ORIGINAL RESEARCH

Using Guided Imagery to Manage Pain in Young Children with Sickle Cell Disease

Findings show the technique can be readily taught to and used effectively by this population.

Sickle cell disease, a group of inherited blood disorders, currently afflicts about 90,000 to 100,000 people in the United States and is most common in those of African ancestry.[1] Many people with this disease experience acute and chronic pain syndromes, with acute pain severity described as comparable to cancer-related pain.[2] Although the pathophysiology is not completely understood, the pain occurs as "the result of tissue ischemia caused by occlusion of vascular beds with sickled erythrocytes."[2] But sickle cell disease–related pain arises unpredictably and may have no apparent precipitating factor.[2] One large study found that patients with sickle cell disease experienced an average of 0.4 to 1 pain episode per patient-year.[3] Although some patients had no pain episodes, the 5% who had three to 10 episodes per patient-year accounted for a third of all episodes.

Intensely painful episodes requiring ED visits, hospitalization, opioid treatment, or a combination of these often begin at an early age. It's been reported that in children and youths with sickle cell disease, pain episodes can vary in frequency from biweekly to monthly.[4] While most such episodes are managed at home, studies indicate that this population averages about one to 2.6 hospitalizations and one to two ED visits annually, the majority for pain-related crises.[4-6] Little is known about pain crises managed at home, or about the preonset (prodromal) period before pain intensifies to crisis. One study, reporting on nonpharmacologic pain interventions used by children in home settings, found that the most commonly used were watching TV or reading, talking with someone, and taking a nap.[7]

Overall, Americans with sickle cell disease undergo about 75,000 hospitalizations annually, with high 14-day and 30-day rehospitalization rates[5] and rising annual health care expenditures estimated at $475 million to $488 million in recent years.[2,8] Medical expenditures for sickle cell disease tend to rise with age from infancy to young adulthood; one large study "conservatively" estimated U.S. sickle cell disease–related pediatric costs at $335 million in 2005.[9]

Because pain can be a lifelong issue for people with sickle cell disease, it's essential that they learn a multitude of pain management strategies that can be used from childhood through adulthood. It's well known that enhanced coping abilities support self-management of chronic illnesses. Self-efficacy, which has been defined as a belief in one's ability "to execute given levels of performance and to exercise control over events,"[10] may contribute to coping but has not often been studied as a discrete component. Cognitive behavioral therapies, which can include the use of guided imagery, incorporate the concepts of coping and self-efficacy. Such therapies can be effective in addressing the multidimensional nature of pain perception. Guided imagery has been defined as "a thought-provoking technique that conditions [one] to imagine a pleasant or happy scene that is inconsistent

By Cassandra Elaine Dobson, PhD, RN-BC, PHc, and Mary Woods Byrne, PhD, RN, FAAN

ABSTRACT

Background: Despite innovations in treatment, disease-related pain is still the primary cause of hospitalization for children with sickle cell disease. Pharmacologic pain management relieves pain temporarily, but adverse effects are increasingly a concern. Cognitive behavioral therapies, which include the use of guided imagery, have shown promise in changing pain perception and coping patterns in people with chronic illnesses. Few studies have been done in children with sickle cell disease.

Objectives: The purposes of this study were to test the effects of guided imagery training on school-age children who had been diagnosed with sickle cell disease, and to describe changes in pain perception, analgesic use, self-efficacy, and imaging ability from the month before to the month after training.

Methods: A quasi-experimental interrupted time-series design was used with a purposive sample of 20 children ages six to 11 years enrolled from one sickle cell disease clinic, where they had been treated for at least one year. Children completed pain diaries daily for two months, and investigators measured baseline and end-of-treatment imaging ability and self-efficacy.

Results: After training in the use of guided imagery, participants reported significant increases in self-efficacy and reductions in pain intensity, and use of analgesics decreased as well.

Conclusions: Guided imagery is an effective technique for managing and limiting sickle cell disease–related pain in a pediatric population.

Keywords: cognitive behavioral therapy, guided imagery, pain, pain diary, pediatric, self-efficacy, sickle cell disease

with feelings of tension and pain" and which distracts from and reduces pain perception.[11] And, compared with adults, children tend to have heightened imaging ability—"the ability to generate vivid mental images and to experience them as though they were real"[12]—suggesting that children could learn guided imagery and use it effectively. Yet this approach has been inadequately tested in children with sickle cell disease.

