Emergency Provider Analgesic Practices and Attitudes Toward Patients With Sickle Cell Disease

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Study objective: We determine whether emergency provider attitudes and demographics are associated with adherence to national guidelines for the management of acute sickle cell disease pain.

Methods: We conducted a cross-sectional survey of emergency providers at the 2011 annual American College of Emergency Physicians *Scientific Assembly*, using a validated instrument to assess provider attitudes and self-reported analgesic practices toward patients with sickle cell disease. Multivariable, relative risk regressions were used to identify factors associated with adherence to guidelines.

Results: There were 722 eligible participants, with a 93% complete response rate. Most providers self-reported adherence to the cornerstones of sickle cell disease pain management, including parenteral opioids (90%) and redosing opioids within 30 minutes if analgesia is inadequate (85%). Self-reported adherence was lower for other recommendations, including use of patient-controlled analgesia, acetaminophen, non-steroidal anti-inflammatory drugs and hypotonic fluids for euvolemic patients. Emergency providers in the highest quartile of negative attitudes were 20% less likely to redose opioids within 30 minutes for inadequate analgesia (risk ratio 0.8; 95% confidence interval [CI] 0.7 to 0.9). High-volume providers (those who treat more than 1 sickle cell disease patient per week), were less likely to redose opioids within 30 minutes for inadequate analgesia (risk ratio 0.9; 95% CI 0.8 to 0.9). Pediatric providers were 6.6 times more likely to use patient-controlled analgesia for analgesia (95% CI 2.6 to 16.6).

Conclusion: The majority of emergency providers report that they adhere to national guidelines about use of opioids for sickle cell disease–related acute pain episodes. Other recommendations have less penetration. Negative attitudes toward individuals with sickle cell disease are associated with lower adherence to guidelines. [Ann Emerg Med. 2013;62:293-302.]

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INTRODUCTION

Background

Sickle cell disease is an inherited disorder of hemoglobin that affects approximately 100,000 Americans.[1] The most common manifestation of sickle cell disease is the vaso-occlusive painful episode, and with more than 230,000 emergency department (ED) visits for pain per year, acute care use for sickle cell disease accounts for more than $1.5 billion in health care expenditures annually.[2] The quality of emergency care for sickle cell disease pain has been cited repeatedly as an area in need of improvement.[3-6] It has been widely proffered that emergency providers do not know how to manage acute sickle cell disease pain[7,8] and that they are unaware of national guidelines on this topic (published by the American Pain Society[9] and National Heart, Lung, and Blood Institute).[10] Despite the perceptions of inadequate treatment, to our knowledge there have been no large studies to examine the practice patterns of emergency providers, nor has there been a rigorous evaluation of emergency provider attitudes toward persons with sickle cell disease.

Importance

High rates of ED recidivism for a small proportion of persons with sickle cell disease are thought to contribute to negative provider attitudes.[11-14] Although multiple systematic reviews suggest that negative health care provider attitudes toward sickle cell disease patients serve as general barriers to the provision of high-quality pain management, an association between provider attitudes and practice has not been demonstrated on a large scale. Why select health care providers choose to deviate from accepted guidelines that affect the quality of sickle cell disease care is unclear.[15-17]

Goals of This Investigation

The primary goal of this investigation is to identify risk factors for self-reported nonadherence to national guidelines for

Editor's Capsule Summary

What is already known on this topic

Pain management practices in sickle cell disease often differ from expert recommendations.

What question this study addressed

This survey of 795 emergency providers examined the association of negative attitudes toward patients with sickle cell disease and nonadherence to national guidelines.

What this study adds to our knowledge

Negative views of patients with sickle cell disease were associated with lower guideline adherence.

How this is relevant to clinical practice

A better understanding of provider attitudes may help us develop more effective interventions to improve care.

the treatment of individuals with sickle cell disease who present to the ED for acute vaso-occlusive pain episodes. We tested the hypothesis that emergency providers with negative attitudes toward individuals with sickle cell disease will deviate from national guidelines for the management of acute vaso-occlusive pain episodes. We also tested the hypothesis that clinical and demographic characteristics will be associated with nonadherence to the guidelines. Identifying provider-related risk factors associated with nonadherence to national guidelines will provide opportunities for focused strategies to improve patient care.

MATERIALS AND METHODS

Study Design and Setting

This was a cross-sectional convenience sample survey study. Instrument design and validation are described below. The study was approved by the Mount Sinai School of Medicine Institutional Review Board and granted a waiver from informed consent.

Selection of Participants

Emergency providers in attendance at the 2011 American College of Emergency Physician's (ACEP) *Scientific Assembly* in San Francisco, CA, were approached to participate in a written survey. A booth in the exhibit hall was purchased with funds from the Mount Sinai Department of Emergency Medicine. The booth remained open during all exhibit hall hours. In return for filling out the survey, participants were entered into a raffle to win a gift.

Methods of Measurement

We administered a 33-item instrument containing items developed or adapted from the extant literature (Appendix E1, available online at http://www.annemergmed.com). The entire survey was grouped into 3 sections: demographics (10 items), provider practice patterns (6 items), and provider attitudes (17 items).

To measure attitudes, we administered the previously validated 17-item General Perceptions About Sickle Cell Patients Scale. Subscales of the attitudes survey have been shown to possess good reliability (Cronbach's α 0.76 to 0.89).[18]

To measure practice patterns, the study team developed 6 new items based on a literature review of analgesic practices for sickle cell disease patients. From the National Heart, Lung, and Blood Institute and American Pain Society guidelines, we identified 8 recommendations for the management of sickle cell disease pain.[10] In addition to the 8 guidelines mentioned above, an additional item was designed to assess the use of analgesic prescriptions at ED discharge. Provider practice pattern items were generated with these guidelines in mind to explore analgesic practice patterns, including pharmacologic approaches (choice of agent, route, dose, and frequency of selection), nonpharmacologic approaches, and analgesic prescribing patterns on discharge.

After a draft set of practice pattern questions was developed, we assessed content validity, specifically, face and utility validity, from a panel of 5 experts in emergency medicine and sickle cell disease (B.L., V.T., L.D.R.), a sickle cell hematologist (M.R.D.), and a patient perspective (C.H.) (Appendix E2, available online at http://www.annemergmed.com). Expert reviews of the survey resulted in 100% agreement that the instrument covered the construct and content validity indices for each domain. Participants filled out paper questionnaires, and the data were scanned and entered by 2 trained abstractors according to a set protocol. Abstractors were blinded to the study hypotheses, and 5% of questionnaires were double-entered and checked for interrater agreement, with a mandatory cutoff of 98.5% agreement. All variables were checked for outliers (below the fifth percentile and above the 95th percentile), and all implausible values were corrected (Appendix E3 and E4, available online at http://www.annemergmed.com).

Outcome Measures

A series of binary outcome variables was created to dichotomize those who did and did not regularly follow 8 prespecified guideline recommendations (results for those who indicated "frequently" or "always" were scored as 1; results for those who chose "rarely" or "never" were scored as zero) for acute sickle cell disease pain management.[10]

Primary Data Analysis

All analyses were performed with SAS (version 9.2; SAS Institute, Inc., Cary, NC). Descriptive statistics (for demographics, practice patterns, and attitude scales) were expressed in medians, with interquartile range and proportions as appropriate. *t* Tests, χ^2 tests, and nonparametric tests were used to compare means and proportions as appropriate. A content validity index was calculated as the mean of all expert

scores for each set of items. Preliminary data analyses focused on examination of the distributional characteristics of measures used in the study. This step was to ensure that all assumptions were met for the statistical tests used (ultimately, transformations were not necessary). For all multivariable models, potential predictors were chosen for inclusion a priori according to conceptually plausible or known associations with the outcome variable. Variables included in the multivariable models were race, level of practice (attending physician, resident, nurse practitioner), teaching status of the institution, adult versus pediatric practice, availability of sickle cell disease follow-up services, and the volume of sickle cell disease patients treated per week. Cases with missing data were excluded from multivariable analyses.

