

# Pediatric Pain Assessment In the Emergency Department: A Nursing Evidence-Based Practice Protocol

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**D**espite the presence of published evidence-based standards of care specific to pain assessment and management, pediatric patients are inconsistently and/or inappropriately assessed for pain (Probst, Lyons, Leonard, & Esposito, 2005). In particular, nurses in the emergency department (ED) may not know about and/or consistently use these evidence-based practices (LeMay et al., 2009). The aim of this project was to make standard the utilization of evidence-based practices regarding pediatric pain assessment in the ED at a community hospital. The use of a computer-based education program and implementation of a pediatric pain protocol were expected to be an effective method to promote change in pediatric pain assessment and management in the ED at this facility.

## Background

Approximately 25 million children, many with a symptom of pain, visit the ED annually (Niska, Bhuiya, & Xu, 2010). Despite the high frequency of pain, pediatric patients are often not appropriately assessed for pain in this setting (Drendel, Brosseau, & Gorelick, 2006; LeMay et al., 2009; Probst et al., 2005). For example, in one investigation of over 120 EDs in the state of Illinois, significant disparities were noted in nurses' assessment of pediatric pain (Probst et al., 2005). Only 60% of patients ( $n = 923$ ) were evaluated by a nurse using an accept-

**Background:** Many children present to the emergency department (ED) in pain and/or experience pain as a result of interventions necessary to manage their illness. Pediatric pain assessment and management is complex and challenging. Despite the presence of published standards of care specific to pain assessment and management, nurses in the ED may not know about and/or consistently use these evidence-based practices. In particular, pediatric patients are inconsistently and/or inappropriately assessed for pain in the ED.

**Methods:** The aim of this project was to make standard the utilization of evidence-based practices regarding pediatric pain assessment in the ED at a community hospital. The purpose of this project was to develop, implement, and evaluate a pediatric pain education program and pain assessment protocol to improve nurses' knowledge and standardize care in a community hospital emergency department.

**Results:** Seventy-eight ED nurses completed the education program, consisting of an online module with content addressing pediatric pain assessment and management, and then used the protocol. Education program evaluations were very positive. A statistically significant difference in the mean pre- and post-test scores indicated significant learning gains among participants; strong reliability of this test was demonstrated. Sixty patient medical records were reviewed two weeks after the educational program. Pain assessment at triage and use of an appropriate pain scale for all assessments were the most consistently used components of the protocol. A low percentage of protocol adherence was found regarding assessment of pain characteristics.

**Conclusion:** Significant improvements in nurses' pain knowledge are demonstrated via an education program. Implementation of a pain assessment protocol is one mechanism to standardize nursing practice with pediatric patients in the ED setting.

ed pain scale during their visit. Of those, only 76% of patients had their pain documented at triage; only 80% of patients had documentation of pain reassessment within one hour of a pharmacologic and/or non-pharmacologic intervention. Likewise, in a recent study, nurses documented their assessment of pain in only 59% ( $n = 150$ ) of pediatric ED patients (LeMay et al., 2009).

In 2001, The Joint Commission established accreditation standards specific to the recognition, identification and treatment of pain (The Joint Commission, 2011). The Joint Commission pain standards serve as the foundation for population-specific pain protocols. Using these as a guide, the Illinois Emergency Medical Services for Children (EMSC) (2002)

published an education module on Pediatric Pain Management in the ED. A panel of experts across the state updated this module (EMSC, 2013). The EMSC module target population includes ED nurses, physicians, and organization leaders. While the EMSC module has been in existence for a number of years, the ED at the facility where this project was conducted had not fully implemented its recommendations.

## Description of Methods And Results

The purpose of this project was to develop, implement, and evaluate a pediatric pain education program and pain assessment protocol to improve nurses' knowledge and standardize

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care in a community hospital ED. The following patient, intervention, comparison, and outcome (PICO) question was posed: In the pediatric population, does use of an education program and implementation of an assessment protocol improve nurses' knowledge and standardize nurses' pain assessment practices in the ED? A quasi-experimental design was used to measure the effects of the education program and assessment protocol. The university and hospital Institutional Review Board approved the project. A waiver of signed consent was granted.