The purposes of this study were to test the effects of guided imagery training in children ages six to 11 years who had been diagnosed with sickle cell disease, and to describe changes in pain perception, analgesic use, self-efficacy, and imaging ability from the month before to the month after training. We hypothesized that after training in guided imagery, the children would have greater disease-specific self-efficacy, report less pain intensity, and require less analgesics. We further hypothesized relationships between the reported use of self-initiated guided imagery, baseline imaging ability, and disease-specific self-efficacy.

BACKGROUND

Pain influences functional ability and quality of life in people of all ages. Pain perception and experience are controlled by personality and by biological, situational, social, and cultural factors.[13] Cognitive behavioral therapies seek to alter pain perception and experience by helping the patient change negative thoughts to more positive, health-promoting ones. Efforts to study such interventions in children have yielded mixed results.

Pain can be a lifelong issue for people with sickle cell disease.

In 1992, a sickle cell center in an Ohio children's hospital reported success with a program that taught pain self-regulation techniques to a small group of patients who hadn't responded to standard pharmacotherapies.[14] The approach included the use of a pain flowchart, a symptom checklist, and psychophysiologic monitoring. The authors reported that after training, several patients were able to manage mild pain without medication. (They also noted that research investigating the use of hypnosis and biofeedback in adults with sickle cell disease had found those self-regulatory strategies to be associated with decreased pain symptoms, reduced ED visits, decreased use of narcotics, and increased school or work attendance.) More recently, self-monitoring and relaxation techniques, either therapist directed or using

self-help manuals, have been used effectively in children with headaches.[15]

A series of descriptive studies by Gil and colleagues, conducted among both adults and children with sickle cell disease, have demonstrated that individuals who have more positive cognitive and behavioral coping skills have higher functionality during pain episodes and fewer hospitalizations.[4, 16-18] It's also worth noting that in adults, the related but distinct concept of self-efficacy has been shown to offset the sense of helplessness and lack of control associated with pain experiences.[19] Indeed, stronger perceptions of self-efficacy have been associated with higher pain tolerance and improved coping strategies for laboratory-induced acute pain[10, 20] as well as for chronic clinical pain.[21, 22] Weaker perceptions of self-efficacy have predicted both disability and depression in patients with chronic pain.[23, 25]

Guided imagery and pain management. Huth and colleagues studied the use of guided imagery by children ages seven to 12 years who were undergoing tonsillectomies and other ambulatory surgeries.[26, 27] They found that participants who used guided imagery reported significantly less postoperative pain in the hospital.[26] Lambert studied the use of "self-hypnosis with guided imagery" in children ages seven to 19 years undergoing elective surgeries, and found that it decreased their pain.[28] Guided imagery was also effective in a small study of children with recurrent abdominal pain.[29] A literature review by McQuaid and Nassau found that the efficacy of guided imagery in managing cancer-related adverse effects in children was "well-established."[30]

Two studies investigating the use of guided imagery specifically by children with sickle cell disease yielded mixed results.[31, 32] Gil and colleagues taught children daily coping practices for pain that included the use of "pleasant imagery," and found that on the days the children practiced, compared with missed days, they were more functional and less likely to visit the ED or miss school.[32] Although these benefits were absent at one-month follow-up, the researchers concluded that consistent daily practice could lead to more successful home management of pain. But in an unpublished pilot study, Braniecki, testing an intervention that included guided imagery, reported no significant differences between the intervention and control groups.[31]

MATERIALS AND METHODS

The study used a quasi-experimental interrupted time-series design, in which a series of sequential and repeated observations are made both before and after administration of the experimental treatment to all participants, who thereby serve as their own controls. Following institutional review board approval, 21 children were enrolled on a rolling basis in the study, with written informed consent from parent and assent from child. Data collection took place from April 2004 through February 2006. One child subsequently moved out of state without returning her postintervention diary. Data analyses were performed for the 20 children who completed all study questionnaires and returned both the pre- and postintervention diaries.

At the study's outset, the children's medical records were reviewed and the children were interviewed to establish individual pain profiles. All participants were initially assessed for usual pain patterns using an investigator-adapted Pain Assessment Tool (PAT), for visual imaging ability using the Kids Imaging Ability Questionnaire (KIAQ), and for sickle cell disease–specific self-efficacy using the Sickle Cell Self-Efficacy Scale (SCSES). For the next month, participants kept a diary, recording their daily activities and all pain episodes, including location and intensity, as well as strategies for management. The diaries included blank daily pages with the instruction, "Use one page a day to describe your activities and your pain, and one page to draw a picture." The principal investigator (CED) used participants' medical records to verify usual and episodic care related to disease course, including any hospitalizations that occurred.

