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Emergency Department Provider Survey Regarding Acute Sickle Cell Pain Management

Olufunke Y. Martin, MD[*,†], **Sean M. Thompson, MD**[*,†,‡], **Aaron E. Carroll, MD, MS**[*,†,§,‖], **Seethal A. Jacob, MD, MS**[*,†,§,¶]

[*]Indiana University School of Medicine, Indianapolis, IN

[†]Riley Hospital for Children, Indianapolis, IN

[‡]Department of Emergency Medicine, Indianapolis, IN

[§]Center for Pediatric and Adolescent Comparative Effectiveness Research, Indianapolis, IN

[‖]Children's Health Services Research, Department of Pediatrics, Indiana University, Indianapolis, IN

[¶]Department of Pediatrics, Division of Pediatric Hematology/Oncology, Indianapolis, IN

Summary:

Sickle cell disease (SCD) can lead to potentially devastating complications that occur secondary to vaso-occlusion. Current national clinical guidelines are largely based on expert opinion, resulting in significant variation of management. Provider awareness regarding emergency department (ED) management of vaso-occlusive crises (VOC) remains unknown. A 23-question assessment of VOC management was administered to all eligible ED providers at Riley Hospital for Children between September and November 2018. Univariate analyses were performed to evaluate responses between groups. Of 52 respondents comprised of ED staff attendings (27%), resident trainees (58%), and ED nurses (15%), the majority were not aware of SCD management guidelines being available. Approximately 54% of providers endorsed a high comfort level in managing VOC, with staff and nurses more likely to report this than trainees ($P = 0.02$). Less than 10% of all providers knew the recommended timeframe from triage to initial medication administration. Prolonged time between pain assessments was reported by 25% of providers with a high comfort level in managing VOC, which was similar to providers with a lower comfort level (13%, $P = 0.217$). Only one fourth of all respondents appropriately did not use vital signs as an indication of a patient's pain level, and > 10% reported not utilizing patient-reported pain scores. This was not significantly different between provider comfort levels ($P = 0.285$ and 0.412, relatively). Our results suggest education regarding recommended practices was inadequate regardless of reported provider comfort. Further provider education and/or standardized ED VOC management guidelines may serve as areas for improvement in SCD care.

Reprints: Olufunke Y. Martin, MD, Department of Pediatrics, Riley Hospital for Children, 705 Riley Hospital Drive, RI 5867, Indianapolis, IN 46254 (fyogunfo@iu.edu).

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Keywords

pediatrics; sickle cell disease; emergency department; vaso-occlusive crisis; provider survey

Sickle cell disease (SCD) is an inherited disorder of red blood cells that can lead to many potentially devastating complications that occur secondary to vaso-occlusion.[1] SCD affects nearly 100,000 individuals in the United States and occurs predominately in individuals of African, Mediterranean, Indian, and Middle Eastern descent.[2] The underlying pathophysiology of the disease involves formation of rigid polymers of deoxygenated hemoglobin that damage the red blood cell membrane, which subsequently leads to tissue hypoxia and ischemia, resulting in acute, episodic vaso-occlusive pain.[3,4]

Vaso-occlusive pain crisis (VOC) is the most common complication seen in SCD, accounting for 79% to 91% of emergency department (ED) visits and a significant number of hospitalizations in patients with SCD.[5] This pain can occur diffusely, but often involves chest, lower back, and legs requiring prompt intervention to prevent long term sequelae. Severe pain episodes can evolve over time, with episodes lasting a few days to several weeks.[3,6]

ED management of VOC is crucial for improving clinical outcomes in pediatric SCD. ED physicians must be able to quickly identify these acute manifestations and provide early pain management and resuscitation, with expeditious determination of patient disposition.[2] The 2014 National Heart, Lung, and Blood Institute (NHLBI) expert panel recommendations for management of VOC highlights the importance of (1) Rapid evaluation and initiation of analgesia, (2) Optimized analgesia selection and dosing frequency, and (3) Frequent pain assessments.[7] However, emergency care is often cited by patients with SCD as an area with the greatest need for improvement.[3] Children with SCD, in particular, represent a vulnerable population. The absence of objective findings often discourages health providers from repeating tests and ignites suspicion regarding the authenticity of the pain.[6] A recent report from the Institute of Medicine cited inadequate provider knowledge as one reason for suboptimal management of SCD-related pain.[8,9]

Physician comfort with, knowledge, and awareness of the NHLBI management guidelines for SCD remains unknown at our institution. These 2014 NHLBI guidelines were utilized as the gold standard clinical management recommendations for comparison of provider responses in our survey (Supplemental Digital Content 1, http://links.lww.com/JPHO/A385). To better understand the gap in understanding, we evaluated ED provider awareness of and comfort with current pain management guidelines for sickle cell VOC at our institution. This will provide valuable information regarding the potential limitations of current guidelines and potentially support the use of VOC-specific interventions.

