Using quality improvement strategies to enhance pediatric pain assessment

MARSHA J. TREADWELL, LINDA S. FRANCK AND ELLIOTT VICHINSKY

Abstract

Objective. To evaluate the impact of a quality improvement approach to implementing developmentally appropriate pain assessment guidelines for pediatric inpatients. Patient and staff satisfaction with pain assessment and management, and staff documentation were evaluated one year following the implementation of the revised pain assessment guidelines.

Design. Quasi-experimental design.

Setting. The pediatric hematology/oncology unit of a regional children's hospital.

Study participants. A convenience sample of 36 children and 68 staff at time 1 (T1) and 49 children and 82 staff at time 2 (T2).

Interventions. Staff were educated on the use of pediatric pain assessment tools and a standardized pain assessment protocol was put into practice. Children or their primary caregivers were interviewed, using a questionnaire modified from the American Pain Society quality assurance guidelines, regarding their experiences with pain assessment and management on the unit at T1, just prior to the staff education, and one year later at T2. Multidisciplinary unit staff completed a parallel questionnaire at T1 and T2.

Main outcome measures. Patient and staff satisfaction with pain assessment and management, and chart audit of compliance with pain assessment documentation.

Results. Patients, family members, and staff reported increased pain assessment, improved staff responsiveness to patients’ pain and greater satisfaction with assessment tools between T1 and T2. Increased compliance with the assessment guidelines was confirmed by chart audit.

Conclusions. Improved pain assessment and management practices with resultant increase in patient and staff satisfaction can be achieved and sustained over time using quality improvement strategies.

Keywords: pain assessment, pediatrics, quality improvement

Optimal pain assessment observes and quantifies the patient’s pain status and related experiences over time, documents the efficacy of interventions, and provides the foundation for effective pain management [1,2]. Standards for the assessment and management of acute pain, cancer pain, and sickle cell pain have been published in recent years in response to the need for guidelines for practitioners [3–5]. The guidelines emphasize the commitment of institutions to pain treatment as shown by providing support for staff responsiveness to unrelieved pain, encouraging patients’ communication about pain, implementing educational approaches, and monitoring for quality [6]. Most recently, the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) set forth standards for pain management [7]. The major features of the new standards require that health care organizations provide evidence that: (a) all patients are assessed for pain; (b) policies and procedures are in place to ensure effective pain management by competent staff; and (c) patients and families are educated about pain and pain management, particularly in preparation for discharge.

Research studies have described the implementation of pain guidelines and their short-term effectiveness in improving pain assessment and management for children and adults [8–13]. Obstacles to the implementation of pain assessment recommendations in health care settings include a desire for a ‘one-size fits all’ approach that overlooks differences.
in pain perception and expression for different developmental stages and for such varied etiologies as post surgery, cancer, or sickle cell disease; lack of agreement among clinicians about the validity of the different measures; and limited involvement of patients and families in the pain assessment process [2,14]. Incomplete pain assessment and suboptimal pain management are perpetuated, resulting in considerable costs to patients, their families, and the health care system.

Continuous quality improvement in health care is aimed at reducing errors and complications and improving patient outcomes by increasing consistency in adherence to evidence-based practice standards [15]. It involves monitoring of clinical indicators that can be used to evaluate the quality of important patient care interventions [16]. This approach also includes the identification of best practices, here the use of developmentally appropriate and multidimensional pain assessment, the implementation of interventions to improve compliance with best practices, and re-audit to determine whether the expected improvement in outcomes was achieved. Quality improvement programs include some variant of Deming’s Plan–Do–Check–Act cycle [17] to ensure that compliance with best practice is achieved and sustained. The quality improvement process has been used successfully to enhance pain assessment for patients [10–12,18–21]. However, studies with pediatric patients have not examined patient and staff variables simultaneously, nor have they demonstrated sustained improvement in pain assessment and management practices beyond a few months.

**Purpose of study**

We initiated a multidisciplinary quality improvement project for pain management on our pediatric hematology/oncology inpatient unit in response to staff and family indications that the existing hospital-wide pain assessment guidelines were not capturing the complexities of the pain experience. The existing guidelines did not address developmental differences in patients’ abilities to communicate about pain [22]. They were originally developed for post-surgical patients rather than for children with pain associated with sickle cell disease or oncological disorders, and focused on the intensity dimension of pain. The first phase of our project was the introduction of a range of pain assessment tools for infants through adolescents, which assessed multiple dimensions of the pain experience where possible. The purpose of the investigation was to evaluate the impact of a quality improvement approach to implementing developmentally appropriate pain assessment guidelines for children on patient and staff satisfaction with pain assessment and staff compliance with pain assessment documentation one year following the implementation of the revised pain assessment standards.