All of the participants in our study were capable of being taught the use of guided imagery for pain management in a brief session.

At the end of this initial four-week period, each of the study participants was taught the use of guided imagery, either by a certified child life specialist trained in imagery methods or by the principal investigator under the specialist's supervision. Training included exercises in visualization and the use of imagery scripts. Validation that imagery was being used was determined by the participants' descriptions and drawings of what they imagined. Competency was assessed

Figure 1. Postintervention Diary Page

Date _____/ _____/ _____

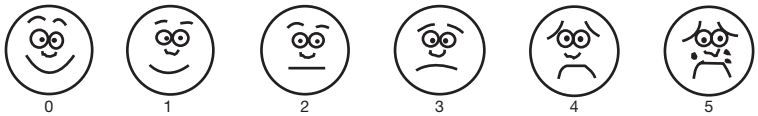
1 - I went to school today:
☐ yes
☐ no, because it is not a school day
☐ no, because I was sick
☐ no, for another reason which is _____

2a) I did these things today: *Check each one that you did.*
☐ played inside the house ☐ did homework ☐ watched TV or played video games
☐ played outside ☐ went to church ☐ went shopping
☐ read books ☐ and something else which is _____

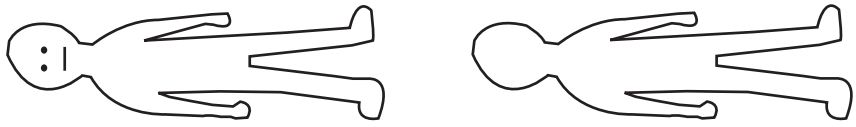
b) I did guided imagery today: yes ☐ no, not at all ☐
If yes, I did it: morning ☐ afternoon ☐ bedtime ☐ another time for pain ☐

3 - I had pain today: ☐ yes *If yes, continue below.* ☐ no *If no, turn the page and draw.*

4 - This is how I rate my pain: *Put a line under the face that shows how you feel.*



5 - My pain is here (put a check by the word and a mark on the picture):
☐ head/neck ☐ chest ☐ belly ☐ back
☐ arm (right/left) ☐ leg (right/left) ☐ knee (right/left) ☐ ankle (right/left)



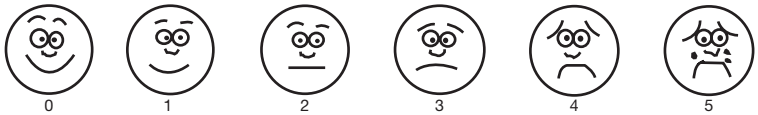
6 - My pain feels like this (check all the words that describe your pain or write in one of your own):
☐ achy ☐ throbbing ☐ burning ☐ tingling

☐ A different word I would use to describe my pain is _____

7 - Here is what makes my pain better or worse.

	Better ☺	Worse ☹	Don't Know?
Lying down	◇	◇	◇
Keeping busy	◇	◇	◇
Heat	◇	◇	◇
Cold	◇	◇	◇
Medicine	◇	◇	◇
Guided imagery	◇	◇	◇
Something else _____	◇	◇	◇

8 - I took medicine for my pain: ☐ yes ☐ no
The medicine is called _____
I took this much _____
After 1 hour my pain is: *Put a line under the face that shows how you feel.*



by the trainers using videotaped observations and a visual validation exercise. Children were trained individually with the exception of two siblings who were trained together. Training sessions lasted from 15 to 45 minutes, and no child required more than one training session. The instructions included how to continue using guided imagery at home. Participants were instructed to self-initiate using guided imagery for a scheduled five to 10 minutes three times each day regardless of pain and also during each pain episode. Each participant was given a tape or CD with guided imagery messages for home use.

After this training, the participants were monitored for another month. During this time, each participant continued to keep a diary, recording daily activities and all pain episodes as well as the frequency of guided imagery use. (For a blank postintervention diary page, see Figure 1.) The diaries again included blank daily pages with the amended instruction, "Use one page a day to describe your use of guided imagery, your activities and your pain, and one page to draw a picture." The principal investigator again monitored their medical records. At the end of this second four-week period, participants' usual pain patterns, visual imagery ability, and sickle cell disease–specific self-efficacy were reassessed. Throughout the study, the protocol to achieve full participation and retention included weekly follow-up phone calls reminding children to complete diaries; occasional home visits to pick up diaries; and, after the training, a series of additional guided imagery sessions conducted on weekends or evenings for the convenience of families. At the study's completion, each child was compensated with a CD of original music created specifically for the child based on her or his interests and hobbies.

