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Evidence-Based Sickle Cell Pain Management in the Emergency Department

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Abstract
This quality improvement project addressed the gaps in sickle cell pain management at a suburban teaching hospital emergency department. The aims were to (1) measure baseline pain management practices for patients with sickle cell disease in the ED and (2) implement an adapted emergency department sickle cell pain management clinical pathway. A retrospective chart review was conducted for data abstraction on pain management practices. Medical record review from 44 patient visits showed a high use of monotherapy, delay in time to medical evaluation, medication order, and time to first and subsequent analgesic administration and pain reassessments. Results were used by a multidisciplinary team to develop and implement an evidence-based clinical pathway to improve sickle cell disease pain management. The clinical pathway development was guided by both the advancing research through close collaboration model (ARCC) and Levine's principles of conservation to provide holistic care while preserving vital organs. **Key words:** advanced practice nurses, emergency department, evidence-based care, Levine's theory, quality improvement, sickle cell pain

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CASE EXAMPLE

Mr. John Doe arrives to your unit with a 3-day history of his usual sickle cell related backache and left leg pain. He took 15 mg morphine and

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diphenhydramine 25 mg 2 hr ago. He reports that warm pad, gentle massage, dark room, and chicken noodle soup usually help but he has no appetite. He remains stoic and is asking for ketorolac (Toradol) and intravenous morphine 5 mg.

INTRODUCTION

Acute pain episodes are the single biggest reason for emergency department (ED) visits or hospitalizations in adults with sickle cell disease (SCD) (Ballas, 1995; Khattab, Rawlings, & Ali, 2006; Platt, Eckman, Beasley, & Miller 2002; Yale, Nagib, & Guthrie, 2000), but unfortunately, sickle cell pain management has been inadequate and suboptimal (Benjamin et al. 1999; Jacob & Mueller, 2008). This practice has been attributed to inadequate clinician education, (Clarke, French, Bilodeau, Capasso, Edwards, & Empoliti, 1996; Haywood et al, 2009; Pack-Mabien, Labbe, Herbert, & Haynes, 2001; Solomon, 2008), negative attitude and failure to apply available pain management guidelines (Jacob & Mueller, 2008; Jacob, 2001b). "So sometimes you just fight it within yourself. You don't want to go and ask for help because you know what they are going to do … you know what it is going to be like when you go to A and E—You think 'oh no'!" (Booker, Blethyn, Wright, & Greenfield, 2006, p. 47). Despite evidence of a need for a unique approach to SCD pain management (National Heart, Lung, and Blood Institute, 2002; Platt et al., 2002; Preboth, 2000; Rees et al., 2003), the healthcare system has mostly relied on a traditional method of pain assessment and management which is neither reliable nor effective (Jacob & Mueller, 2008; Jacob, 2001a; Todd, Green, Bonham, Haywood, & Ivy, 2006). Furthermore, patients with SCD are often stigmatized as drug seekers and as a result have historically suffered from disparities in access to quality healthcare, including timely and adequate pain management (Smith, Oyeku, Homer, & Zuckerman, 2006; Strickland, Jackson, Gilead, McGuire, & Quarles, 2001; Todd et al., 2006).

Sickle cell disease is the most common genetic condition worldwide (National Heart, Lung, and Blood Institute, 2002). It affects approximately 100,000 Americans of almost all races (Hassel, 2007). According to the 2005 data report from the Connecticut Hospital Information Management Exchange database, adults seek emergency care two times more often than children with SCD and also stay longer when admitted. Recommendations in the Connecticut Department of Public Health sickle cell initiative (2007), based on the Connecticut Hospital Information Management Exchange data and stakeholders input, include educating the ED staff about sickle cell pain and developing effective clinical guidelines for improved pain management.