**Methods**

**Design**

Patient (or caregiver) views of frequency of pain assessment and satisfaction with pain assessment, staff views of frequency of pain assessment and satisfaction with pain assessment, and staff compliance with pain assessment documentation were measured using a quasi-experimental design.

**Setting**

This study was conducted on the hematology/oncology unit of a large regional tertiary care children’s hospital on the West coast of the United States. The unit has 26 beds and >1000 admissions per year.

**Study participants**

The hospital Institutional Review Board approved the study. A convenience sample of patients admitted to the unit, their primary caregivers, and nursing, medical, and ancillary staff were recruited to participate in this study. Participant inclusion criteria were: experience of pain in the preceding 24 hours, enrollment within 48 hours of admission, and only one interview per data collection period for patients with repeated admissions. Children and/or their primary caregivers received a letter notifying them that a survey regarding pain assessment and management was being conducted on the unit. Trained research assistants who were not directly responsible for patient care obtained informed consent from the parent or legal guardian on admission and conducted the interviews. Staff completed questionnaires regarding their experiences with pain assessment and management prior to the education about and initiation of the revised unit guidelines (time 1, T1).

**Pain assessment tools**

Pain tools were selected after a literature search and polling of practitioners specializing in pediatric pain management from around the country. For infancy through 12 months of age, the Postoperative Pain Score [23,24], an observational measure of pain behaviors with demonstrated clinical validity was selected. For ages 12–36 months the Children’s Hospital of Eastern Ontario Pain Scale (CHEOPS) [25,26], an observational behavioral scale, was chosen. Inter-rater reliability of the CHEOPS is >90%; correlations between individual and total scores range from 0.50 to 0.86; correlations with visual analogue scale (VAS) ratings carried out by nurses in the recovery room after surgery are high; and teacher ratings of films of children in pain were highly correlated with CHEOPS scores obtained by a trained rater.

Children aged 3–6 were asked to report their pain intensity and pain relief using a Faces scale [27]. Test–retest reliability for the Faces is 61% and convergent validity with observational measures is good. Studies have demonstrated that children are able to use the Faces scale to rate pain intensity of medical procedures. Children have been able to rank a series of faces in order of increasing pain and the faces selected were consistent with the intensity of remembered pain [28]. Faces scales have been widely used with multiethnic samples.

Children 6 and 7 years of age who could read were given the option of using the Faces scale or a 0–10 numerical and word–graphic rating scale to indicate pain intensity and pain relief. The convergent validity of the word–graphic rating
scale has been demonstrated in studies showing a significant association between pain scores and behavioral responses, and good correlations have emerged between word–graphic rating scales and the Faces pain scale [29]. Test–retest reliability is 74%. Participants in this age group also rated their mood on a five-point word–graphic scale developed for this study.

For patients aged 8 and over, the Adolescent Pediatric Pain Tool (APPT) [30] was selected. The APPT consists of a body outline, a 100 mm word–graphic scale of intensity, and a pain quality word descriptor list grouped into four categories—an overall evaluation of the pain experience, descriptors of pain properties, and associated affective and time quality of the pain. The validity and reliability of each component of the APPT have been established in a series of studies with multiethnic children, both healthy and hospitalized [31–34]. Inter-rater reliability for body sites was 81% between observers and children and there was a 0.83 correlation between the number of sites marked by children on the outline and that recorded based on pointing. Convergent validity of the word–graphic rating scale with other scales was high, and moderate to high consistency has been found in children’s sorting of the word descriptors. Factor analyses have demonstrated the construct validity of the word groupings.

Interventions

The quality improvement approach targeted increasing consistency in adherence to the ‘best practice’ [15] of the use of developmentally appropriate and multidimensional pain assessment. The intervention was to educate and support staff in the implementation of revised pain assessment guidelines. Clinical indicators (patient perceptions of the use of the pain assessment tools and nursing documentation) were monitored in order to evaluate adherence with the practice standards [16]. Important outcomes were patient and staff satisfaction with the revised pain assessment guidelines. Documentation and satisfaction were re-audited to determine whether the expected improvement in outcomes was achieved.