Table 1. Demographics of the Sample (N = 20)

Age, mean (SD), y	8.4 (1.6); range, 6–11
Race/ethnicity, No. (%)	
African American	15 (75)
African	2 (10)
Hispanic	2 (10)
Hispanic–African American	1 (5)
Sex, No. (%)	
Female	12 (60)
Male	8 (40)
Genotype, No. (%)	
Hgb SS	19 (95)
Hgb β^+	1 (5)
Family structure, No. (%)	
Single-parent (mother)	11 (55)
Two-parent	8 (40)
Grandparent	1 (5)
Health insurance, No. (%)	
Medicaid	11 (55)
Private	9 (45)
Seen at clinic study site, mean (SD), y	6.3 (1.7); range, 3–8
Zip code area, No. (%)	
Bronx County	18 (90)
Other counties of New York City	2 (10)

Hgb SS = sickle cell anemia; Hgb β^+ = sickle cell–β thalassemia.

Sample selection and characteristics. Children were purposefully recruited from one sickle cell clinic where they had been diagnosed and were receiving ongoing monitoring and treatment as needed. Eligibility was limited to school-age children ages six to 11 years, because such children are in a developmental period marked by a psychological need to achieve competence, their understanding continues to be informed through imagining and pretense, and they are learning behavioral responses that will mold their problem solving into adulthood.[27, 33, 34]

Study participants ranged in age from six to 11 years, the full range of study eligibility; the mean (SD) age was 8.4 (1.6) years. Twelve (60%) were girls; eight (40%) were boys. All had medically diagnosed sickle cell disease; of these, 19 had sickle cell anemia (hemoglobin SS) and one had sickle cell–β thalassemia (hemoglobin β^+). All of the children resided in New York City, with most living in zip code areas of Bronx County. Eight children (40%) lived with both parents, 11 children (55%) with their mother only, and one child (5%) with a grandparent. Fifteen children were African American, two were African, and three were Hispanic (one Hispanic–African American, one whose parents were born in the Dominican Republic, and one whose parents were born in Puerto Rico). All had been seen at the clinic study site for an average (SD) of 6.3 (1.7) years, with a range of three to eight years. The child whose data were not included in the analyses because she moved away shared similar demographics. Table 1 presents the sample demographics.

Measures. The four instruments used in this study were developed as self-report instruments but were used in interview format to accommodate the reading abilities of the child participants and to ensure complete and accurate answers in one administration.

Pain profile. The investigator-adapted pain profile is based on the PAT, a flow sheet developed by an expert who had performed extensive research on patients with pain.[35] The PAT is a multidimensional tool that incorporates the affective, cognitive, behavioral, and sensory components of the pain experience. It consists of a series of open-ended questions that ask the patient to describe location, intensity,

quality, onset and variations, manner of expression, relief measures, exacerbating factors, and the effects of pain on daily living activities. The PAT has traditionally been used to provide a comprehensive pain evaluation for patients admitted to the hospital in pain; its use may also help to establish trust and foster a therapeutic relationship between a patient and a provider. For this study, with the permission of the tool's developer, the questions were adapted for use in an interview format in order to elicit the usual pain patterns experienced by a child with sickle cell disease. Before its use in this study, the investigator-adapted pain profile was judged by two medical experts in sickle cell disease to have content validity.

The KIAQ contains 17 items appropriate for children ages six through 14 years.[12] Its two subscales measure absorption and image-generation skills. For the 10 absorption items, respondents use a three-option scale to rate the personal descriptiveness of each sentence as "Not true for me" (0 points), "A little true for me" (1 point), or "Very true for me" (2 points). For the seven image-generation items, respondents are asked to imagine various situations or events and then use a three-option scale to rate how clearly they were able to do so. For example, one item asks, "Imagine feeling or touching a stuffed animal"; possible responses are "I can't feel it at all" (0 points), "I can kind of feel it" (1 point), or "I can really feel it well" (2 points). Points are summed for a total score that can range from 0 to 34 points, with higher scores indicating greater imaging ability. Content validity, internal consistency, and test–retest reliability over a one-week interval were established by the developers at acceptable levels. Criterion-related validity was established by examining the correlations between KIAQ and Singer Fantasy Proneness Interview scores; the correlations were significant, albeit weak.