### Setting and Sample

The project setting was the ED, main adult and pediatric, at a nationally recognized community hospital located in a suburb west of Chicago. The ED is a level II trauma center and is an approved site for pediatric emergency care of children of all ages by the Illinois Department of Public Health. The main and pediatric EDs combined provide care for approximately 20,000 patients under the age of 19 each year. Seventy-five percent of these patients are seen in the pediatric ED. When the pediatric ED is at capacity or is closed, all pediatric patients are triaged in the main ED. Over 100 nurses staff the ED, working a variety of shifts. The sample for this project included all ED nurses and 60 ED pediatric patient medical records.

### Education Program

The EMSC module and supporting literature stress the importance of routine nursing staff education specific to pediatric pain assessment and management (EMSC, 2013). This project included the development of a 40-minute education program to communicate EMSC recommendations and introduce the pediatric pain assessment protocol. The education program consisted of a pre- and post-test, narrated education module, demographic and professional characteristic questionnaire, and program evaluation. Using the hospital's electronic learning management system, the program was made available to all nurses employed in the main and pediatric EDs.

The education module included standardized content in the following areas: pediatric pain assessment and management barriers, methods of developmentally appropriate pain assessment, non-pharmacologic and

pharmacologic pain treatment, patient and family education, and pediatric pain outcome measurement. Although the primary focus of this project was pain assessment, general pain management principles were included in the education program to demonstrate the assessment, intervention, and reassessment cycle.

**Measures and data analysis.** The authors developed a 20-item multiple-choice pre- and post-test based upon the education program to measure knowledge regarding module objectives. Test item construction was evaluated by a doctorally prepared nursing faculty member and revised accordingly. Following test item review, five nursing pain experts were asked to critique the education module and evaluate pre- and post-test questions. The experts included two advanced practice nurses with a specialty in pediatric pain or general pain in hospitalized children and adults, a pediatric inpatient nurse with demonstrated expertise in pediatric pain, the pediatric ED manager, and ED clinical educator with demonstrated pediatric ED expertise and an awareness of pain-related standards in this population. Test content validity was assessed using the scale content validity index average (S-CVI/Ave) (Polit, Beck, & Owen, 2007). The S-CVI/Ave was determined by computing the item-content validity index (I-CVI) for each test question and calculating the average I-CVI across items (Polit et al., 2007). The lower limit of acceptability for S-CVI/Ave was 0.80 (Davis, 1992). Adjustments to the test were made based on these data.

A program evaluation and nursing characteristics questionnaire were also developed. Using a 1- to 4-point Likert rating scale, nurses were asked to rate their perceptions of achievement of each objective and confidence in assessing and managing pediatric pain. Additionally, nurses were asked (using a yes/no response) if the computer-based program was effective to deliver the information relevant to practice, and if they expect to change their practice as a result from learning/understanding the content. The nursing questionnaire solicited the following demographic and professional characteristics of participants: age, nursing educational background, years of ED nursing experience, specific ED location (i.e., main or pediatrics), and time since last participation in pedi-

atric pain-related continuing education.

Nurses' responses to the nursing demographic questionnaire, pre- and post-test, and program evaluation were electronically extracted. Data from the nursing demographic questionnaire were used to describe the characteristics of participants. For the pre- and post-test, each multiple choice question had one best answer; points were assigned for correct selection, and a total exam score was calculated across all questions. Program evaluations were measured by calculating an overall score on ratings of achievement of the objectives and analyzing responses to the questions regarding confidence in assessing pediatric pain, effectiveness of the computer-based program, relevance of content, and resultant change in nursing practice.

Nonparametric descriptive statistics were used to analyze categorical variables. Paired sample *t*-test was used to note differences between pre- and post-test scores. Internal consistency of the test was evaluated using Cronbach's alpha coefficient.

**Results.** Findings are reported on three topics: demographics, test analysis, and program evaluation.

**Demographics.** Eighty-two percent ( $n = 63$ ) of main ED nurses and 100% ( $n = 15$ ) of pediatric ED nurses completed the education module and pre- and post-test. Seventy-six nurses completed the nursing questionnaire and program evaluation. Eighty-eight percent ( $n = 58$ ) of participants were less than 44 years of age, with the highest percentage (35%,  $n = 27$ ) between the ages of 35 to 44. The bachelor's degree was the highest level of education for the majority of participants (71%,  $n = 54$ ). The median range of ED years experience was between 4 and 9 years (27%,  $n = 21$ ). Over half ( $n = 43$ ) of all participating nurses reported previous participation in a pediatric pain-related continuing education activity either at work or outside of work with the last year. Of note, approximately 20% ( $n = 15$ ) had never participated in such continuing education activity.