MATERIALS AND METHODS

Setting

This Institutional Review Board-exempt, cross-sectional study was conducted in an urban pediatric ED in a Level 1 trauma center with ~47,000 visits a year in patients 21 years of age and under. This site serves as the primary ED for over 250 children and adolescents with SCD who are followed at our institution.

Sample Population/Survey Administration

All eligible pediatric ED providers (ED staff attendings, resident trainees and ED nurses) at Riley Hospital for Children in Indianapolis, IN were surveyed from September through November 2018. The institution's ED providers included ~25 ED staff attendings, 211 resident trainees (ie, categorical pediatrics residents, emergency medicine residents and combined pediatrics residents such as medicine/pediatrics, emergency medicine/pediatrics) and 50 ED nurses. Of note, resident trainee time spent in the pediatric ED accounts for ~1 month per year. All providers had worked in the Riley ED within the last 3 years and/or would work in the Riley ED in the upcoming year. The survey was administered electronically via email during this timeframe using RedCap, with responses submitted anonymously and a completion time of ~10 to 15 minutes.

Methods of Measurement

We created a 23-question multiple choice provider survey (Fig. 1) designed to identify baseline knowledge of and comfort with national VOC management guidelines. As there exists no validated surveys in the literature for this purpose, we selected questions that directly related to VOC and ED management based on the 2014 NHLBI expert panel recommendations and an extensive literature review of analgesia practices. There were 4 items adapted from a validated emergency provider practice pattern questionnaire by Glassberg et al.[10] Our survey was created with input from ED and hematology providers, and a small test sample was utilized to exclude leading or confusing questions. In addition to demographics (7 items), the survey was broken down into 2 additional sections: provider practices (4 items) and knowledge of national guidelines (12 items). Provider comfort in management and current use of various pain assessment tools were assessed using a 5-point Likert scale. Key knowledge measures based on NHLBI guidelines included: the recommended time to initial dose of analgesia (<30 min from triage), expected frequency of pain assessments (every 15 to 30 min), and utilizing patient-reported pain scores as an indication of pain. In addition, measures aimed to determine best-practices and patient safety were included, such as standard triage level for SCD patients with VOC, as detailed by the emergency severity index (ESI) version 4 triage system, and determination of disposition.[11,12]

Statistical Analyses

Provider responses were collected within the RedCap database and sorted based on provider training and title. Descriptive statistics were used to analyze demographic data. Responses to the survey were analyzed overall for all participants, within provider training groups, as well as based on comfort level. We used χ^2 or Fisher exact tests to evaluate responses between groups, with a level of significance of P-value <0.05.

RESULTS

We obtained responses from 68 eligible survey respondents (~24% response rate). Of these, 16 were excluded due to missing responses, for a completion rate of 18%. Responses were comprised of ED staff attendings (27%), resident trainees (58%), and ED nurses (15%). Table 1 provides demographic information regarding the survey respondents. Greater than 40% of staff and nurses who were surveyed had >5 years of clinical experience. Seventy-five percent of respondents identified as female. Fifty percent of respondents were pediatrics trained with an additional 27% combined pediatrics trained (Table 1). Current trainees who were in their second year of training or above, accounted for 87% of resident trainee respondents.

Of the respondents, the majority (75%) were not aware of SCD pain management guidelines being available (Table 2). Providers who reported their level of comfort with managing VOC as "excellent" or "very good" were categorized as having a "high comfort level," and those who reported "good", "fair", or "poor" were categorized as having a "low comfort level." Table 3 stratifies the correct number of survey responses to key protocol components by comfort level. Approximately 54% of providers endorsed a high comfort level (very good or excellent) in managing acute VOC, with attendings and nurses more likely to report this than trainees (P=0.02). From this same high comfort subset, 75% were able to correctly identify that a standard triage level of 2 be assigned to a patient with VOC, which was greater than those who reported lower levels of comfort but not statistically significant (50%, P=0.057).