Nurses play a significant role in the assessment and care of patients with sickle cell pain across the continuum of care (Jakubik & Thompson, 2000; Jamison & Brown, 2002; Newcombe, 2002). "I am feeling as if I am dying at this moment, and you are telling me to wait in two hours time. I can't wait two hours! I feel angry, and even sometimes against my mother! I hate everybody!" (Booker et al., 2006, p. 46). Comments like this are common in adults seeking treatment for sickle cell pain in the ED. In order for nurses to eliminate healthcare disparity related specifically to sickle cell pain management in the ED and become effective advocates and member of a multidisciplinary team, they must become familiar with the unique attributes of sickle cell pain. To develop appropriate pain care plans across environments of care, especially in the ED, nurses need to understand the contextual basis of the pathophysiology of SCD and vaso-occlusive events/acute pain episodes as well as that of chronic pain issues affecting many people with SCD (Alleyne & Thomas, 1994; Newcombe, 2002). Furthermore, nurses need to address racism, as a factor in the healthcare disparity that plagues the sickle cell community (Atkin & Ahmad, 2001; Atkin, Ahmad & Anionwu, 1998; Booker et al., 2006; Dyson, 1999). When treating an adult with SCD, clinicians must be cognizant of the above. Equally important is that in 1994, Platt et al. recognized that approximately 33% of deaths in adults with SCD occurred during

an acute pain episode. The pain episode, usually typical of previous pain episodes, often presented an element of "surprise" at the patient's sudden demise to all involved in the patient's care. Another author realized that adult patients hospitalized with SCD pain died within 24 hr of presentation with acute events (Manci et al., 2003). Without the knowledge of the pathophysiology of SCD, nurses will not appreciate the effect of continuous tissue damage associated with ongoing painful vaso-occlusive episodes and the implications for nursing practice including advocacy for prompt treatment. "It's very hard to convince someone that I am having pain; and they gonna take care of that one (another patient) just because they don't see (how much pain I am in). They don't take care of me" (Booker et al., 2006, p. 47). It also underscores the variability in patient presentation, and while the patient with SCD may appear "well" and practice a self-distracting coping method, clinicians must be aware of the need and rationale for urgent care.

SPECIFIC AIMS AND PURPOSE

This study examined the current SCD pain management practice patterns, explored evidence-based SCD pain management clinical guidelines, and developed and implemented an adapted ED sickle cell pain management clinical pathway.

METHODS

There were multiple components to this project, which took place over a 9-month period including (1) ED medical record review of patients with SCD and (2) the development and implementation of the SCD pain clinical pathway, which was guided in part by Levine's theory to conserve the patient's health and reduce organ damage. Not discussed in this article are simultaneous activities related to the assessment of ED nurses' attitudes and knowledge about sickle cell pain management and self-reported practice patterns and a continuing education program on the uniqueness of SCD pain management. Also omitted is the experience with the utilization of the ARCC model.

Design

A retrospective medical record review design was used for data abstraction to assess the current SCD pain management practice patterns.

Setting and Samples

This project was conducted in the ED of a suburban university healthcare center. The ED was an 18-bed unit with an average daily census of 80 patients. There was an average daily census of two patients with SCD. The data source for assessment of practice patterns was the medical records of adult patients' visits to the ED for sickle cell pain from July 2008 through May 2009. Non-SCD pain-related ED visits were excluded from the reviewed records.

Procedure

Institutional review board approval was obtained to conduct this study. Prior to the project, SCD pain management in the ED was an identified area needing improvement at the study site by the Connecticut Department of Public Health. In addressing the hospital's gaps in pain management, the administration established multidisciplinary strategic pain management teams with quality improvement team responsible for ED pain management including SCD pain management. The team consisted of the interim ED medical director, ED nurse and nurse manager, hematologist/sickle cell program director, a representative from administration (facilitator), and the palliative care nurse clinician. Other ad hoc team members included the nursing education consultant, nursing protocol director, and quality assurance director. The lead author, a DNP candidate, was invited to join and cofacilitated the process.