**Test analysis.** Internal consistency of the 20-item post-test was evaluated using Cronbach's alpha coefficient (0.95). The test demonstrates excellent internal consistency of each test question. Each of the 20 test questions were found to be quite relevant or highly relevant to the education module content I-CVI = 1.00 for each



**Figure 1.**  
**Pediatric Pain Emergency Department Assessment Protocol**

Pain assessment frequency.	<ul style="list-style-type: none"> <li>Assess for the presence of pain in triage. May defer due to critical condition.</li> <li>Pain reassessment within one hour of pain-relieving non-pharmacologic and/or pharmacologic intervention.</li> <li>Patients determined to have pain during the ED visit will be assessed for pain within 30 minutes of discharge.</li> </ul>
Utilize an appropriate standardized pediatric pain scale with each pain assessment.	<ul style="list-style-type: none"> <li>N-PASS will be used to assess pain in infants less than 3 months.</li> <li>The r-FLACC scale will be used to assess pain in children ages 3 months to 3 years, cognitively impaired children, and those unable to utilize a subjective scale due to clinical condition.</li> <li>The Wong-Baker Faces will be used to assess pain in children age 3 and older</li> <li>The visual analogue scale will be used to assess pain in the child ages 8 and older.</li> </ul>
Ask the patient to identify the location (all assessments) and characteristics (triage only) of the pain.	<ul style="list-style-type: none"> <li>Ask the toddler and preschool patient if they "hurt" or have an "owie" and ask them to point or tell you where it hurts.</li> <li>Ask the school age and adolescent patient if they have pain.               <ul style="list-style-type: none"> <li>If they report pain ask about additional pain descriptors including: location, onset ("When did the pain start?"), progression ("What makes the pain worse and what makes the pain better?"), quality ("Are there words to describe your pain?"), and effect on daily activities (Does the pain stop you from doing things you normally do?").</li> </ul> </li> </ul>
Documentation.	<ul style="list-style-type: none"> <li>Type of pain assessment scale used with each assessment and pain score.</li> <li>Location of pain and additional pain characteristics such as onset, progression quality, and effect on daily activities as appropriate.</li> </ul>
N-PASS	It is important to observe the infant for approximately 5 minutes before scoring each category. Score each category and add each score to determine pain score. Sedation specific criteria will not be scored. Total from 0 to 10.
r-FLACC	Observe patient for at least 1 to 3 minutes (5 minutes if asleep). Score each category and add each score to determine pain score. Total from 0 to 10. Includes common pain expressive behaviors seen in cognitively impaired. Can be individualized.
FACES	Explain that each face is for a person who has no pain (hurt) or some, or a lot of pain (0 to 10). Ask the patient to point to the face that best describes their pain.
VAS	On a scale from 0 to 10 where 0 is "no pain" and 10 is the "worst pain" ask the patient to point or state the number that best describes their pain.

**Sources:** Hummel, Puchalski, Greech, & Weiss, 2008; Illinois Emergency Medical Services for Children (EMSC), 2013; Malviya, Voepel-Lewis, Burke, Merkel, & Tait, 2006; Stinton, Kavanagh, Yamada, Gill, & Stevens, 2006; Wong & Baker, 1988.

question. The S-CVI/Ave was 1.00, demonstrating acceptable test content validity.

Each of the 20 multiple choice questions had one best answer; points were assigned for correct selection and a total exam score was calculated across all questions. The pre-test scores ranged from 15% to 85% ( $M = 56.8$ ;  $SD = 13.7$ ). The post-test scores ranged from 15% to 90% ( $M = 69.4$ ;  $SD = 15.9$ ). On average, post-test scores were found to have a statistically significant increase of 12.6% higher than the pre-test ( $t = 6.63$ ,  $df = 78$ ,  $p = 0.000$ ).

**Program evaluation.** The majority of the participants reported that the education program objectives were met to a moderate or great extent. Fifty-four percent ( $n = 41$ ) felt confident in assessing pediatric pain after the program. The majority (88%,  $n = 67$ ) reported that the computer-based

program was effective in delivering the content. Ninety-six percent ( $n = 73$ ) noted that the content was directly relevant to their nursing practice and that they desired to change their practice as a result of this program (78%,  $n = 59$ ).