The majority (87%) of all providers knew the recommended timeframe (<30 min) from triage to initial medication administration, but this did not correlate with their choice of how frequently pain should be reassessed (P=0.058). The majority of providers accurately identified that the expected frequency of repeat pain assessments was every 15 to 30 minutes, however, 19% reported a frequency of 60 minutes or greater. Of those who selected a prolonged time between pain reassessments, there was no difference in response based on provider comfort level (25% vs. 13%, P=0.217). The clinical guidelines advocate for determination of analgesia needs based on subjective patient-reported pain scores; amongst survey respondents, 88% appropriately utilized patient-reported pain scores but 77% also reported consistently using vital signs as an indication of a patient's pain level. This was not statistically significantly different between provider comfort level.

Providers with a high level of comfort in managing VOC were more likely to report a pain score of 4 or less being necessary for discharge home (P = 0.033), while those with a lower comfort level were more likely to report administering 5 or more doses of medication in the ED prior to determining disposition (P = 0.015).

DISCUSSION

The ED remains a key area of management for children with SCD, and acute pain continues to be the leading chief complaint.[5,8,10] VOC accounts for > 230,000 ED visits nationally and billions of health care dollars each year.[10,13] Current guidelines for VOC management are primarily based on the 2014 NHLBI expert panel recommendations.[7] However, ED provider management practices have been shown to vary from published national guidelines.[10] Our study demonstrated that self-reported comfort level in managing VOC did not correlate with provider understanding of SCD VOC management as advised by the NHLBI. This implies a need for re-evaluation of previous education regarding recommended practices.

Rapid Initiation of Analgesia

The NHLBI guidelines suggest rapid initiation of analgesia within 30 minutes of triage and within 60 minutes of presentation to the ED, which are also quality-of-care indicators for pediatric SCD.[7,8,14,15] In our survey, the majority of providers reported a much larger range of time for initial analgesia dosing. This is consistent with studies of pediatric SCD patients that demonstrate children wait 2 to 3 times the recommended timeframe for his or her first dose of analgesia.[8,14] Furthermore, studies support that analgesia is often under-prescribed by ED physicians.[2] In addition, the NHLBI emphasizes the importance of repeated pain assessments in determining disposition.[2,7] Assessment of pain should correlate with the onset of action for the analgesic agent administered, hence why opioids that are given intravascularly be reassessed within 15 to 30 minutes.[16] Despite this, providers in our survey predominately chose a prolonged time range for repeat pain assessment.

Pain Assessments

Patient perception of pain is also an important focus of the NHLBI guidelines with most traditional pain assessment tools focused on assessment of pain intensity,[17] yet literature suggests variability of adaption into practice. Shapiro et al[18] showed in a survey of 115 hematologists and ED physicians that patient-reported pain scores were not considered a reliable indicator of pain existence or intensity in patients with SCD. The providers in our survey were similar, in that 12% of respondents did not use patient-reported pain scores as an indicator of a patient’s pain level. This raises concern for potential provider mistrust in patient self-report of pain, a cornerstone of acute pain management, with studies finding that SCD patients are twice as likely to be perceived by health care professionals as opioid dependent[19] and differing perceptions of the effect of race on the quality of health care delivery.[20,21] There are limited subjective measures in addition to the absence of objective physical examination findings (including vital signs), radiographic evaluation or laboratory workup that validate pain and determine its severity[11] yet only 23% of providers in our survey appropriately recognized that vital signs were not a valid measure of patient pain severity. This further illustrates the importance of entrusting patient report of pain severity to guide medical management and avoid delays in prompt identification of VOC pain. With an evolving understanding of the complex multidimensional acute pain experience for patients with SCD, there are research efforts underway to develop and validate multimodal pain assessment tools.[17]

Clinical guidelines continue to advocate for determination of analgesia needs based on subjective pain assessments. Yet, studies rarely comment on dosing recommendations and even fewer provide data regarding disposition.[15] Furthermore, the NHLBI guidelines comment on continued reassessment and analgesia dosing until pain is controlled with no clear end point outlined,[3] as well as no studies that clearly outline disposition goals to determine whether a patient warrants admission versus discharge home. The Joint

Commission outlined standards for pain assessment and management, largely based on Acute Pain Clinical Practice Guidelines, further requiring that pain assessment tools be used uniformly across the entire hospital.[16] In our study, a pain score of ≤ 4 correlated with our institution-specific standard for oral non-opioid analgesia agents; thus, it was chosen as the discharge disposition.