Because the provider attitude scales had not previously been validated among emergency providers, we used factor analysis to assess the underlying factor structure of the attitudinal items, using methodology previously described by Haywood et al.[18] To explore the associations between demographic and clinical predictors with provider attitudes, we performed MANOVA to control for potential confounders. Collinearity of the model was assessed (condition index greater than 8), and variables were modeled with linear or quadratic terms when appropriate. Two-sided P values were used to assess statistical significance. Predictor variables were considered significant if $P \leq .05$.

To identify factors associated with provider practices that differ from national guidelines for the management of acute sickle cell disease pain, multivariable relative risk (a generalized linear model using a binomial distribution with log link and robust estimation of variance) regressions were performed. Separate multivariable regressions were performed for each of 8 prespecified guideline recommendations. Because of the large number of hypotheses tested with regard to provider practices, we chose a Bonferroni correction ($\alpha/8$) to adjust α to .00625.

In a final set of analyses, we explored associations between emergency provider attitudes and guideline adherence. Associations between emergency provider attitudes and 9 practice patterns were assessed (the 8 guidelines mentioned above plus the use of analgesic prescriptions at discharge). Attitudinal scales were recoded into quartiles. Quartile attitude scales were included in multivariable relative risk regressions (1 model for each of 9 binary outcome variables). These models were not adjusted for other demographic variables. The decision not to adjust for demographics (or alternatively to include attitude scales in the models mentioned in the previous paragraph) was made because attitudinal scales were highly collinear with demographic predictors, which caused the models to perform poorly. For this set of analyses, we chose a Bonferroni correction as well ($\alpha/9$), with a cutoff of .006 for statistical significance.

RESULTS

Characteristics of Study Subjects

Of 795 respondents, 722 indicated that they take care of patients with sickle cell disease and 671 responded completely to the survey and were included in the analyses. Providers from academic or teaching hospitals were more heavily represented (67.9%). The majority of participants practice in the United States (83.2%). Home states of emergency providers were distributed similarly to sickle cell disease prevalence patterns, with good representation from New York, California, Florida, and Texas, which are the states with the highest prevalence of sickle cell disease (Figure).[1] Demographics of this sample were similar to estimates of the overall demographic characteristics of American emergency physicians[19-22] (Table 1).

Factor analyses of the attitudes component of the survey resulted in retaining 15 of the 17 original attitude items, which separated into 3 factors with good psychometric properties (Appendix E5, available online at http://www.annemergmed.com). Six items grouped together to form what we call a negative attitudes scale (mean=39.5; SD=21.9; potential range 0 to 100). Higher scores on this scale indicated more negative views about sickle cell disease patients. Four items grouped together in what we call a positive attitudes scale (mean=37.1; SD=23.1; potential range 0 to 100). Higher scores indicated an endorsement of more positive views about sickle cell disease patients. Five items grouped together to form what we call the red-flag behaviors scale (mean=58.7; SD=22.4; potential range 0 to 100). Higher scores indicate greater belief that certain sickle cell disease patient behaviors raise concern that the patient is inappropriately drug-seeking.

Main Results

Pediatric providers had more positive attitudes, and adult providers had more negative attitudes, toward individuals with sickle cell disease. Another variable strongly associated with negative attitudes was the number of sickle cell disease patients treated per week, with those providers treating greater numbers of patients expressing more negative attitudes. Race was also significantly associated with provider attitudes. In comparison with white emergency providers, black providers had more positive attitudes and lower scores on the red-flag behaviors scale. Variables that were not significantly associated with a difference in attitudes toward sickle cell disease patients included age, sex, ethnicity, level of practice, hospital teaching status, and the availability of follow-up services. Attitudes of emergency providers at institutions with comprehensive sickle cell disease clinics did not differ significantly from those at other institutions (Table 1).

Morphine and hydromorphone were the most commonly prescribed opioids (used by 95% and 91% of emergency physicians, respectively) (Table 2). More than 90% of emergency providers reported frequently or always using parenteral opioids, and 85% indicated that they are comfortable redosing opioids within 30 minutes if analgesia is inadequate. Only a fraction of emergency providers indicated that they do not administer opioids for sickle cell disease pain (1.4%) or that they do not redose opioids (1.1%). The majority of providers (95.1%) avoid using meperidine for sickle cell disease pain. Other recommendations were less likely to be followed. Only

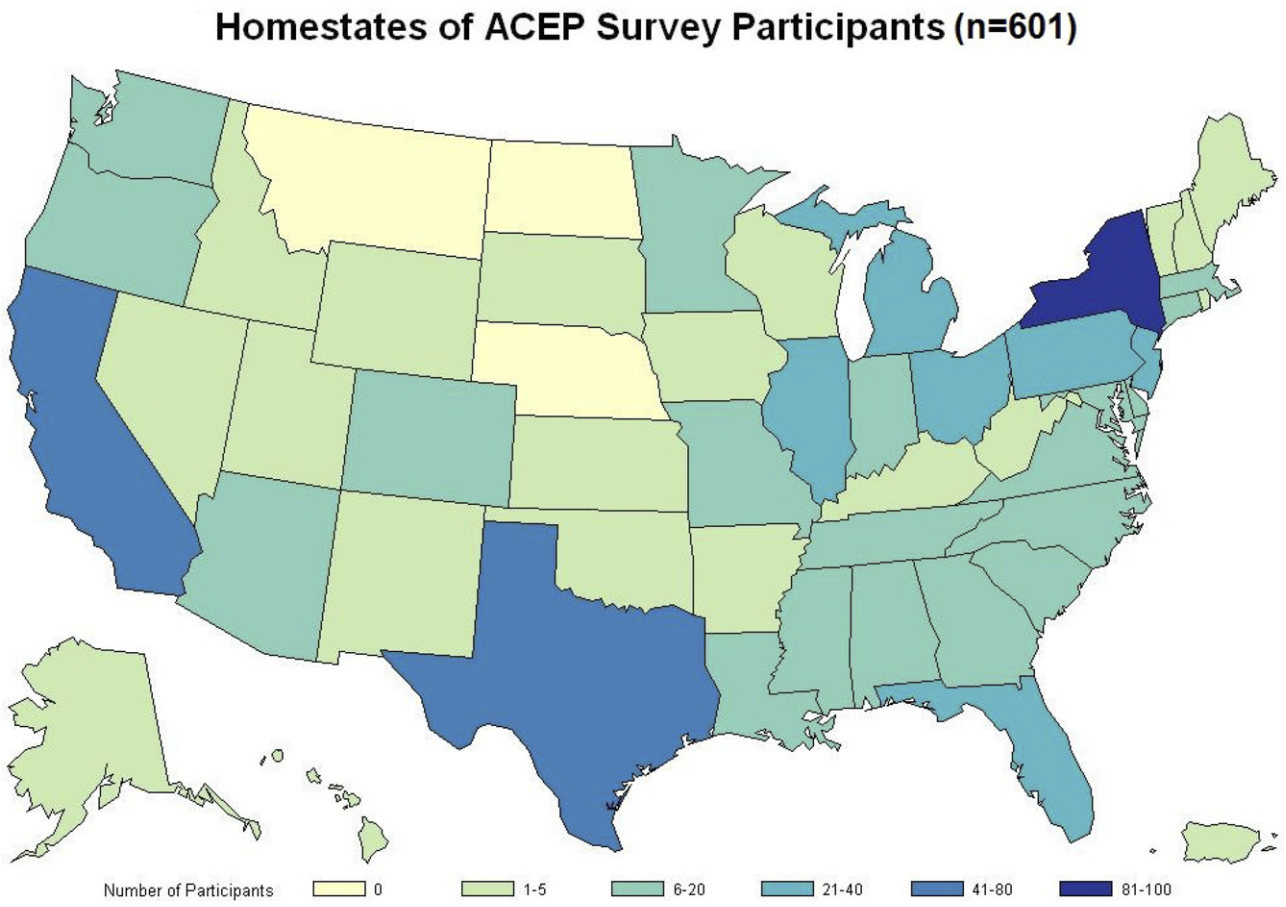

Figure. Home states of survey participants.