### Pain Assessment Protocol Development

The pain assessment protocol included four components: frequency of pain assessment by the nurse, selection of pain assessment scale, assessment of pain location and characteristics, and frequency of pain-related documentation (see Figure 1). According to current standards, pain was to be assessed in all pediatric patients in triage within one hour of pain-relieving intervention, and in the event the patient experienced pain during the visit, an additional assessment was to

be done within 30 minutes prior to discharge from the ED (EMSC, 2013). Of note, the initial pain assessment was to be deferred due to critical patient conditions requiring emergent resuscitation such as hemodynamic instability, acute airway or respiratory compromise, potentially lethal arrhythmias, or the cumulative effects of multiple organ dysfunctions.

A cognitively and clinically appropriate pain assessment scale was to be used for each pain assessment (Cohen et al., 2008, EMSC, 2013; Stinton, Kavanagh, Yamada, Gill, & Stevens, 2006). Nurses used one of four standardized pediatric pain assessment scales: 1) Neonatal Pain, Agitation, and Sedation Scale (N-PASS); 2) revised Faces, Legs, Arms, Cry, and Consolability scale (r-FLACC); 3) Wong-Baker FACES; and 4)



visual analogue scale. These scales have demonstrated strong psychometric properties in the acute care setting (American Medical Association, 2010; Bailey, Bergerson, Gravel, & Daoust, 2007; Duhn & Medves, 2004; Garra et al., 2010; Hummel, Lawlor-Klean, & Weiss, 2010; Malviya, Voepel-Lewis, Burke, Merkel, & Tait, 2006; Niska et al., 2010; Stinton et al., 2006; Voepel-Lewis, Zanolli, Dammeyer, & Merkel, 2010). In addition to indicating their current level of pain, pre-school children, school-age children, and adolescents were asked to identify the location of pain (EMSC, 2013). During the triage pain assessment, school-age children and adolescents were asked to describe pain onset ("When did the pain start?"), progression ("What makes the pain worse and what makes the pain better?"), quality ("Are there words to describe your pain?"), and effect on daily activities ("Does the pain stop you from doing things you normally do?") (EMSC, 2013). The ED electronic medical record (EMR) contained the FLACC, Wong-Baker FACES, and visual analogue scale. The EMR was revised to include the N-PASS and r-FLACC scales with dedicated documentation rows for pain location, onset, progression, quality, and effect on daily activities.

**Measures and data analysis.** EMR data collection began following nursing staff completion of the education program and continued for a total of two weeks. Data collected through the EMR review included patient demographics and nurses' pain-related documentation. Non-parametric descriptive statistics was used to describe patient characteristics and nurses' adherence to the pain assessment protocol.

**Results.** Patient ages ranged from 10 days to 16 years. Fifty-eight percent ( $n = 35$ ) of the patients were males. The majority of the patients (67%,  $n = 40$ ) received care in the pediatric ED. Thirty-three percent ( $n = 20$ ) of patients presented post-injury with the following diagnoses: contusion, laceration, sprain, fracture, abrasion, and closed head injury. An additional 33% ( $n = 20$ ) had infectious diagnoses including: fever, viral illness, otitis media, pharyngitis, urinary tract infection, and cellulitis. Ten percent ( $n = 6$ ) presented with localized pain of the abdomen, head, or extremity. Respiratory diagnoses, such as pneumonia, croup, and bronchiolitis, was present in 8% ( $n = 5$ ). An

additional 8% ( $n = 5$ ) had gastrointestinal conditions, including gastroenteritis, constipation, and acid indigestion. The remaining 6% ( $n = 4$ ) had general skin conditions.