Provider Comfort and Attitudes

The patient-provider relationship has long been recognized as playing a fundamental role in the delivery of high-quality care, yet studies that examine health care provider attitudes towards patients with SCD and the clinical implications on quality-of-care are limited. Whiteman et al[22] investigated the comfort level of primary care providers in providing ambulatory care for adult and pediatric patients with SCD. They found that the majority of respondents did not feel comfortable managing care for patients with SCD and that 26.8% of respondents believed that their patients' needs were not being met.[22] Interestingly, knowledge acquired from residency training was the most utilized reference and correlated with increased comfort in primary care management. Although about half of the providers surveyed in our study reported having a high level of comfort in caring for SCD patients with acute VOC, only 30% of resident trainees reported as such. In addition, reporting a high comfort level in our study did not necessarily correlate with correct survey responses, illustrating the importance of high-quality clinical training and continued physician education as it relates to SCD VOC management.

ED provider attitudes towards pain management in individuals with SCD are essential to improving adherence to guidelines.[10] One study specifically assessed pediatric residents attitudes and barriers to pain management in children with SCD.[23] This study identified that pediatric residents perceived several barriers to acute VOC pain management, including concern for patient addiction and tolerance, as well as inadequate resident training.[23] They concluded that negative provider perceptions of patients with SCD were prevalent amongst the residents, notably that "patients with SCD are frustrating to take care of."[23] Negative provider misconceptions that patients with SCD exemplify drug seeking behaviors or have addiction issues lead to provider perceptions of exaggerated pain levels, further serving as barriers to care.[3,24] Despite Shapiro and colleagues demonstrating that 46% of emergency physicians believe that > 10% of pediatric patients were addicted, in reality, the rate of addiction in the SCD population is similar to that of the general population (2% to 5%).[3,18] Another study comparing attitudes of white emergency providers versus black emergency providers, showed that black providers had more positive attitudes and higher self-reported VOC guideline adherence.[10,21] A multidisciplinary provider survey performed at a comprehensive sickle cell center, examined provider and patient/families' perceptions of race and health care delivery.[20] Strikingly, they found that while 41% of black physicians cited race as a key factor in quality of health care delivery, while only 4% of white physicians thought this to be true.[20] This can certainly lead to hesitancy to repeat or escalate opioid analgesia dosing.[3,25] In addition, it may further hinder the physician-patient relationship resulting in inadequate treatment, biases, knowledge gaps and dissatisfaction with care for both patients and physicians.[3,18] Haywood et al,[24] implemented a short video intervention to improve clinician attitudes towards patient's with SCD and demonstrated a strong impact on reducation of negative provider attitudes.

A survey of EDs at US teaching hospitals was conducted in the mid-1990s and illustrated that only 20% of survey respondents utilized pain management guidelines.[26–28] Since then, there have been several studies, particularly in adult populations, that have cited improvement in ED utilization and hospital admissions after implementation of a standard and/or individualized pain protocol in patients with SCD.[26,29–31] One multicenter quality improvement (QI) study conducted in adult patients (18 y or older) evaluated the impact of a standard nurse-initiated pain protocol in the ED. They compared time to initial analgesia, pain scores on admission versus discharge, and patient-reported satisfaction with pain management in the ED.[29] They concluded that there was no improvement in the time to initial analgesia administration but did note improvement in the patient-reported pain scores from admission to discharge. Kavanagh et al[8] conducted a similar QI study in pediatric SCD patients and was able to demonstrate improvement in patient-reported pain scores, as well as time to initial analgesia, using a standardized protocol, intranasal fentanyl as initial analgesic agent, and patient/provider education. Timely and appropriate implementation of a standardized SCD pain protocol appears to correlate with improved clinical outcomes for patients with SCD.

Study Limitations

Limitations to our study include that this is a small sampling of a single institution pediatric ED, and, therefore, may not be generalizable to community EDs utilized by patients in our region. We might suspect similar responses from these providers, although, as the majority of providers in our state were trained at our institution. With a survey response rate of 24%, we anticipate that this may be attributable to survey fatigue, but the decreased completion rate of 18% suggests it could also be secondary to lack of comfort with the clinical management guidelines. In addition, although our survey identifies management that deters from expert recommended guidelines, it does not identify *why* this deterrence exists (eg, *why* does a provider choose to wait > 50 min to reassess pain). Finally, the complex nature of the ED means varying census and wait times that underlie system wide confounders to care delivery that were not assessed as part of this study.