19.7% of respondents chose subcutaneous opioids over intramuscular for nonintravenous administration, 6.4% indicated frequent use of patient-controlled analgesia, 24.3% frequently used acetaminophen, and 1.1% choose gentle (maintenance or half-maintenance) hypotonic fluids for intravenous hydration. In multivariable analyses (Table 3), pediatric providers were more than 6 times more likely to use patient-controlled analgesia for analgesia (adjusted RR 6.6; 95% CI 2.6 to 16.6). High-volume providers (those who treat more than 1 sickle cell disease patient per week) were less likely to indicate that they redose opioids within 30 minutes for inadequate analgesia (RR 0.9; 95% CI 0.8 to 0.9).

Analgesic practices were affected by emergency provider attitudes. Providers in the 2 highest quartiles of negative attitudes were, respectively, 10% and 20% less likely to report redosing opioids within 30 minutes for inadequate analgesia. Emergency providers with the highest levels of positive attitude scores were 33% more likely than providers with the lowest positive attitudes scores to discharge patients with analgesic prescriptions. Unexpectedly, high scores on both the positive and negative attitudes scales (thought to reflect opposing perceptions of individuals with sickle cell disease) were both associated with more frequent use of parenteral opioids. Also unexpectedly, high scores in both positive attitudes and red-flag behaviors scales were associated with more use of NSAIDs (Table 4).

LIMITATIONS

Our study has limitations. The sample included 655 emergency physicians (11.3% of the 5,788 physicians in attendance at the ACEP meeting and approximately 2% of the 39,061 physicians in the United States who designate emergency medicine as their primary or secondary practice). The selection of providers in attendance at ACEP and, furthermore, those willing to participate in this survey may cause differential bias because these providers may be more likely to work in a teaching environment and more likely to be aware of national guidelines. Adherence to national guidelines may be lower and the effects of negative attitudes may be larger in an unselected population of providers, and these effects should be explored separately. There was bias in our sample toward academic providers. The majority of emergency providers do not practice in teaching hospitals, but 67.9% of our sample indicated teaching status. Nonteaching emergency providers were well enough represented (182 participants) to test for differences between the 2 groups. We did not find any

Table 1. Characteristics of participants.

Association of demographic variables with attitudinal scales: Values indicate change in attitude scale associated with each demographic*				
Variable	**Frequency†**	**Negative Attitudes**	**Red Flag Behaviors**	**Positive Attitudes**
N	722	659	681	661
Age (IQR), y	36 (32 to 45)	−0.1 (−0.3 to 2.0)	−0 (−0.3 to 2.1)	0.3 (0.1 to 2.4)
Number of years in practice				
Attending (n=479)	7 (3 to 15)	Ref	Ref	Ref
Nurse practitioner (n=16)	5 (4 to 10)	4.0 (−3.2 to 9.6)	8.7 (1.1 to 14.5)	−0.5 (−8.0 to 5.3)
Medical student (n=10)	3 (2 to 4)	4.0 (−3.2 to 9.6)	8.7 (1.1 to 14.5)	−0.5 (−8.0 to 5.3)
Resident (n=176)	3 (3 to 4)	2.1 (−2.7 to 6.5)	5.6 (0.4 to 10.1)	−0.3 (−5.3 to 4.3)
Physician assistant (n=19)	10 (4 to 12.8)	4.0 (−3.2 to 9.6)	8.7 (1.1 to 14.5)	−0.5 (−8.0 to 5.3)
Other (n=16)	NA	4.0 (−3.2 to 9.6)	8.7 (1.1 to 14.5)	−0.5 (−8.0 to 5.3)
Sex (% male)	64.8% (n=468)	3.2 (−0.5 to 7.1)	1.8 (−2.2 to 5.8)	−3.8 (−7.7 to 0.2)
Race				
White	73.5% (n=528)	Ref	Ref	Ref
Black	5.9% (n=42)	−7.9 (−16.0 to −1.8)	−8.6 (−17.2 to −2.3)	14.3 (5.8 to 20.6)
Asian	16.3% (n=117)	6.3 (1.4 to 10.7)	4.7 (−0.5 to 9.3)	0.9 (−4.2 to 5.5)
Hawaiian/Pacific Islander	0.3% (n=2)	3.9 (−25.6 to 21.0)	0.5 (−30.8 to 18.4)	−2.3 (−33.2 to 15.4)
Native American/Alaskan Native	0.3% (n=2)	−6.9 (−48.8 to 16.4)	20.6 (−23.8 to 45.2)	−16.5 (−60.3 to 7.8)
Other	3.8% (n=27)	−0.5 (−9.7 to 6.2)	−5.0 (−14.8 to 1.9)	0.3 (−9.4 to 7.1)
Ethnicity				
Hispanic	9.4% (n=59)	3.0 (−3.6 to 8.4)	4.1 (−2.9 to 9.6)	3.4 (−3.5 to 8.9)
Not Hispanic	90.6% (n=571)	Ref	Ref	Ref
Number of SCD patients seen/wk	1.5 (0.5 to 4.0)	0.9 (0.5 to 3.1)	0.5 (0.03 to 2.7)	−0.6 (−1.1 to −0.1)
Type of patient treated				
Primarily adults	36.6% (n=264)	6.6 (2.9 to 10.5)	3.6 (−0.3 to 7.6)	−7.6 (−11.5 to −3.6)
Primarily children	1.8% (n=13)	−16.5 (−29.3 to −8.0)	14.8 (−28.4 to −5.9)	11.0 (−2.4 to 19.8)
Both	61.6% (n=445)	Ref	Ref	Ref
Location and teaching status				
Rural teaching	7.5% (n=54)	−3.1 (−7.3 to 1.0)	−4.5 (−9.0 to −0.3)	5.4 (1.0 to 9.6)
Rural nonteaching	7.1% (n=51)	Ref	Ref	Ref
Urban teaching	60.2% (n=432)	−3.1 (−7.3 to 1.0)	−4.5 (−9.0 to −0.3)	5.4 (1.0 to 9.6)
Urban nonteaching	17.8% (n=128)	Ref	Ref	Ref
Are any of the following available to the SCD patients you treat?				
Comprehensive SCD clinic	8.0% (n=55)	Ref	Ref	Ref
SCD hematologist	30.7% (n=211)	1.2 (−5.6 to 6.7)	−3.3 (−10.5 to 2.3)	0.1 (−7.0 to 5.7)
Any hematologist	40.6% (n=279)	2.9 (−3.9 to 8.3)	−2.3 (−9.5 to 3.3)	−2.2 (−9.3 to 3.3)
Other follow-up services	10.8% (n=74)	1.1 (−7.2 to 7.3)	−4.6 (−13.4 to 1.8)	1.4 (−7.3 to 7.8)
No follow-up services available	9.9% (n=68)	4.5 (−4.1 to 10.8)	−1.5 (−10.5 to 5.1)	−6.3 (−15.2 to 0.3)
Other	7.4% (n=53)	1.1 (−7.2 to 7.3)	−4.6 (−13.4 to 1.8)	1.4 (−7.3 to 7.8)

SCD, Sickle cell disease; *IQR*, interquartile range.