The SCSES is a nine-item scale that measures sickle cell disease–specific perceptions of self-efficacy.[36] It is the first, and to our knowledge the only, measure of self-efficacy designed specifically for use in this population. Its nine questions ask respondents their perceptions of their ability to perform daily functions and to manage sickle cell disease–related symptoms (including pain). For each question, respondents answer using a five-option scale ranging from "Not sure at all" (1 point) to "Very sure" (5 points). Total scores can range from 9 to 45 points. The instrument's developers established its internal consistency. Convergent validity was established by examining for significant correlations between SCSES scores and scores on the Rosenberg Self-Esteem Scale, the Pearlin Sense of Mastery Scale, and the Multidimensional Health Locus of Control. Predictive validity was established by examining for significant negative correlations between SCSES scores and both reported sickle cell pain severity in the previous 30 days and total number of sickle cell disease symptoms. A significant relationship was also found between SCSES scores and ED visits, with higher scores associated with fewer visits. Before this study, the principal investigator tested the SCSES with school-age children and established that they understood its wording and that the tool was feasible for use with this age group in an interview format.

Following the guided imagery training and its subsequent use over one month, participants' imaging ability increased significantly.

Diary. Each child was given a structured study diary and instructed in how to record in it at home daily. As a measurement strategy, pain diaries have been shown to be reliable and valid.[7] A parent or primary caregiver received similar instructions about the diary so that she or he could serve as a resource for the child. The diary was in the form of a notebook, included a separate page for each day, incorporated the Wong-Baker FACES Pain Rating Scale, and made use of bright colors and a user-friendly recording structure designed for children. (Such features were used successfully in a study among children and adolescents who had 90% adherence to diary recording over a period of six to 36 months.[37]) Two versions of the diary were prepared, one for the preintervention phase and one for the postintervention phase. Each daily sheet also had check boxes for attendance or absence from school on school days and for daily participation in age-appropriate activities. The postintervention version also had space to record the use of guided imagery sessions. The diaries were completed at home by each child, with parental supervision as needed. The principal investigator was available during scheduled weekly telephone calls to encourage complete and accurate diary records, as well as by pager when needed.

The Wong-Baker FACES Pain Rating Scale has been used frequently with children since the initial version was developed in the 1980s.[38, 39] Depictions of six faces provide options to report pain severity at theoretically equal intervals ranging from none ("No hurt," 0 points) to severe ("Hurts worst," 5 points). Test–retest reliability data for six-year-olds were established by the developers. The scale's usability by young children is derived from its minimal

Table 2. Changes in Self-Efficacy, Imaging Ability, and Pain Perception in School-Age Children After Guided Imagery Training (N = 20)

Variable	Measure	Preintervention Score, Mean (SD)	Postintervention Score, Mean (SD)	Mean Difference, *t* Value, *P* Value[a]
Self-efficacy	Sickle Cell Self-Efficacy Scale	26.4 (8.3)	36.6 (3.9)	10.2 $t = 5.46$ $P = 0.00$
Imaging ability	Kids Imaging Ability Questionnaire	23.5 (7)	30.2 (3.4)	6.7 $t = 3.55$ $P = 0.002$
Pain frequency	Daily diary: monthly average of child's report	5.6 (3.3)	2.5 (4.1)	−3.1 $t = 3.38$ $P = 0.003$
Pain intensity	Wong-Baker FACES Pain Rating Scale	2.4 (1.2)	0.7 (1.2)	−1.7 $t = 4.95$ $P = 0.00$

[a] Parametric testing is reported because most variables yielded normal distributions in spite of small sample size and results were similar to those with nonparametric approaches.

cognitive demands and use of nonverbal prompts requiring little instruction.[40]

RESULTS

Findings describing pain profiles and guided imagery use, as well as the predictive value of our hypotheses regarding the effects of training on self-efficacy, pain intensity, and analgesic use, are detailed below. Exploratory outcomes related to health care use and school attendance are also noted. Changes in key variables from the pre- to the postintervention phase are summarized in Table 2. There was 100% participation in the intervention and all 20 children completed their pre- and postintervention diaries with minimal missing data. There were entries for all diary days, totaling 60 days for 20 children and 1,200 daily diary pages, each with entries on multiple variables. Missing data were limited to no more than one variable entry on several diary pages for any one child, and this was usually the exact amount of medication taken.