Theoretical Framework

The advancing research and clinical practice through close collaboration (ARCC) model for

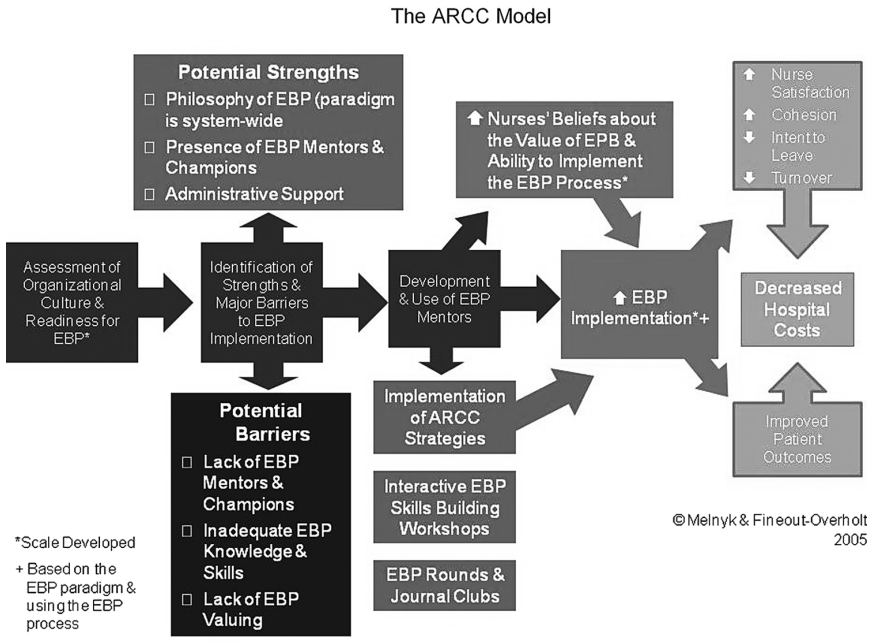

Figure 1. The advancing research and clinical practice through close collaboration (ARCC) model. From *Evidence-based practice in nursing & healthcare*, 2004, Philadelphia, PA: Lippincott Williams & Wilkins. Copyright 2005 by Melnyk and Fineout-Overholt. Reprinted with permission. EBP = evidence-based practice.

quality improvement developed by Melnyk and Fine-Overholt (2005; 2002) guided preliminary data collection and in part the development of the clinical pathway. The focus of ARCC model is to evaluate the effectiveness of evidence-based practice implementation strategies and outcomes of clinical care, as well as to disseminate and facilitate use of best evidence from well-designed studies to advance an evidence-based approach through clinical care studies. The ARCC model provided an opportunity for a system-wide implementation and sustainability of evidence-based practice. Figure 1 shows the ARCC model. The process was abridged for this project.

Quality Improvement Team Review and Policy Change Procedure

According to the American Pain Society's guideline for the management of acute pain in SCD, *Quick Reference Guide for Emergency Department Clinician* (Benjamin et al., 1999), SCD pain assessment must include an ascertainment of the characteristics such as whether the pain is acute or chronic; the intensity, location and quality of pain; past treatment; and medical and surgical history. SCD pain management parameters include acuity level, triage time, treatment time, and time to pain relief, intravenous infusion, and administration of opioid within 20 min of patient arrival to the ED. Other recommendations are patient reassessment every 15 min with the administration of around the clock rescue dosing for breakthrough pain, use of adjuvant medications, appropriate route and dose for effectiveness, assuring tolerable side effects, use of nonpharmacological interventions, disposition to home with enough medications for pain management, and referral to primary care provider/hematologist and case manager for follow-up. Similarly, SCD pain report of 7 out of 10 must be considered a level 2 out of the 5 levels in the *Emergency Department Severity Index, Version 4* (with level 1 being the most emergent and 5 being the least emergent; Gilboy, Tanabe, Travers, Rosenau, & Eitel, 2005). The above recommendations

and management principles were adapted in the new clinical pathway. They are similar to the protocol from Tanabe et al. (2007), except for time to first analgesic dose, which was increased to 30 min. The adapted protocol is also a nurse-initiated protocol when the MD is not readily available (with a verbal order), which facilitates the administration of first opioid within 30 min of arrival to the ED.