*Association of demographic variables with attitudinal scales: Each column refers to an attitude scale. Attitude scales are measured from 0 to 100, and the values expressed in this table represent the changes in each attitude scale associated with demographic variables. Values expressed are point estimates with 95% confidence interval in parentheses. For categorical variables, the value expressed indicates the change in attitudinal scale associated with that category in comparison with the reference group (eg, black race was associated with a 14.3-point higher score on the positive attitude scale in comparison with white race). For continuous variables, results indicate the change in attitude scale associated with unit change in the explanatory variable (eg, for each additional SCD patient treated per week, there is a 0.9-point increase in the negative attitude scale). Results were determined by MANOVA. $P \leq .05$ was required for statistical significance.

†Continuous variables are expressed as medians, with interquartile range in parentheses. Categorical variables are expressed as a percentage of the total respondents, with raw value in parentheses. Within-category counts that do not add up to 722 indicate missing responses for that variable.

significant differences in practice patterns or attitudes between the 2 groups; this suggests that within our sample, the selection bias toward academic providers did not substantially alter the results. Finally, practice pattern data were self-reported and may or may not represent actual practice patterns.

DISCUSSION

With this cross-sectional study, we describe emergency providers' self-reported analgesic practices and attitudes toward individuals with sickle cell disease. We also report on factors associated with lower adherence to national guidelines for the management of sickle cell disease pain. Our data indicate that the majority of emergency providers surveyed are aware of how to use opioids to manage acute vaso-occlusive pain episodes and that other factors (such as negative attitudes or system issues not measured in this study) play a larger role in contributing to the inadequate care that sickle cell disease patients often receive in the ED.

Table 2. Emergency physician choice of opiate, route, and frequency of use for the treatment of SCD pain.

Drug	n	Percentage Who Use This Drug	PO, %	IV, %	Subcutaneous, %	IM, %	Rarely, %	Frequently, %	Always, %
Acetaminophen	637	66					63	30	7
Ibuprofen	625	65					62	33	5
Ketorolac	672	76	12	79	1	37	44	49	7
Other NSAIDs	501	38	70	17	1	17	78	17	6
Morphine	684	95	5	94	5	22	16	67	18
Hydromorphone	683	91	8	94	4	24	9	72	19
Fenatyl	683	48	4	98			68	26	6
Meperidine	671	19	8	78	2	34	74	21	5
Oxycodone/acetaminophen	656	71					43	53	4
Hydrocodone/acetaminophen	629	62					47	49	4
Oxycodone	612	43					63	34	3
Codeine	668	26					82	18	1
Tramadol	679	31					72	24	4
Methadone	669	13	76	20	4	4	93	7	0
Other opiate	586	12	43	57	7	11	94	4	1
Other antihistamine	471	38	49	60	2	21	76	22	2
Diphenhydramine	676	80	34	82	2	20	30	59	11
PCA	684	24					73	25	2
Intranasal opiate	680	9					84	13	3
Intranasal NSAID	677	5					91	6	3

PO, per os; *IM*, intramuscular; *PCA*, Patient-controlled analgesia; *NSAID*, non-steroidal anti-inflammatory drugs.

The cornerstones of managing acute vaso-occlusive pain episodes are parenteral opioids and frequent reassessments, yet several published articles indicate that patients do not consistently receive this level of care.[3,23] Our study suggests that the majority of emergency providers, regardless of teaching status, affiliation with comprehensive sickle cell disease clinics, or any other demographic predictors, report that they practice in line with these fundamentals. Nearly 92% of providers indicated that they frequently or always use parenteral opioids to manage acute sickle cell disease pain, and 85% reported being comfortable with delivering a second or third dose of opioids within 30 minutes for inadequate analgesia. These data suggest that factors such as deficient knowledge[24] or practice preferences that differ from national guidelines do not drive the disparity between emergency provider self-reported practice and the experience of sickle cell disease patients in the ED. Emergency provider attitudes were significantly associated with opioid use practices, but the effects were not large enough to fully explain the disparities between self-reported practice and patient experience.

The low level of adherence to most of the 8 recommendations we studied may indicate that emergency providers use opioids properly because this is part of their emergency medicine training, not because they are aware of National Heart, Lung, and Blood Institute guidelines for sickle cell disease. Recommendations that were less accepted included use of subcutaneous over intramuscular opioids, hypotonic fluids, frequent acetaminophen use, and sparing use of non-steroidal anti-inflammatory drugs. Intramuscular administration is generally discouraged because it is painful, causes tissue damage, and is associated with unpredictable pharmacokinetics.[25] We suspect that emergency providers prefer intramuscular because it is the route of choice for other drugs (eg, epinephrine in anaphylaxis[26]) and has long been used in EDs. Low acceptance of these recommendations may be because they are less well supported by data or that emergency providers are not aware that such recommendations exist. Although we did not include questions about whether clinicians were aware of National Heart, Lung, and Blood Institute or American Pain Society guidelines for sickle cell disease, our data indicate that penetration of many of these recommendations into practice is poor. A policy statement from emergency medicine professional societies may help expert recommendations to penetrate emergency provider practice.

Our results indicate that providers with negative attitudes and those who reported caring for more than 1 sickle cell disease patient per week were less likely to adhere to the most important aspect of high-quality sickle cell disease pain management, willingness to redose opioids within 30 minutes for inadequate analgesia. These 2 factors, negative attitudes and high-volume providers, were highly collinear, and multiple mechanisms may contribute to this finding. A small subset of sickle cell disease patients have overrepresentation of ED visits compared with those who have fewer visits to the ED,[27] and these patients have been shown to have a higher prevalence of mood, cocaine, and alcohol disorders.[8,14] Emergency providers who treat the highest volumes of sickle cell disease patients have more exposure to the "high-use" group, which may contribute to more negative attitudes held by these providers toward the entire sickle cell disease population. Regardless of the root cause,

Table 3. Predictors of self-reported adherence to sickle cell disease guidelines.*

