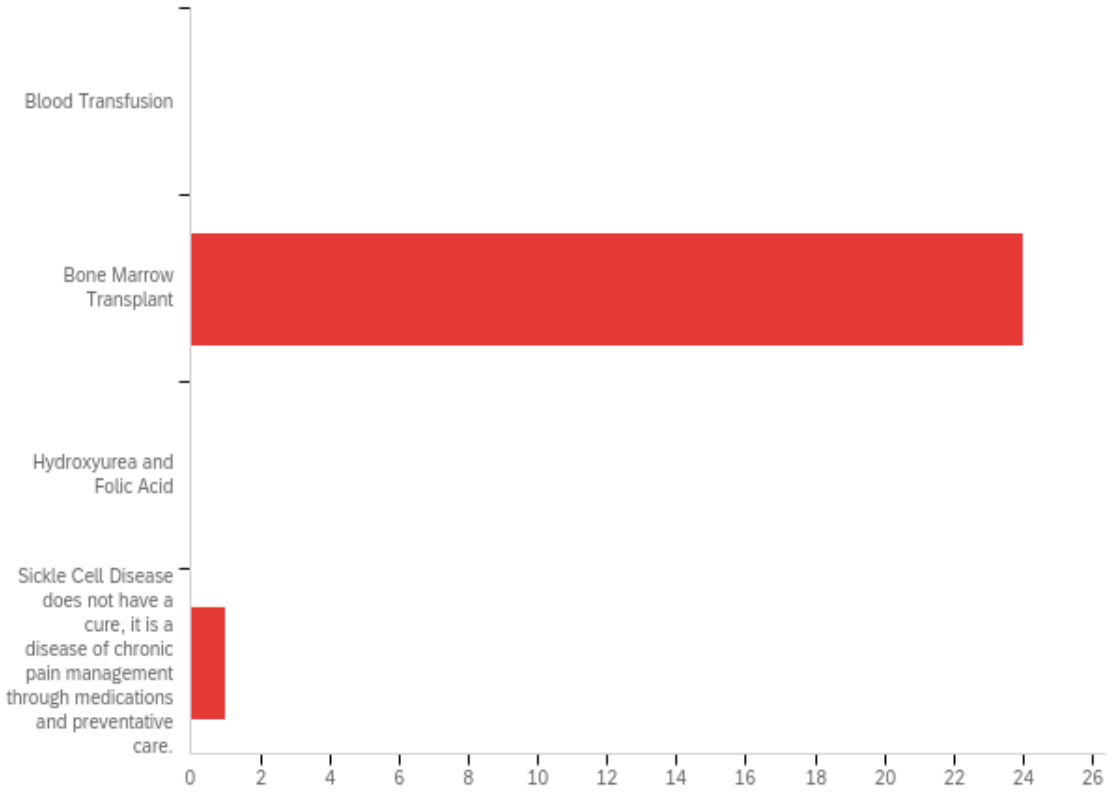
Q9 - Which of the following factors trigger a sickle cell crisis?



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Which of the following factors trigger a sickle cell crisis?	6.00	6.00	6.00	0.00	0.00	25

#	Answer	%	Count
1	Stress	0.00%	0
2	Dehydration	0.00%	0
3	Fatigue	0.00%	0
4	Weather changes	0.00%	0
5	Alcohol	0.00%	0
6	All of the above	100.00%	25
	Total	100%	25

Q10 - What is the cure for sickle cell disease?



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	What is the cure for sickle cell disease?	2.00	4.00	2.08	0.39	0.15	25

#	Answer	%	Count
1	Blood Transfusion	0.00%	0
2	Bone Marrow Transplant	96.00%	24
3	Hydroxyurea and Folic Acid	0.00%	0
4	Sickle Cell Disease does not have a cure, it is a disease of chronic pain management through medications and preventative care.	4.00%	1
	Total	100%	25

Appendix J

Implementation of Standard of Care of Acute SCD Crisis Pain Algorithm