The revised pain assessment guidelines consisted of procedures for baseline admission assessment and reassessment on each shift that were incorporated into the clinical practice guideline for pain management. The clinical practice guideline is available from the first author upon request. A poster outlining the assessment tools, protocol, readings, and references, was displayed in the unit charting room. A nurse specialist and psychologist provided initial education to staff, which consisted of definitions of pain, strategies for multidimensional and developmentally appropriate assessment and reassessment of pain, overview of pharmacological and non-pharmacological pain management strategies and side effects, overview of psychological, social, and behavioral aspects of pain, developmental differences in pain behaviors, expressions, fears, and sources of comfort, and appropriate documentation. The staff education included didactics, discussion, and role plays of challenges to pain assessment. The unit manager, department director, and resident education director were very supportive of improving pain assessment so encouraged participation in the trainings by scheduling the sessions at varied times so that all shifts could attend and by providing coverage on the unit as needed so that the majority of staff would be able to attend. With this administrative support, developmentally appropriate pain assessment became a part of the ‘unit culture’. Education about pain assessment became a standard part of orientation to the unit.

Ongoing continuing education sessions for nursing and medical staff reviewed challenges to adequate pain management and pharmacology. One year following the implementation of the revised protocol, patients were again interviewed and staff completed the same questionnaires (time 2, T2). Further details about the staff education are available from the first author.

Main outcome measures

Structured interviews were adapted from the patient outcome questionnaire developed by the American Pain Society (APS) for the quality improvement of acute pain and cancer pain [6,35]. The language of the items in the APS questionnaire was modified for use with children ages 5–7, patients aged 8 and older, and primary caregivers (see Appendix for a copy of the 8 years and older interview). Children (or their primary caregiver) rated their pain from ‘no’ to ‘worst possible’ pain. They rated patient mood from ‘very good’ to ‘worst possible’. Participants selected the type of pain assessment tools staff used from a list and rated the tools from ‘helped a lot’ (to tell about pain) to ‘did not help at all’. They rated effectiveness of medications in relieving their pain, reported on their use of adjunctive strategies, and indicated their satisfaction with how the nurses and physicians treated their pain. They responded to an open-ended question asking how pain management could be improved on the unit. The questionnaire for medical, nursing, and ancillary staff was also adapted from the APS quality improvement questionnaire [6,35]. Respondents were asked to rate their frequency of use and satisfaction with diverse pain measures and to describe what they considered to be major challenges in caring for children experiencing pain.

Randomly selected charts were audited for nursing documentation of initial assessment and reassessment using the pain measurement tools for each age group. Chart audits were conducted for the 12 months following the initial staff education. Trained research assistants who were not directly responsible for patient care conducted the audits.

Results

Sample characteristics

Thirty-six patients or primary caregivers completed interviews at T1 and 49 completed interviews at T2. No participants at either T1 or T2 were under the age of 3 and the majority of participants were 8 years of age or older (Table 1). Three-quarters of the participants at each time point had a primary diagnosis of sickle cell disease (SCD), and 25% were diagnosed with cancer. Seventy-one percent of all admissions for patients with SCD and 23% of admissions for oncology patients were for pain. The majority of patients were African American
Table 1  Patient characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>T1 (n = 36)</th>
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<th>T2 (n = 49)</th>
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<tbody>
<tr>
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<td>Percent</td>
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<tr>
<td>3–6 years</td>
<td>6</td>
<td>17</td>
<td>6</td>
<td>12</td>
<td></td>
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<tr>
<td>6–8 years</td>
<td>5</td>
<td>14</td>
<td>3</td>
<td>6</td>
<td></td>
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<td>69</td>
<td>40</td>
<td>82</td>
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<td></td>
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<td></td>
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<td>18</td>
<td>50</td>
<td>22</td>
<td>45</td>
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<tr>
<td>Male</td>
<td>18</td>
<td>50</td>
<td>27</td>
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<tr>
<td>Diagnosis</td>
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<td></td>
<td></td>
</tr>
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<td>27</td>
<td>75</td>
<td>36</td>
<td>73</td>
<td></td>
</tr>
<tr>
<td>Oncology</td>
<td>9</td>
<td>25</td>
<td>13</td>
<td>27</td>
<td></td>
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<tr>
<td>Ethnicity</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>African American</td>
<td>31</td>
<td>86</td>
<td>37</td>
<td>75</td>
<td></td>
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<tr>
<td>Asian American</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td></td>
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<tr>
<td>Caucasian</td>
<td>2</td>
<td>5</td>
<td>7</td>
<td>14</td>
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<tr>
<td>Hispanic</td>
<td>2</td>
<td>5</td>
<td>4</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Mixed</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Hours between admission and interview</td>
<td>M</td>
<td>24.67</td>
<td>21.59</td>
<td>8.88</td>
<td>14.17</td>
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<tr>
<td></td>
<td>SD</td>
<td>8.88</td>
<td>14.17</td>
<td></td>
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<tr>
<td>Interviewees</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Patients</td>
<td>23</td>
<td>64</td>
<td>43</td>
<td>87</td>
<td></td>
</tr>
<tr>
<td>Primary caregivers</td>
<td>13</td>
<td>36</td>
<td>7</td>
<td>13</td>
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</tr>
</tbody>
</table>