Guideline	Uses Parenteral Opioids to Treat SCD Pain (Frequently or Always)	Redoses Opioids Within 30 Minutes for Inadequate Analgesia	Use of PCA Pump (Frequently or Always)	Uses Meperidine to Treat SCD Pain (Frequently or Always)	Uses Hypotonic Fluids for IV Hydration (Frequently or Always)	Uses Subcutaneous Over IM for Opioid Administration	Uses NSAIDs to Treat SCD Pain (Frequently or Always)	Uses Acetaminophen to Treat SCD Pain (Frequently or Always)
Race								
Black	0.9 (0.8−1.0)	0.9 (0.7−1.0)	0.8 (0.2−3.4)	2.0 (0.6−6.6)	1.4 (0.2−13.2)	1.9 (0.5−6.6)	1.2 (0.9−1.5)	1.5 (0.9−2.4)
Other	1.0 (0.9−1.0)	1.0 (0.9−1.0)	0.8 (0.4−1.8)	2.1 (1.0−4.3)	0 (0−0)	1.5 (0.7−3.0)	1.1 (0.9−1.3)	1.5 (1.1−2.1)
White	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Level of Practice								
Resident	1.0 (1.0−1.1)	1.0 (0.9−1.0)	1.9 (1.0−3.7)	0.1 (0−1.0)	1.2 (0.2−6.8)	1.2 (0.6−2.3)	0.8 (0.7−1.0)	0.7 (0.5−1.1)
NP, PA, medical student	0.9 (0.8−1.0)	1.0 (0.9−1.1)	1.6 (0.6−4.3)	3.9 (1.9−7.9)	2.2 (0.2−20.9)	0.8 (0.1−5.4)	1.0 (0.7−1.3)	1.4 (0.9−2.1)
Attending	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Teaching hospital	1.0 (0.9−1.1)	1.0 (0.9−1.1)	1.7 (0.8−3.7)	1.1 (0.5−2.4)	0.6 (0.1−2.9)	1.4 (0.6−3.1)	1.0 (0.8−1.2)	1.2 (0.9−1.7)
Type of practice								
Adults	1.1 (1.0−1.1)	1.0 (0.9−1.0)	1.5 (0.8−2.7)	0.7 (0.3−1.6)	1.4 (0.3−6.7)	1.4 (0.7−2.6)	1.0 (0.8−1.1)	0.8 (0.6−1.1)
Children	1.0 (0.8−1.2)	1.0 (0.9−1.3)	6.6 (2.6−16.6)	1.6 (0.3−8.7)	6.4 (0.6−68.0)	9.3 (4.4−19.5)	1.2 (0.8−1.9)	1.2 (0.9−1.7)
Both	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Availability of follow-up								
No follow-up	1.1 (1.0−1.2)	0.9 (0.7−1.1)	0.5 (0.1−2.6)	1.4 (0.3−5.7)	0 (0−0)	Ref	0.9 (0.6−1.3)	2.1 (0.8−5.5)
Other follow-up	1.1 (1.0−1.2)	1.0 (0.9−1.2)	1.4 (0.4−4.8)	1.1 (0.3−4.4)	0.7 (0−12.3)	0.4 (0.1−2.5)	1.1 (0.7−1.5)	2.3 (0.9−6.0)
Any hematologist	1.0 (1.0−1.2)	1.0 (0.9−1.2)	0.9 (0.3−2.6)	0.8 (0.2−2.8)	0.4 (0−4.5)	0.4 (0.1−2.5)	1.0 (0.7−1.3)	2.1 (0.9−4.9)
SCD hematologist	1.0 (1.0−1.1)	1.0 (0.9−1.2)	0.8 (0.3−2.4)	0.3 (0.1−1.5)	1.0 (0.1−9.4)	0.4 (0.1−2.5)	1.1 (0.8−1.4)	2.2 (0.9−5.2)
Comprehensive center	Ref	Ref	Ref	Ref	Ref	0.4 (0.1−2.5)	Ref	Ref
>1 patient/wk	1.1 (1.0−1.1)	0.9 (0.8−0.9)	0.7 (0.4−1.2)	1.4 (0.7−3.0)	1.3 (0.3−6.0)	1.3 (0.6−2.7)	1.0 (0.9−1.2)	0.8 (0.6−1.0)

SCD, Sickle cell disease; *NP*, nurse practitioner; *PA*, physician assistant; *IV*, intravenous; *IM*, intramuscular; *PCA*, patient-controlled analgesia.

*Values expressed are risk ratio with 95% CI in parentheses. All variables in the model were categorical; thus, results indicate the relative risk of adhering to a particular guideline in comparison with the reference group (eg, in comparison to attending physicians, NPs, PAs, and medical students were 3.9 times as likely to self-report use of meperidine for SCD pain). $P \leq .006$ was required for statistical significance.

Table 4. Association of emergency physician attitudes with self-reported guideline adherence.*

Guideline	Uses Parenteral Opioids to Treat SCD Pain (Frequently or Always)	Redoses Opioids Within 30 Minutes for Inadequate Analgesia	Use of PCA Pump (Frequently or Always)	Uses Meperidine to Treat SCD Pain (Frequently or Always)	Uses Hypotonic Fluids for IV Hydration (Frequently or Always)	Discharges SCD Patients With a Pain Medication Prescription (Frequently or Always)	Uses Subcutaneous Over IM for Opioid Administration	Uses NSAIDs to Treat SCD Pain (Frequently or Always)	Uses Acetaminophen to Treat SCD Pain (Frequently or Always)
Negative attitudes scale									
Low quartile	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
25%−50%	1.3 (1.2−1.5)	0.9 (0.8−1.0)	1.2 (0.5−2.9)	1.6 (0.6−4.4)	0 (0−0)	1.0 (0.9−1.2)	0.6 (0.3−1.5)	1.0 (0.8−1.3)	0.7 (0.5−1.0)
50%−75%	1.3 (1.2−1.5)	0.9 (0.8−0.9)	0.7 (0.2−1.9)	1.3 (0.4−4.0)	2.1 (0.4−10.7)	1.1 (0.9−1.3)	0.5 (0.2−1.3)	1.1 (0.9−1.4)	0.7 (0.5−1.0)
High quartile	1.4 (1.2−1.5)	0.8 (0.7−0.9)	1.3 (0.4−4.2)	2.3 (0.7−8.2)	1.2 (0.1−9.2)	1.1 (0.9−1.4)	0.8 (0.3−2.1)	1.0 (0.8−1.3)	0.8 (0.5−1.2)
Red-flag behaviors scale									
Low quartile	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
25%−50%	1.3 (1.2−1.4)	1.0 (0.9−1.1)	0.8 (0.3−1.9)	0.6 (0.2−1.6)	0.8 (0.1−5.0)	1.0 (0.8−1.2)	1.2 (0.5−3.3)	1.9 (1.5−2.5)	1.6 (1.1−2.3)
50%−75%	1.3 (1.2−1.4)	1.1 (1.0−1.1)	0.9 (1.4−2.0)	0.3 (0.1−0.9)	0.3 (0−2.7)	1.0 (0.8−1.2)	0.7 (0.3−1.7)	1.4 (1.1−1.9)	1.0 (0.7−1.6)
High quartile	1.3 (1.2−1.4)	1.0 (0.9−1.1)	0.4 (0.1−1.1)	0.6 (0.2−1.7)	0.6 (0.1−3.9)	1.0 (0.8−1.2)	0.9 (0.3−2.4)	1.8 (1.4−2.3)	1.1 (0.7−1.7)
Positive attitudes scale									
Low quartile	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
25%−50%	1.2 (1.1−1.3)	1.0 (0.9−1.1)	1.5 (0.5−4.2)	0.7 (0.3−1.9)	0.2 (0−1.3)	1.2 (1.0−1.4)	0.5 (0.2−1.2)	1.1 (0.9−1.4)	0.9 (0.6−1.3)
50%−75%	1.3 (1.2−1.4)	1.1 (1.0−1.2)	2.7 (1.0−7.3)	0.3 (0.1−1.6)	0.3 (0−2.2)	1.2 (1.0−1.4)	1.0 (0.4−2.4)	1.5 (1.2−1.9)	1.4 (0.9−2.2)
High quartile	1.4 (1.3−1.5)	1.0 (0.9−1.1)	2.0 (0.7−5.6)	1.7 (0.6−4.5)	0.3 (0−1.9)	1.3 (1.1−1.6)	1.3 (0.6−3.0)	1.6 (1.3−1.9)	1.4 (0.9−2.0)

*Values are expressed as rate ratios (95% CI). Attitude scales were divided into quartiles, with the lowest quartile as the reference group. Results indicate the relative risk of guideline adherence (eg, in comparison with the lowest quartile of the negative attitude scale, those in the highest quartile were 20% [RR=0.8] less likely to redose opiates within 30 minutes for inadequate analgesia). $P \leq .006$ was required for statistical significance.

our data suggest that understanding why emergency providers with the highest patient volumes have the most negative attitudes should be further evaluated because of the potential effect on patient care. Interventions to ameliorate negative attitudes may mitigate this effect.