The primary author reviewed a total of 60 patient records. Eighty-seven percent ( $n = 52$ ) of patients had documentation of pain assessment at triage. Sixty-five percent ( $n = 34$ ) of patients had documentation of pain, with a pain score greater than or equal to one, at some time during their visit. However, only 32% ( $n = 11$ ) of patients with documented pain received a pharmacologic or non-pharmacologic intervention for pain. Of those, 45% ( $n = 6$ ) had documentation of pain reassessment within one hour of the intervention. Forty-seven percent ( $n = 16$ ) of patients with pain had documentation of pain assessment within 30 minutes of discharge from the ED. Overall, 88% ( $n = 66$ ) of all pain assessments at triage, post-intervention, and prior to discharge were documented using an appropriate pain scale and included a pain score. When the N-PASS or r-FLACC was used, all scale components were scored 100% ( $n = 33$ ) of the time. Pain location was documented in 56% ( $n = 20$ ) of pain assessments. At triage, 24% ( $n = 4$ ) of school-age children and adolescents had documentation of pain quality, 29% ( $n = 5$ ) pain onset, and 12% ( $n = 2$ ) pain progression. None of these patients had documentation of pain effects on daily activities in triage. Pain assessment at triage and use of an appropriate pain scale for all assessments represent the most consistently used components of the protocol. In contrast, assessment of additional pain-related characteristics represented the lowest percentage of protocol adherence.

## Discussion and Nursing Implications

This project provided a mechanism to deliver evidence-based pediatric pain assessment and management education to all ED nursing staff. This project also included the implementation of a pediatric pain assessment protocol and measurement of nurses' medical record documentation to evaluate adherence to identified practices.

This education program offering was carefully planned to support staff's completion of the program. Unfortunately, the hospital's human

resources department was not identified as a key stakeholder related to the timing of the education program. A number of hospital-wide human resources electronic learning assignments occurred concurrently with this education program. The abundance of assignments at the same time may have contributed to the overall program completion of only 75%.

Lower-than-expected pre-test scores may be a result of variability of pediatric pain content across schools of nursing and participation in routine pediatric pain-related continuing education. Although a significant increase in post-test scores is evident, these scores were also lower than expected given the participant-reported outstanding achievement of program objectives and confidence in assessing pediatric pain after program completion.

The high percentage of patients assessed for pain using an appropriate scale demonstrates nurses' understanding of the unique developmental and cognitive implications for pediatric pain assessment. This was especially impressive as the protocol included the addition of the two new pain assessment scales. Although nurses in this ED demonstrated increased knowledge, overall comfort in pediatric pain assessment, and a favorable desire to incorporate new pain knowledge from this program into practice, the EMR review highlighted variability in actual adherence to practice, including 1) adherence to use of correct pain scale, 2) adherence to pain assessment at triage, 3) non-adherence to documentation of pain location and additional pain characteristics, and 4) non-adherence to pain assessment post-intervention and prior to discharge from the ED.

Although many patients had pain, defined as pain score greater than or equal to one, few received an intervention for pain. This project did not include recommendations for the selection of pharmacologic or non-pharmacologic intervention based on the severity of pain. As a result of this project limitation, it is possible some patients did not receive intervention due to low pain severity or lack of pharmacologic orders. It is also possible that nurses did use, but did not document, non-pharmacologic interventions. Further exploration is needed to evaluate nursing and physician specific pain management practices in this department. Nurses' low adher-



ence to post-intervention and pre-discharge protocol assessments needs further exploration. The addition of missing documentation alerts in the EMR may be useful to remind nurses of the need to document reassessment of pain following pain intervention. The inclusion of pain assessment in routine pre-discharge vital signs may also increase nurses' adherence.

Of interest, the highest percentage of pain location documentation occurred in triage. It may be assumed that pain location remains constant, unless otherwise indicated, for the remainder of the visit thus subsequent documentation of pain location was lacking. Few patients had documentation of additional pain characteristics. Although these practices were recommended by EMSC, further assessment is needed to determine barriers to use in this ED.

## Conclusion

The importance of improving pediatric pain assessment has been well documented in the literature. Nurses' are primarily responsible for assessing pain and response to interventions in the ED patient. Significant improvements in nurses' pain knowledge can be achieved through a computer-based education program. Translating this knowledge to practice can then occur, as presented in Figure 1, via the implementation of a pain assessment protocol. Together these serve as a platform for optimal care delivery. However, education and availability of practice standards alone may not translate to actual improvement in care delivered by nurses. Exploration of factors contributing to nurses' decisions to use new pediatric pain-related knowledge in practice must be explored and addressed. Further, ongoing quality measurement will provide a mechanism to sustain this project over time. Appropriate identification and documentation of pain is the first step in successful pain management.

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