Pain profiles. Participants described their usual pain patterns at the outset of the study using the investigator-adapted PAT. All reported extensive experience with pain. Their descriptions included its typical onset, location, intensity, and quality; how they expressed pain; what increased and relieved pain; and what effects they thought pain had on their activities, emotions, and ability to think. At the study's outset, three participants had presented with sickle cell disease–related pain during a crisis and 17 during episodic or routine clinic visits. Among the latter, eight reported symptoms at the time of the clinic visit, four with pain symptoms and four with other complaints including viral illness, nausea and vomiting, eye infection, and asthma. In describing their usual pain patterns, children reported intensities (on a 6-point scale) with an average of 2.4 points. At the most recent clinic visit, one child reported no pain experience. The other 19 children reported that typically pain episodes had unpredictable onsets and described pain qualities as ache (30%), sharpness (25%), and burning or pricking (10% each).

Eleven children (55%) said they expressed their pain by crying, one (5%) by whining and one by being irritable (5%); four children (20%) said they remained quiet or tried to reduce their pain by assuming a position of comfort. All of the participants who experienced pain reported that it affected several physical or psychological aspects of daily life, including emotions (75%, primarily anger and "crying"), physical activities (65%), ability to concentrate (60%), appetite (60%), and sleep (40%). Nineteen participants relied on medication to manage pain. When asked about a plan for coping with pain in the future, three (15%) mentioned medication and 16 (80%) specified guided imagery; the latter might have reflected their recent introduction to the study and its assent process.

Use of guided imagery. The participants reported actually using guided imagery on zero to 23 days (average, 7.75 days) during the postintervention month. The number of days that guided imagery was used did not correlate significantly with imaging ability or self-efficacy as measured at the end of the postintervention month, or with pain frequency or pain

intensity reported during that month. There was a modest and inverse correlation between preintervention self-efficacy scores and frequency of guided imagery use ($r = -0.481$, $P = 0.03$). At the end of the study, frequency of use correlated positively at a trend level with change scores for self-efficacy; that is, the greatest increases in self-efficacy scores were seen in those children who used guided imagery more often ($r = 0.43$, $P = 0.06$).

Guided imagery and self-efficacy. The first study hypothesis predicted that children with sickle cell disease who were trained in using guided imagery would have greater disease-specific self-efficacy following the training. This hypothesis was tested using paired samples *t* tests of mean interval-level SCSES scores. Since the SCSES had not previously been used with children, internal consistency was calculated with a Cronbach α of 0.89, quite acceptable for research and identical to that reported by the developer of the measure for adults.[36]

Mean (SD) SCSES scores were 26.4 (8.3) at the outset of the study and 36.6 (3.9) at the end of the study. The mean difference of 10.2 points represented a significant increase in self-efficacy ($t = 5.46$, $P = 0.00$). The SCSES scores were further analyzed relative to the occurrence of the guided imagery intervention. At baseline, the distribution of self-efficacy scores was negatively skewed with wide variation around the mean. At the end of the study, scores were more normally distributed with less variability around the mean. This reflects the fact that most participants' scores increased after the training. Change scores on the SCSES were calculated to identify individual variations at the two time points. Numerical changes ranged from –7 to +24; 18 participants had positive gain scores and 16 raised their scores more than 1 standard deviation above the mean.

Guided imagery and perceived pain intensity. The second hypothesis predicted that children with sickle cell disease who used guided imagery would report less severe pain for all pain episodes during the first month after training than they had during the month before training. This hypothesis was tested by *t* test of mean interval-level scores on the Wong-Baker FACES Pain Rating Scale.

The majority of pain episodes were managed at home. Participants reported an average of 5.6 pain episodes per month before training compared with an average of 2.5 pain episodes per month following training. This mean difference of 3.1 episodes was statistically significant ($t = 3.38$, $P = 0.003$). On a six-point FACES scale, they reported average pain severities of 2.4 during the month before training and 0.7 during the month following training. This mean difference of 1.7 was statistically significant ($t = 4.95$, $P = 0.00$).

Guided imagery and analgesic use. The third hypothesis predicted that children with sickle cell disease who use guided imagery would report using fewer total analgesics during the month after training than during the month before training. This hypothesis was tested by comparing the types of analgesics required during each time period. Throughout the study period, there were no changes to the prescribed medication regimens. All of the participants had prescriptions for ibuprofen and access to prescriptions from their physicians for a selection of opioid analgesics as needed, including acetaminophen with codeine (Tylenol with Codeine), morphine IV, and hydromorphone (Dilaudid) IV or by mouth. More children used no medication during the postintervention month than during the month before training, and when analgesics were required for home management of pain, only ibuprofen was used.