A range of demographic factors was associated with improved adherence to national guidelines for the treatment of acute vaso-occlusive pain episodes. Our analyses demonstrated that pediatric providers had less negative feelings toward sickle cell disease patients than adult providers, which is emblematic of the deterioration of the patient-provider relationship that occurs with the transition of adolescent sickle cell disease patients into adult clinics.[11,13,28] Our analyses also indicated an association between provider race and attitudes toward sickle cell disease patients, with black providers exhibiting more positive feelings of affiliation toward sickle cell disease patients and being less likely to endorse certain behaviors as signs of inappropriate drug-seeking. This finding supports previous work by Telfair et al,[29] who found that black health care providers were more likely than providers of other races to believe that race plays a role in the delivery of quality care to sickle cell disease patients. Together, these findings suggest a role in the promotion of cultural competency training programs for health care providers, as well as initiatives to increase the number of underrepresented minorities in medical fields, as a way to improve the quality of care delivered to sickle cell disease patients.

Results from this study fill an important gap in our understanding of the challenges confronting emergency management of sickle cell disease pain. Specific links between ED clinician attitudes and practice patterns have been identified that may be amenable to intervention. Initiatives to improve ED management of acute sickle cell disease pain could promote more efficient ways to manage sickle cell disease pain, better dissemination of national guidelines, and efforts to improve negative physician attitudes toward sickle cell disease patients.

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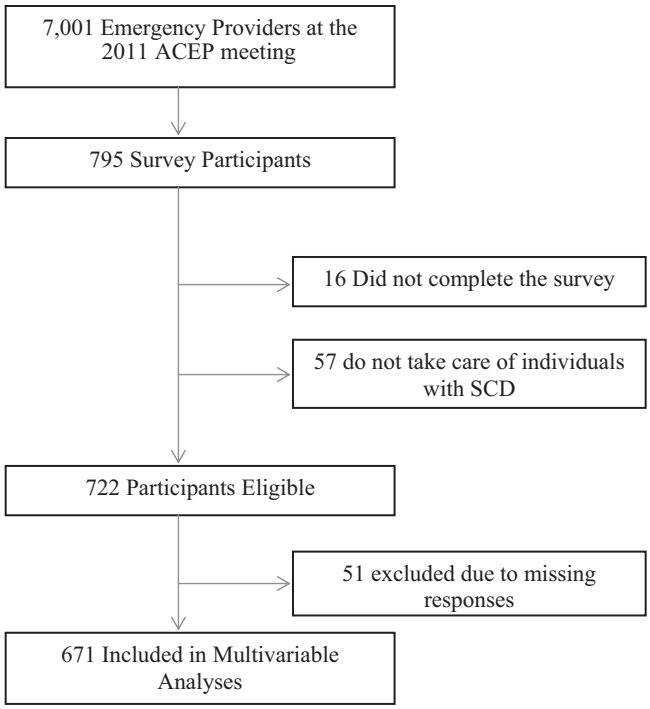
CORRECTION

In the December 2012 issue, in the article by Smith et al ("Diagnosis of ST-Elevation Myocardial Infarction in the Presence of Left Bundle Branch Block With the ST-Elevation to S-Wave Ratio in a Modified Sgarbossa Rule," pages 766-776), there was an error in the abstract, Results section. It should have read: "Excessive absolute discordant ST-segment elevation of 5 mm was present in at least one lead in 30% of ECGs in patients with confirmed coronary occlusion versus 9% of the control group, whereas *excessive relative discordant ST-segment elevation less than −0.25 was present in 79% vs. 9%:" (*not 58% versus 8).



Appendix E1 Flow diagram.

Do you take care of patients with Sickle Cell Disease? If yes, please proceed to question 1. If you do NOT, you are finished with the survey. Thank you.

1) Yes **2)** No

1. Age_____

2. What is your gender?
1) Male **2)** Female

3. What is your race?
1) White **2)** Black **3)** Asian **4)** Hawaiian/Pacific Islander
5) Native American/Alaskan Native **6)** Other _____

4. What is your ethnicity?
1) Hispanic or Latino **2)** Not Hispanic or Latino **3)** Other _____

5. What is your level of practice?
□ Attending: Years post residency _____ □ Resident: PGY_____
□ Nurse Practitioner: Years_____ □ Physician Assistant: Years _____
□ Medical Student: Year ____ □ Other _____

6. **What state or country to you primarily practice in?**_____

7. **Do you treat:**
1) Primarily adults **2)** Primarily children **3)** Both

8. How do you characterize the location and teaching status of your primary hospital?
1) Rural teaching **2)** Rural non-teaching **3)** Urban teaching
4) Urban non-teaching **5)** Other _____

9. How often do you refer to a patient with Sickle Cell Disease as a "sickler"?
1) Never 2) Rarely 3) Frequently 4) Always

10. During a typical week, how many patients with SCD do you treat (or supervise others that treat)? _____

11. Please circle the preferred route and how frequently you administer each analgesic listed below to patients with SCD.

	Preferred Route (circle all that apply)				Never	Rarely	Frequently	Always
a) Acetaminophen	PO				1	2	3	4
NSAIDS								
b) Ibuprofen	PO				1	2	3	4
c) Ketorolac	PO	IV	SC	IM	1	2	3	4
d) Other NSAID _____	PO	IV	SC	IM	1	2	3	4
ANTIHISTAMINES								
e) Diphenhydramine	PO	IV	SC	IM	1	2	3	4
f) Other antihistamine _____	PO	IV	SC	IM	1	2	3	4
Oral and Parenteral OPIATES								
g) Morphine	PO	IV	SC	IM	1	2	3	4
h) Hydromorphone (dilaudid)	PO	IV	SC	IM	1	2	3	4
i) Oxycodone/APAP (Percocet)	PO				1	2	3	4
j) Oxycodone/oxycontin	PO				1	2	3	4
k) Hydrocodone/APAP (Vicodin, or Norco)	PO				1	2	3	4
l) Meperidine (Demerol)	PO	IV	SC	IM	1	2	3	4
m) Fentanyl	PO	IV			1	2	3	4
n) Codeine	PO	IV			1	2	3	4
o) Tramadol	PO	IV			1	2	3	4
p) Methadone	PO	IV	SC	IM	1	2	3	4
q) Other opiate _____	PO	IV	SC	IM	1	2	3	4
OTHER ANALGESIC DELIVERY METHODS								
r) Opiate PCA					1	2	3	4
s) Intranasal opiate					1	2	3	4
t) Intranasal NSAID					1	2	3	4
u) Other medicine _____	PO	IV	SC	IM	1	2	3	4

Appendix E2 ACEP survey.

12. How many minutes apart are you comfortable re-administering a 2nd or 3rd dose of opioid if the previous dose did not result in sufficient pain relief and the patient is not becoming sedated (assuming the patient is not on a PCA or continuous opiate infusion)?

□ _____ minutes □ I do not give opiates
□ I do not give repeat doses of opiates □ Other response _____

13. How often do you discharge Sickle Cell patients from the ED with a prescription for pain medication?

1) Never 2) Rarely 3) Frequently 4) Always

14. Which analgesic do you most frequently prescribe at discharge (please write the name of the medicine, dose and route)?

_____

15. Are any of the following available to the Sickle Cell patients that you treat?

1) Comprehensive Sickle Cell Clinic 2) A hematologist who treats primarily patients with Sickle Cell Disease
3) Any hematologist 4) Other follow-up services (free text) _____
5) There are no follow-up services available for patients with Sickle Cell at my institution.