Instrument

A chart abstraction tool, the modified sickle cell disease form, was developed for this purpose by adapting a similar form used by Tanabe et al. (2007). The form was modified after consultation with Tanabe who suggested removal of some variables unrelated to this project. The modifications entailed the elimination of variables contained in that form that are not listed above and the addition of an extra field to capture use of nonpharmacological or complementary and alternative interventions (Benjamin et al., 1999).

RESULTS

Pain Experience and Pain Management Practices: Chart Review

Forty-four ED patient visits for sickle cell pain by 18 unique patients occurred from July 2008–May 2009 by retrospective chart review. The mean patient age for all patient visits was 29.9 ($SD = 5.61$), with a range of 20–38. The most frequent phenotype was HbSS at 60%, and 55% of the patient visits had no documented primary care clinician.

Triage and Pain Management

The majority (98%) of the 44 patient visits on arrival to the ED had initial pain score of above 7 with a mean of 9. The mean time from patient visit registration to medical evaluation was 32 min with a median of 24 min and a range of 4–187 min. See Figure 2 for mean time to patient triage and evaluation by medical provider. The mean time from patient visit registration to receiving the first

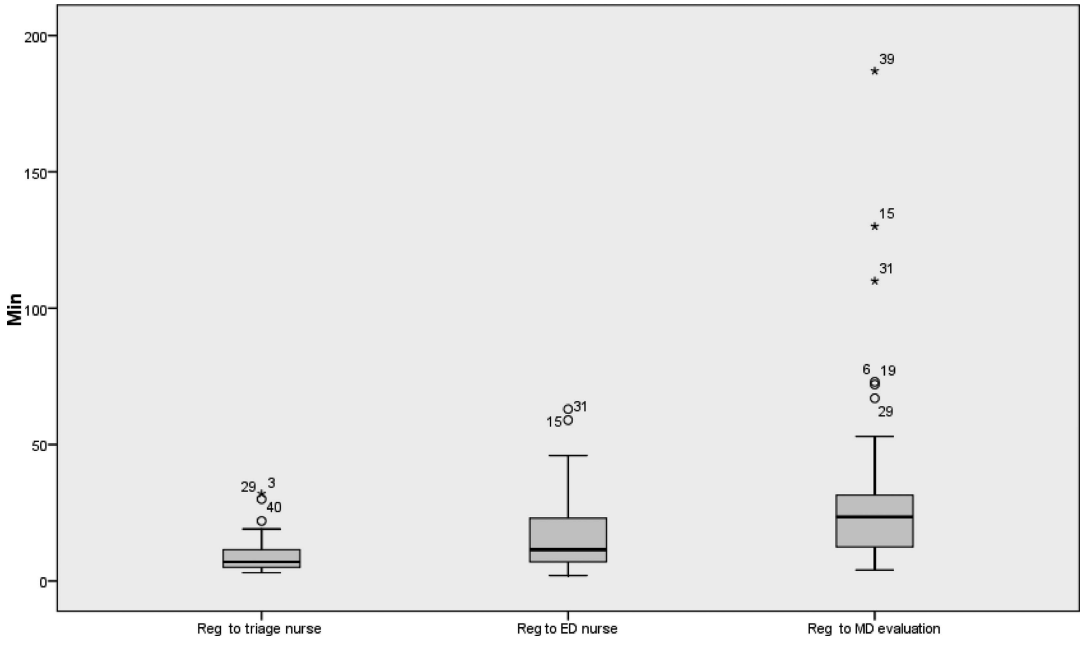

Figure 2. A box plot showing variability in mean time to patient triage, placement in the treatment room, and evaluation by the provider (MD). Five out of 44 patients (44%) waited for more than an hour before evaluation by the MD. ED = emergency department; Reg = registration.