Guided imagery and use of acute care facilities. For this small sample of children, all of whom were being followed in a specialty clinic, we did not hypothesize about changes in ED visits or hospital care related to the guided imagery training; but we did monitor health care use. Overall, during the month before training, the participants reported nine pain episodes that resulted in three ED visits and six hospitalizations; during the month following training, the participants reported four pain episodes resulting in one ED visit and three hospitalizations. But these differences were not statistically significant. Indeed, throughout the course of the study, this sample had relatively few ED visits and hospitalizations, at rates consistent with those reported in at least one other study.[32] Nevertheless, these are among the most expensive and life-disrupting uses of health care services; and the numbers of ED visits and hospitalizations reported by our sample did decrease.

The greatest increases in self-efficacy scores were seen in those children who used guided imagery more often.

Guided imagery and school attendance. Similarly, we did not hypothesize about changes in school attendance related to the training, but we did monitor it. Participants missed fewer school days on average during the month following training than they did during the month before training, but the differences were not statistically significant. However, if the trend were to continue at the same rate for the course of the school year, it would represent a meaningful increase in school attendance.

DISCUSSION

This is the first empirical study to demonstrate that guided imagery can be an effective tool for pain management in school-age children with sickle cell disease. The study measured imaging ability and self-efficacy prospectively. The simultaneous improvement of these characteristics following guided imagery training suggests that they are malleable and that guided imagery may work on them together. Our findings reinforce the conclusion, expressed by experts two decades ago, that complementary therapies can no longer be ignored as an important aspect of pediatric health care.[41] All of the participants in our study were capable of being taught the use of guided imagery for pain management in a brief session. During the postintervention month, the evident benefits of using guided imagery included reduced pain severity during pain episodes, less use of analgesics, and improved school attendance.

The evident benefits of using guided imagery included reduced pain severity during pain episodes, less use of analgesics, and improved school attendance.

The use of guided imagery in this population assumes that a child's imagination has the potential to affect health, and our findings support that assumption. Across the sample, imaging ability was present at baseline. Furthermore, following the guided imagery training and its subsequent use (to varying degrees) over one month, participants' imaging ability increased significantly. This finding is important because it suggests that with time and practice, children can become better at using their imaging skills to manage pain. And because this finding is specific to school-age children, it also reinforces the importance of offering guided imagery to this age group.

The finding that increased self-efficacy results in reduced pain severity is consistent with what has been reported in the literature for adults. And as noted earlier, self-efficacy in turn has been shown to foster positive coping behaviors. What was surprising in this study was the degree to which participants' self-efficacy improved after a relatively brief guided imagery training session. It's possible that the attention the children received through weekly telephone calls and personal contact in the clinic with the same investigator, as well as the self-directed attention achieved through keeping daily diaries, may also have contributed to increased self-efficacy. Many children showed self-reliance and were eager to complete the diaries by themselves or with little help. Some parents reported that their child often reminded them that the day's diary had to be completed. Other parents reported that they too were eager for their children to complete a day's diary, since this gave them current information about their child's experience of pain. As expected, the older children were better able than the younger ones to complete the diaries independently.

The fact that study participants reported using guided imagery on an average of 7.75 days raises the question of how important frequency of use was in achieving the effects. In other, similar studies, the actual use of an intervention was also limited. Gil and colleagues reported an average of 1.3 times per day for the use of audiotapes,[32] and Braniecki did not report actual use but noted difficulties with achieving desired attendance at scheduled intervention sessions.[31] In our study, it's possible that the training sessions themselves helped to increase self-efficacy and change pain perceptions. It may also be that guided imagery can be used far less frequently than daily, yet still be effective. Gil and colleagues observed that the children in their study were far more likely to practice their coping strategies on a day they experienced pain than on a day they did not.[32] It's also interesting that in our study the children who had the lowest self-efficacy scores at baseline used guided imagery the most. It may be that children who already had greater self-efficacy used other strategies to cope with pain and had less need for guided imagery. It's possible, too, that these new skills need to become part of the child's behavior over a longer period of time than was used in this study. Exposure to a guided imagery training program may be a first important step, and actual practice and use may come slowly over time.

Implications. The findings from this pilot study suggest that training in guided imagery might help children cope with sickle cell disease–related pain (or any pain) on a daily basis. Better pain management in turn can result in decreased opioid use and its associated adverse effects. Cognitive behavioral therapies such as guided imagery should be available to all children with sickle cell disease as part of their pain management protocol. These therapies should be integrated into the health care setting so that chil-

dren and their families have ready access to training. Nurses caring for these children can familiarize themselves with guided imagery, advocate the inclusion of guided imagery in the treatment plan, ask for on-site training resources for children and families, and document usage and outcomes of guided imagery in the medical record.