CONCLUSIONS

ED management of SCD VOC is a crucial and important area for improving clinical outcomes in pediatric patients. Existing management guidelines lack the specificity to fully guide medical providers and monitor performance of key QI measures. The results of our study suggest that there may be a gap between provider practices and knowledge of nationally published guidelines. Multi-institutional studies are needed to confirm that our findings occur on a national scale. Focused multidisciplinary provider education as well as the development of a standardized SCD ED pain management protocol, may serve as potential areas for improvement in SCD care. Further study is needed to understand *why* providers may deviate from national or institutional guidelines, as well as to identify provider training gaps.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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1. Overall, how would you rate your level of comfort in managing an acute sickle cell pain crisis?
2. How likely are you to utilize a patient's reported pain score as an indication that the patient is in pain?
3. How often do you utilize vital signs as an indication of a patient's pain level?
4. What is the standard triage level for a patient with sickle cell disease at your institution?
5. According to the guidelines, what is the expected time from triage to initial analgesia administration?
6. According to the guidelines, how frequently is a pain score assessed?

FIGURE 1.
Sickle cell disease emergency department provider pain survey questions.

TABLE 1.

Characteristics of Survey Participants

Characteristics (N=52)	n (%)
Clinical role	
ED staff attending	14 (27)
Resident trainee	30 (58)
ED nurse	8 (15)
Sex	
Male	12 (23)
Female	39 (75)
Prefer not to answer	1 (2)
Specialty training background	
Adult EM	10 (23)
Pediatrics/EM	9 (20)
Pediatrics	22 (50)
Combined (ie, medicine/pediatrics, triple board)	3 (7)
Resident trainee level	
PGY1	4 (13)
PGY2	18 (60)
PGY3	8 (27)
ED staff attending experience (y)	
<1	1 (7.1)
1–5	7 (50)
5–10	3 (21.4)
10–15	1 (7.1)
15+	2 (14.4)
ED nurse experience (y)	
<1	1 (12.5)
1–5	4 (50)
5–10	0
10–15	2 (25)
15+	1 (12.5)
Comfort level in managing VOC	
High	28 (54)

ED indicates emergency department; EM, emergency medicine; PGY, post-graduate year; VOC, vaso-occlusive crises.

TABLE 2.

Correct Survey Responses by Role

	Overall (N = 52) (%)	Emergency Department Staff Attending (n = 14) (%)	Resident Trainee (n = 30) (%)	Emergency Department Nurse (n = 8) (%)	*P*
High comfort level	54	86	30	87.5	<0.001
Aware sickle cell disease guidelines exist	21	21	10	63	0.015
Standard triage level 2	63.5	93	40	100	<0.001
Initial analgesia choice of intranasal fentanyl	32.5	64	16	37	0.006
Pain score assessment every 15–30 min	81	86	83	63	0.392
Pain score to discharge home ≤4	73	93	67	62.5	0.140
Maximum 4 doses to disposition determination	61.5	57	63	62.5	0.377

TABLE 3.

Correct Survey Responses by Comfort Level

Total (N = 52) ED Staff Attending (n = 14) Resident Trainee (n = 30) ED Nurse (n = 8)	High Comfort (N = 28), n (%)	Low Comfort (N = 24), n (%)	*P*
Likely to utilize pain scores			0.674
ED staff attending	10 (36)	2 (8)	
Resident trainee	7 (25)	19 (79)	
ED nurse	7 (25)	1 (4)	
Aware SCD guidelines exist			0.516
ED staff attending	3 (11)	0	
Resident trainee	0	3 (12.5)	
ED nurse	4 (14)	1 (4)	
Recognize standard triage level 2			0.086
ED staff attending	12 (43)	1 (4)	
Resident trainee	2 (7)	10 (42)	
ED nurse	7 (25)	1 (4)	
Initial analgesia choice of intranasal fentanyl			0.037
ED staff attending	9 (32)	0	
Resident trainee	1 (3.5)	4 (16.5)	
ED nurse	3 (11)	0	
Pain score assessment every 15–30 min			0.309
ED staff attending	10 (36)	2 (8)	
Resident trainee	6 (21)	19 (79)	
ED nurse	5 (18)	0	
Pain score to discharge home <4			0.033
ED staff attending	12 (43)	1 (4)	
Resident trainee	7 (25)	13 (54)	
ED nurse	5 (18)	0	
Maximum 4 doses to disposition determination			0.015
ED staff attending	6 (21)	2 (8)	
Resident trainee	3 (11)	16 (66.5)	
ED nurse	4 (14)	1 (4)	

The “N” designated in the High Comfort and Low Comfort columns denotes the number of respondents who were of the specified comfort level (eg, High Comfort). The “%” is the proportion n/N. With “n” denoting the number of individuals in each subcategory (eg, ED Staff Attending) that specified comfort level and answered correctly over this “N” (eg, High Comfort).

ED indicates emergency department; SCD, sickle cell disease.