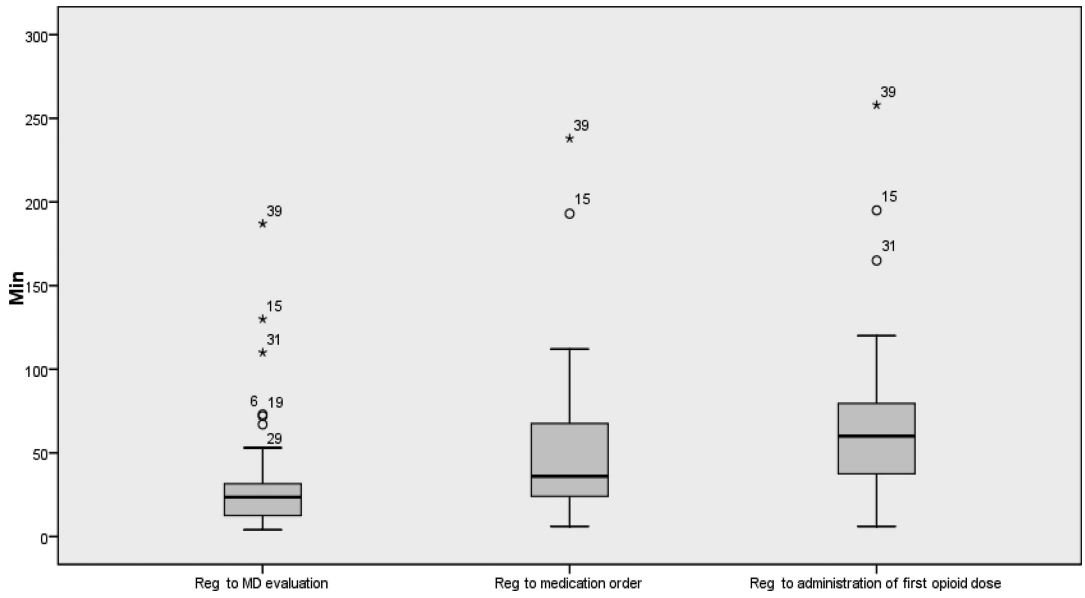

Figure 3. Registration time through MD evaluation, medication order, and first opioid dose. The standard is for patients with sickle cell disease pain episodes to have first opioid dose within 30 min of arrival to the emergency department. This box plot shows time from registration but not time from arrival. There was significant variability in patients treated according to the recommended standard of care. Eleven percent of patients received first opioid dose within 30 min of registration (time of arrival could not be ascertained). Reg = registration.

opioid was 67.5 (*SD* = 48.1) min, with a range of 6–258 min. Figure 3 shows patient registration through medical evaluation and the administration of first opioid. Choice of opioid utilized for pain management included hydromorphone, morphine, fentanyl, oxycodone, or oxycodone with acetaminophen. Almost all of the patients received adjunct medications. Adjunct medications used included promethazine, diphenhydramine, ondansetron, diazepam, enoxaparin, metoclopramide, and acetaminophen. Integrative or nonpharmacologic pain management interventions (holistic/complementary and alternative methods) were sparse. Extra blankets and warm blankets were provided during 10 (22.7%) of patient ED visits and hot packs during 1 patient visit.

Pain Reassessments, Pain Score, and Pain Management After Initial Analgesic

Reassessment for pain relief after the first opioid administration varied from 7–732 min with a mean of 113 min (*SD* = 118.4). The pain scale of 1–10 was mostly utilized for pain assessment (93%) while face scale was used in 7% of the patient visits. There were moderate correlations between time to medical evaluation and time to administering first opioid ($r = .61$, $p < 0.01$) indicating that patients who wait for assessment continue to wait for treatment. In addition, there was a strong correlation between the administration of first opioid dose and time to discharge ($r = .87$, $p < 0.01$), an indication that those who had to wait for treatment (first dose of medicine) have a longer length of stay. Figure 4 shows mean time to patients' first opioid and disposition (discharge home and admission).