Although this study focused on guided imagery, the principles underlying this approach are similar to those underlying other cognitive behavioral therapies. One advantage to guided imagery may be that it invokes all of the senses, causing the body to respond to the imagined experience as if it were real.[42] But the full range of such therapies should be included in the education of all health care providers, so that providers are aware of their usefulness and can refer patients appropriately or seek further training themselves.

The promising evidence from this and other studies indicate that larger, randomized controlled trials of the use of guided imagery for pain management in children with sickle cell disease are needed. Researchers should test various ways to offer guided imagery training to both individuals and groups, determine this therapy's cost-effectiveness, and investigate its multiple potential benefits. The effectiveness of other complementary and alternative approaches to pain management should also continue to be studied—and children with sickle cell disease should be included in those studies. Funding for such studies needs to be made available. Treating a child's ability to cope with pain has wide-ranging and lifelong implications.

Limitations. The findings of any study using a quasi-experimental design have limited credibility relative to causality because of control limits and lack of randomization. That said, the interrupted time-series design provided some compensation for the lack of a control group by using the subjects as their own controls.

The generalizability of the findings will be limited to populations similar to the sample used in this study. This was a nonrandomized convenience sample of school-age children enrolled in one clinic. Selection bias could be another limitation; it can't be assumed that this sample is representative of the target population. There is some compensatory strength in that the sample was purposive. The participants are likely to be representative of children with sickle cell disease, since they were all attending a well-known sickle cell disease clinic in a major medical center located in a geographic area where sickle cell disease is prevalent.

The degree of attention offered to the study families via reminders, phone calls and home visits, and extra guided imagery sessions might limit the feasibility of applying the findings to a real-world situation. Self-reported data can also be limited by the social desirability bias, although the variability found in participants' daily entries suggests that this was not the case.

Another limitation is that the four-week pre- and postintervention time periods may not be typical "windows" into the course of the disease. Seasonal differences in disease-related symptoms might be another limiting factor. Data collection occurred during all four seasons. That said, enrollment was timed such that for a given child, both the pre- and postintervention phases were likely to occur in the same season; most occurred during the fall.

In this study, the "everyday" pains of childhood were not differentiated from pain associated with sickle cell disease; indeed, making that distinction can be difficult. When the children discussed diary entries with the principal investigator, it seemed that they did differentiate between everyday pains, sickle cell disease–related clinical pains, and clinical pains from other causes, and that this discernment improved after the intervention. But there are only anecdotal data to support this. Only those children who visited the ED or were hospitalized for sickle cell disease–related crisis pain could be objectively determined to have such pain.

CONCLUSIONS

This quasi-experimental interrupted time-series study was a sound initial approach to studying the use of guided imagery for pain management in children with sickle cell disease. Very little is known about sickle cell disease–related pain patterns outside of acute episodes. To our knowledge no studies have been conducted in these areas. Currently, providers are limited to applying to patients with sickle cell disease what little is known about guided imagery from studies done in children with other diseases, particularly cancer; the pain experiences may not be entirely analogous. This study established the feasibility of training school-age children with sickle cell disease in the use of guided imagery, and the study findings provide some evidence of the effectiveness of guided imagery for pain management in this population. This groundwork should prompt further large-scale clinical trials in this area.

Children with sickle cell disease need to be taught strategies for coping with pain at an early age.

Children with sickle cell disease need to be taught strategies for coping with pain at an early age. The disease is life long and the related pain can become debilitating. Children with this illness can greatly

benefit from understanding that their pain experiences can vary and learning how to differentiate crisis pain from day-to-day pain. Through the use of guided imagery and other pain management strategies, they can achieve better pain control and improved functioning and will enjoy a better quality of life. ▼

For 53 additional continuing nursing education activities on pain management topics and more than 150 activities on pediatric topics, go to www.nursingcenter.com/ce.

Cassandra Elaine Dobson is an assistant professor of nursing at Lehman College, the City University of New York, in New York City. Mary Woods Byrne is the Stone Foundation and Elise D. Fish Professor in Clinical Health Care for the Underserved at the Columbia University School of Nursing in New York City. *The authors acknowledge Meghan D. Kelly, MSEd, CCLS, for providing training in guided imagery for child participants at the Children's Hospital at Montefiore Medical Center in New York City, and Songs of Love, a nonprofit organization, for creating and donating the original music CDs given to each child at the end of the study.* *Contact author: Cassandra Elaine Dobson, cassandra.dobson@lehman.cuny.edu.* *The authors and planners have disclosed no potential conflicts of interest, financial or otherwise.*

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