16. Please indicate which type of fluids you give to patients with acute sickle cell pain who are not hypotensive and not severely hypovolemic:

	Never	Rarely	Frequently	Always
Isotonic Crystalloid Bolus (NS, LR, 1 liter or 20cc/kg in children)	1	2	3	4
Isotonic Crystalloid at maintenance rate	1	2	3	4
Isotonic Crystalloid at half-maintenance rate	1	2	3	4
Hypotonic Fluid at maintenance (1/2 NS, D51/2NS)	1	2	3	4
Hypotonic Fluid at half-maintenance	1	2	3	4
Oral hydration	1	2	3	4
Other _____	1	2	3	4

What percentage of patients with Sickle Cell Disease…

	<5%	6-20%	21-50%	51-75%	>75%
17.… over-report (exaggerate) discomfort?	1	2	3	4	5
18.… fail to comply with medical advice?	1	2	3	4	5
19.… abuse drugs, including alcohol?	1	2	3	4	5
20.… try to manipulate you or other providers?	1	2	3	4	5
21.… are drug-seeking when they come to the hospital?	1	2	3	4	5
22.… are frustrating to take care of?	1	2	3	4	5
23.… make me glad that I went into medicine?	1	2	3	4	5
24.… are the kind of person I could see myself friends with?	1	2	3	4	5
25.… are satisfying to take care of?	1	2	3	4	5
26.… are easy to empathize with?	1	2	3	4	5

Please indicate your opinion about the degree to which each of the following is a sign that a patient with Sickle Cell Disease is inappropriately/unnecessarily drug-seeking?

	Disagree	Not sure but probably disagree	Not sure but probably agree	Agree	Strongly agree
27. Patient requests specific narcotic drug and dose.	1	2	3	4	5
28. Patient appears comfortable (e.g. talking on phone or watching TV) while complaining of severe pain.	1	2	3	4	5
29. Patient has history of disputes with staff.	1	2	3	4	5
30. Patient rings bell for nurse and constantly asks for more pain medication before next dose is due?	1	2	3	4	5
31. Patient changes his/her behavior (e.g. appears in greater distress) when provider walks in room?	1	2	3	4	5
32. Patient has a history of signing out against medical advice.	1	2	3	4	5
33. Patient tampers with patient controlled analgesia device.	1	2	3	4	5

Thank you for completing this survey.

Appendix E2 (continued)

Thank you for agreeing to assist with Content Validation of our survey, *"EM Providers' Analgesic Practices and Attitudes Towards Patients with Sickle Cell Disease"*. We intend to distribute at the upcoming ACEP Meeting, which is FAST approaching. Below you will find the survey questions. *Groups of questions, and individual questions, are followed by a Table asking you to evaluate each question, or group of questions, for clarity, relevance and ease of understanding.* Please complete each table and list any suggestions for improvements in the space provided following the Table. You do not need to answer the actual survey questions, only the content validation tables and comments. **Please return your completed word document to XXXXXXXXXXXXXXXX no later than Tuesday, October 11, at 8AM.** Thank you for your expertise and timely turnaround.

Do you take care of patients with Sickle Cell Disease? If yes, please proceed to question 2. If you do NOT, you are finished with the survey. Thank you.

2) Yes **2)** No

4. Age

5. What is your gender?
1) Male **2)** Female

3. What is your Race?
1) White **2)** Black **3)** Asian **4)** Hawaian/Pacific Islander
5) Native American/Alaskan Native **6)** Other _____

4. What is your ethnicity
1) Hispanic or Latino **2)** Not Hispanic or Latino **3)** Other _____

5. **What is your level of practice?**
□ Attending: Years post residency___ □ Resident: PGY_____
□ Nurse Practitioner Years_____ □ Physician Assistant: Years _____
□ Medical Student: Year ____ □ Other _____

6. **What state or country to you practice in?**

7. Do you treat: **1)** Primarily adults **2)** Primarily children **3)** Both

8. How do you characterize the location and teaching status of your hospital?

1) Rural teaching **2)** Rural non-teaching **3)** Urban teaching
4) Urban non-teaching **5)** Other _____

1-8	Yes	No	Relevance
Are the demographic questions *clear*?			
Are the questions *relevant* or *important*?			1. Not relevant 2. Somewhat relevant 3. Quite relevant 4. Highly relevant
Are the questions *easy to use* and *understand*?			

Please list any suggestions for improvement you might have below: Questions 3 and 4 are too similar –

Appendix E3 Content validation survey.

9. How often do you refer to a patient with Sickle Cell Disease as a "sickler"?
1) Never 2) Rarely 3) Frequently 4) Always

9.	Yes	No	Relevance
Is the question *clear*?			
Is the question *relevant* or *important*?			1. Not relevant 2. Somewhat relevant 3. Quite relevant 4. Highly relevant
Is the question *easy to use* and *understand*?			

Please list any suggestions for improvement you might have below:

10. During a typical week, how many patients with SCD do you treat?

10.	Yes	No	Relevance
Is the question *clear*?			
Is the question *relevant* or *important*?			1. Not relevant 2. Somewhat relevant 3. Quite relevant 4. Highly relevant
Is the question *easy to use* and *understand*?			

Please list any suggestions for improvement you might have below:

11. Please circle the preferred route and how frequently you use each analgesic list below to treat patients with SCD.

	Preferred Route (choose more than one)				Never	rarely	frequently	Always
a) Acetaminophen	PO				1	2	3	4
NSAIDS								
b) Ibuprofen	PO				1	2	3	4
c) ketorolac	PO	IV			1	2	3	4
d) Other NSAID _____	PO	IV			1	2	3	4
ANTIHISTAMINES								
e) diphenhydramine	PO	IV	SC	PCA	1	2	3	4
f) Other antihistamine _____	PO	IV	SC	PCA	1	2	3	4
OPIATES								
g) Morphine	PO	IV	SC	PCA	1	2	3	4
h) Hydromorphone (dilaudid)	PO	IV	SC	PCA	1	2	3	4
i) Oxycodone/APAP (Percocet)	PO				1	2	3	4
j) Oxycodone/oxycontin	PO				1	2	3	4
k) Hydrocodone/APAP (vicodin, or norco)	PO				1	2	3	4
l) Meperidine (Demerol)	PO	IV	SC	PCA	1	2	3	4
m) Fentanyl	PO	IV		PCA	1	2	3	4
n) codeine	PO	IV			1	2	3	4
o) tramadol	PO	IV			1	2	3	4
p) methadone	PO	IV			1	2	3	4
q) Other opiate _____	PO	IV	SC	PCA	1	2	3	4
r) Other medicine _____	PO	IV			1	2	3	4

Appendix E3 (continued)

11.	Yes	No	Relevance
Is the question *clear*?			
Is the question *relevant* or *important*?			1. Not relevant 2. Somewhat relevant 3. Quite relevant 4. Highly relevant
Is the question *easy to use* and *understand*?			

Please list any suggestions for improvement you might have below:

12. How many minutes apart are you comfortable re-administering a 2nd or 3rd dose of opioid if the previous dose did not result in sufficient pain relief and the patient is not becoming sedated?

□ _____ minutes □ I do not give opiates

□ I do not give repeat doses of opiates □ Other response _____

12.	Yes	No	Relevance
Is the question *clear*?			
Is the question *relevant* or *important*?			1. Not relevant 2. Somewhat relevant 3. Quite relevant 4. Highly relevant
Is the question *easy to use* and *understand*?			

Please list any suggestions for improvement you might have below:

13. Please indicate which type of fluids you give to patients with acute sickle cell pain:

	NEVER	RARELY	FREQUENTLY	ALWAYS
Isotonic Crystalloid Bolus (NS, LR, 1 liter or 20cc/kg in children)	1	2	3	4
Isotonic Crystalloid at maintenance rate	1	2	3	4
Isotonic Crystalloid at half-maintenance rate	1	2	3	4
Hypotonic Fluid at maintenance (1/2 NS, D51/2NS)	1	2	3	4
Hypotonic Fluid at half-maintenance	1	2	3	4
Oral hydration	1	2	3	4
Other _____	1	2	3	4

13.	Yes	No	Relevance
Is the question *clear*?			
Is the question *relevant* or *important*?			1. Not relevant 2. Somewhat relevant 3. Quite relevant 4. Highly relevant
Is the question *easy to use* and *understand*?			