DISCUSSION

Baseline Pain Assessment, Triage, and Treatment

Results from the retrospective medical record review showed significant delays from patient visit registration to clinician evaluation and

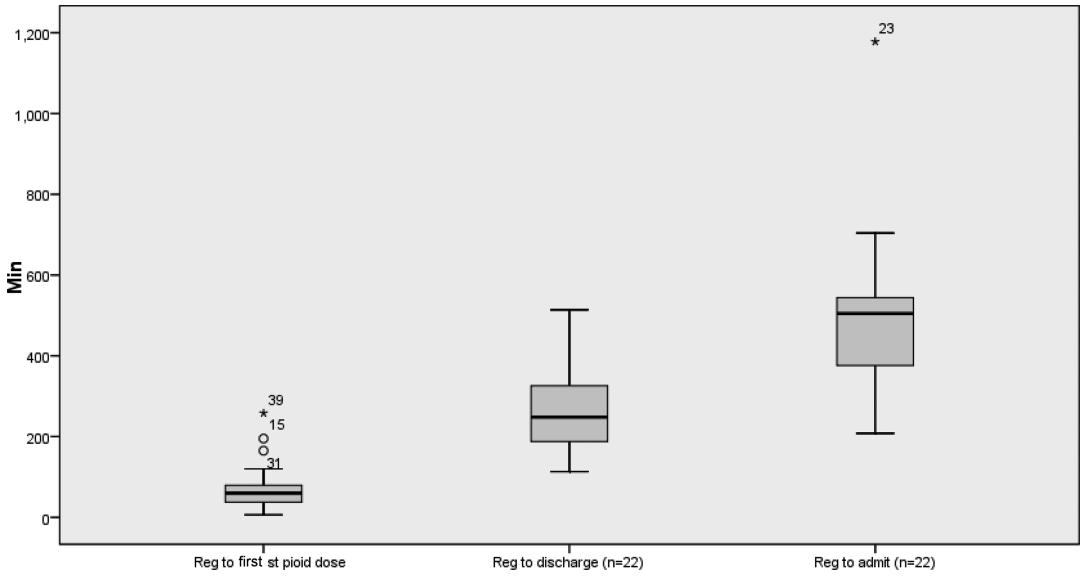

Figure 4. Mean time to first opioid and patient disposition. Many patients did not receive first opioid within the recommended 30 min from time of arrival. The 22 patients who were discharged had a 4-hr median length of stay, and the 22 patients who were admitted had a 9-hr median length of stay (boarding). Since the emergency department was not a day treatment center for sickle cell disease pain, other patient care issues were identified as contributing factors to the extended boarding time. Reg = registration.

patient visit registration to administration of first analgesic dose, similar to the study described by Tanabe et al. (2007). Successful strategies to reduce delays and improve patient care in the ED are applicable to this population (Richards, 2005). By the end of the study, the health center had a new triage system in the ED, which allows the patient to see the triage nurse before registration. While this approach could reduce the wait time to room placement, it could also delay time to treatment resulting from duplicate pretreatment assessments. The role of the advanced practice nurse (APN) could not be overemphasized. For example, the principle investigator of this project designed to change practice norms in SCD pain management is an APN. The initiation and the development of this project serve as role modeling for other APNs.

APNs can play a critical role at all levels of care, providing early assessment and implementation of pain management strategies to reduce time to treatment. The need to reduce the wait time from patient arrival to the triage assessment was a major topic of discussion during the planning stages of this study. Few patient visits received the first opioid dose within 20 min of arrival to the ED as recommended by the APS clinical guidelines for SCD acute pain management in the ED. Although the patient visits (with a mean pain score of 9) were assigned the appropriate triage level on the basis of the emergency severity index triage classification (Benjamin, et al., 1999; Gilboy, et al., 2005), the patients did not receive timely treatment according to the guidelines. A more probable explanation for the delay could be the inadequate knowledge about the uniqueness of SCD pain, effects of inadequate SCD pain management, and lack of awareness about the recommendations of APS guidelines for SCD pain management. The role of the APN in the education of health clinicians regarding the utilization of practice guidelines and advocacy for the implementation of best practices should be evident.