Please list any suggestions for improvement you might have below:

Appendix E3 (continued)

The following questions are taken from the psychometrically validated tool, "Medical Condition Regard Scale" which has been validated in a cohort of providers of patients with Sickle Cell Disease.. The scale measures provider attitudes.

In your opinion, how likely are patients with sickle cell disease to…

	Not at all likely	A little likely	Some-what likely	Very likely	Extremely likely
14. …over-report (exaggerate) discomfort?	1	2	3	4	5
15. … fail to comply with medical advice?	1	2	3	4	5
16. … abuse drugs, including alcohol?	1	2	3	4	5
17. … try to manipulate you or other providers?	1	2	3	4	5
18. … are drug-seeking when they come to the hospital?	1	2	3	4	5
19. … are frustrating to take care of?	1	2	3	4	5
20. … make me glad that I went into medicine?	1	2	3	4	5
21. … are the kind of person I could see myself friends with?	1	2	3	4	5
22. … are satisfying to take care of?	1	2	3	4	5
23. … are easy to empathize with?	1	2	3	4	5

14-23.	Yes	No	Relevance
Are the questions *clear*?			
Are the questions *relevant* or *important*?			1. Not relevant 2. Somewhat relevant 3. Quite relevant 4. Highly relevant
Are the questions *easy to use* and *understand*?			

Please list any suggestions for improvement you might have below:

Please indicate your opinion about the degree to which each of the following is a sign that a patient with sickle cell disease is inappropriately/unnecessarily drug-seeking?

	Not at all likely	A little likely	Some-what likely	Very likely	Extremely likely
24. Patient requests specific narcotic and dose	1	2	3	4	5
25. Patient appears comfortable (e.g. talking on phone or watching TV) while complaining of severe pain	1	2	3	4	5
26. Patient has history of disputes with staff	1	2	3	4	5
27. Patient rings bell for nurse and constantly asks for more pain medication before next dose is due?	1	2	3	4	5
28. Patient changes his/her behavior (e.g. appears in greater distress) when provider walks in room?	1	2	3	4	5
29. Patient has a history of signing out against medical advice	1	2	3	4	5
30. Patient tampers with patient controlled analgesia device.	1	2	3	4	5

24-30.	Yes	No	Relevance
Are the questions *clear*?			
Are the questions *relevant* or *important*?			1. Not relevant 2. Somewhat relevant 3. Quite relevant 4. Highly relevant
Are the questions *easy to use* and *understand*?			

Please list any suggestions for improvement you might have below:

_____

_____

_____

Appendix E3 (continued)

Finally, please answer this question.

Does the survey as a whole cover the construct *of Analgesic Practice Patterns* and *Attitudes Towards Sickle Cell Disease Patients* in an *Emergency Department Setting*?

Yes No

Additional comments:

Thank you for completing this survey.
Thank you for your expertise and timely turnaround.

Appendix E3 (continued)

Databases:

ACEP Database 2.sav:

- All variables
- Modified variables are presented alongside pre-modified variables.

ACEP Database 3 Numeric.sav:

- All variables
- Variables have been split into groups A and B (see variable names).
- Group A (a01-a63) is a complete set of variables listed in survey order.
- Group B (b01-b18) consists of variables that were modified. A new version of each of these exists in group A.

Data cleaning summary:

Outliers:

Outliers (for the most part these were implausible values, such as q11dname= 0 or 11nfreq=1) were identified by sorting columns. Each survey for which there was an implausible entry in some column was reviewed in entirety.

Recoding:

Variables were transformed into new columns or for questions where answers fell into multiple categories (Q3, 4, 5, 8, 27-33). Ranges were averaged (Q1, 12).

New columns were not created for questions where string entries were associated with rounding decisions rather than multiple characterizations. Usually for these questions, if two values were selected the lower, more neutral value was retained and the larger one discarded.

Notes:

- Q1:
  - Age <18 or "18+" were assumed to be erroneous (though upon double checking they were not transcribing errors) or un-informative and left blank.
  - Mean was calculated and recorded for age ranges
- Q3:
  - 1,3; 1,5; 1,6 → 6
- Q4:
  - 1 →1
  - 2 →2
  - 3 →2
- Q5:
  - 3,6 → 3
  - 1,6 → 1
- Q5PA:
  - >15 → 15.5
  - 82? → blank
    - 82 is questionable because the subject is 60-something years old
  - I changed the values and converted String to Numeric without creating a new variable
- Q6
  - This variable was split into two groups
    - States (American)
    - Countries
- Q8:
  - All multiple entries; (4,5); (3,5); (3,4); etc. →6
- Q10:
  - ">x" → x
  - "<x" →x/2
- Q11
  - I changed the values and converted Strings to Numerics without creating new variables
  - If needed, the subjects who circled two values can be identified by searching in the Excel file that preceded the current SPSS files.
  - Example- 11efreq:
    - 3,4 → 3

Appendix E4 Manual of data cleaning operations.

- Q12other
  - 1,4→ 1 but subject's comment is still recorded in the Q12text column (code 7033)

- Q13
  - Deleted "NA"
  - If 2 consecutive values were chosen the more neutral estimate was recorded

- Q15
  - Dummy variables were created

- Q16
  - Converted to numeric without creating a new variable.
    - 16c: deleted a random apostrophe
    - If 2 consecutive values were chosen the lower, more neutral, estimate was entered

- Q17-27 Higher numbers represented more negative perceptions so lower numbers were retained.

- Q 27-33: 2 was a neutral negative and 3 was a neutral positive perception. So where the subject selected 3 and 4, 3 was retained and 4 discarded. Likewise, where 1 and 2 were selected, 1 was retained and 2 discarded. Where the subject circled 2 and 3 together, the field was left blank but this only occurred once.

Appendix E4 (continued)

	What percentage of patients with Sickle Cell Disease…[a]	Factor1	Factor2	Factor3
1	try to manipulate you or other providers?	0.8464		
2	are drug-seeking when they come to the hospital?	0.8054		
3	over-report (exaggerate) discomfort?	0.7965		
4	fail to comply with medical advice?	0.7718		
5	abuse drugs, including alcohol?	0.7356		
6	are frustrating to take care of?	0.5704		
7	are satisfying to take care of?		0.8117	
8	make me glad that I went into medicine?		0.7813	
9	are the kind of person I could see myself friends with?		0.7653	
10	are easy to empathize with?		0.6692	
	Please indicate your opinion about the degree to which each of the following is a sign that a patient with Sickle Cell Disease is inappropriately/unnecessarily drug-seeking?[b]			
11	Patient changes his/her behavior (e.g. appears in greater distress) when provider walks in room?			0.7938
12	Patient has history of disputes with staff.			0.7905
13	Patient has a history of signing out against medical advice.			0.756
14	Patient rings bell for nurse and constantly asks for more pain medication before next dose is due?			0.653
15	Patient appears comfortable (e.g. talking on phone or watching TV) while complaining of severe pain.			0.6216

Only factor loadings ≥ |0.40| are displayed
Factor 1: Negative attitudes scale (Cronbach's alpha = 0.90; Mean inter-item correlation = 0.60, corrected item-total correlations range from 0.44 – 0.73)
Factor 2: Positive attitudes scale (Cronbach's alpha = 0.86; Mean inter-item correlation = 0.61, corrected item-total correlations range from 0.53 – 0.66)
Factor 3: Red flag behaviors scale (Cronbach's alpha = 0.86; Mean inter-item correlation = 0.52, corrected item-total correlations range from 0.63 – 0.72)
[a]Response options: <5%, 6-20%, 21-50%, 51-75%, >75%
[b]Response options: Disagree, Not sure but probably disagree, Not sure but probably agree, Agree, Strongly Agree

Appendix E5 Factor loadings of attitudinal scales.