Future research should assess adherence to the clinical pathway in patient care and address process issues as they develop. Future studies are recommended to explore the role

of Levine's conservation principles (Levine, 1969) on SCD care, pain management, and reduction of organ damage. In addition, patient satisfaction with the individualized care plans and clinical pathway should be examined.

LIMITATIONS

Limitations of this study include the utilization of consecutive patient visits, small sample size and study period outside of time of the year known for high incidence of SCD pain episodes. A future study across multiple settings with large sample size and over an extended period is recommended. Similarly, the small sample size and responses to the pre- and postquestionnaires preclude the generalization of the results. It is unclear if all nurses completing the questionnaires also participated in the education. A more careful control of this variable in future method might demonstrate increased learning than was found in this study.

Implication for Practice

Deficiencies in the delivery of quality and evidence-based sickle cell pain management in the ED were identified at a suburban university healthcare setting. These deficiencies were addressed by providing nursing education and developing a clinical pathway for SCD pain management in the ED. Similar to other studies, this study has reaffirmed the urgent needs of adult patients with SCD concerning quality evidence-based healthcare services. However, the implementation and adherence to evidence-based practice in SCD pain management is negligible. The APN plays a key role in the development and evaluation of evidence-based practice that is clinically beneficial and cost-effective, a paradigm shift required of the healthcare delivery systems for patients with SCD. The APN's knowledge of the identified problems and specific clinical pathway as they relate to individualized patient care plan is essential to achieving optimal patient health outcomes. In combination, these actions will foster a better health-related quality of life and conserve SCD patients' organs so that they can benefit from future biotechnology advancement.

Delayed provider evaluation and time to treatment is associated with prolonged stay in the ED. Recent studies have implicated prolonged stay in the ED with prolonged length of admission (Liu, Thomas, Gordon, Hamedani, & Weissman, 2009). It is prudent to take bold actions that would minimize patient's length of stay in the ED. This is essential in an era of ED overcrowding with competing patients' needs. These needs often lead to clinicians' distraction and unintentional delay in SCD patient reassessment and treatment follow-up. One approach would be to employ more APNs to reduce patient boarding in the ED. The APN's role in the care of patients in some clinical areas including the ED has not been maximized even though patients have reported satisfaction with the care provided by APNs in the ED (Hart & Mirabella, 2009).

An APN at the ED triage area could provide abbreviated assessment; give both verbal and written orders to prevent delays in time to provider evaluation and the administration of first analgesic medication dose. Furthermore, after the initial fast track triage by the triage nurse, the APN could be the designated provider for these patients to reduce the wait time between triage, patient assessment, and treatment administration.

APNs have been functioning as palliative care consultants for ambulatory and inpatients with pain at this health center, but there were no APNs in the ED during the time of study. Future study on the implications of an emergency APN assigned to acute and chronic pain patients with a level 2 ESI triage score is recommended. The APN in the ED can initiate and follow up on the treatment care plan to reduce or eliminate some of the inherent delays, length of stay in the ED, and recidivism. Furthermore, since SCD pain management is multidisciplinary, the APN could be responsible for care coordination across systems of care (ED, inpatient, and outpatient/community), in collaboration with the different specialists, the patient, and family members. The ability of the APN to write

admission orders will also reduce the length of stay in the ED. Unlike rotating residents (resulting in lack of continuity of care), an established APN in the ED can serve as a consistent provider and foster continuity of care for patients with SCD who have repeated and multiple visits to the ED. In addition to the above, another inherent role of the APN is education (patient, professional, and community). The patient and family rely on the APN to provide education regarding patient problems, treatment care plans, and support services. APNs have a responsibility to educate nurses and other clinical staff about specific clinical pathways and guide them through the development, implementation, and evaluation of these pathways. Evaluation of the implemented clinical pathway should include utility, health-related outcomes, patient satisfaction, and cost-effectiveness. Community education on SCD and evidence-based practice will increase awareness, reduce stigma, and foster better understanding and support for the SCD community.

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