and both sexes were equally represented. There were no differences based on gender and generally no differences in findings between patients with SCD and cancer, or between primary caregivers and patients at T1 or T2.

Of the 68 staff who completed the surveys at T1 there were 36 physicians, 29 nurses, and three psychosocial staff. At T2, 82 staff participated, including 41 physicians, 35 nurses, and six psychosocial staff. Over 96% of the same staff who participated at T1 completed the questionnaires at T2.

**Patient views**

**Pain and mood ratings.** There were no significant differences in the ratings of the patients' pain and mood between T1 and T2. No patient at either time period reported 'worst possible pain'; 28% of patients at both time periods reported 'large pain'; and 44% at T1 and 38% at T2 reported 'no' or 'little' pain. Primary caregivers differed from patients at T1, with 75% reporting that the patients had 'no' or 'little' pain while their ratings at T2 were significantly different and consistent with the ratings made by their children [$\chi^2 (4, n = 36) = 13.56, P < 0.01$]. Seventy-seven percent of patients and caregivers rated the patient’s mood as ‘okay’ or better at both T1 and T2.

**Pain assessment.** Children (or their primary caregivers) at T2 reported a significant increase in the staff’s use of multiple measures, in accordance with the protocol for each age group, to assess the child's pain compared with T1 [$\chi^2 (6, n = 85) = 12.42, P = 0.05$; Table 2]. Patients with SCD reported greater use of multiple measures [$\chi^2 (6, n = 85) = 19.23, P < 0.01$], with 45% of patients with SCD reporting the use of multiple measures, compared with 27% of oncology patients. Participants at T2 rated the methods as more helpful in telling about pain compared with T1 [$\chi^2 (3, n = 81) = 9.78, P < 0.05$]. Thirteen percent of the patients with SCD at T1 and 25% of oncology patients indicated the tools were ‘very helpful’, compared with 37% of patients with SCD and 75% of oncology patients at T2.

**Pain management.** There were no differences in ratings of effectiveness of medications administered between T1 and T2 with 53% of patients at both times describing the best possible effectiveness. Participants reported more rapid staff responsiveness at T2 to their reports that the medications were not working [$\chi^2 (3, n = 73) = 24.22, P < 0.00$]. Although no formal changes in pain treatment were implemented on the unit, participants at T2 reported significantly greater use of adjunctive pain management strategies [$\chi^2 (3, n = 68) = 37.34, P < 0.00$].
Table 2 Patient report of pain assessment tools used and helpfulness of the tools to tell about pain

<table>
<thead>
<tr>
<th>Pain assessment tool</th>
<th>T1 (n = 36)</th>
<th>T2 (n = 49)</th>
<th>T1 (n = 35)</th>
<th>T2 (n = 48)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Percent</td>
<td>Number</td>
<td>Percent</td>
</tr>
<tr>
<td>0–4 rating</td>
<td>4</td>
<td>11</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0–10 rating</td>
<td>7</td>
<td>19</td>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td>Body outlines</td>
<td>4</td>
<td>11</td>
<td>5</td>
<td>14</td>
</tr>
<tr>
<td>Pain descriptors</td>
<td>5</td>
<td>14</td>
<td>5</td>
<td>14</td>
</tr>
<tr>
<td>Multiple tools</td>
<td>14</td>
<td>39</td>
<td>30</td>
<td>61</td>
</tr>
<tr>
<td>They did not ask about pain</td>
<td>2</td>
<td>6</td>
<td>0</td>
<td>0</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Helpfulness rating¹</th>
<th>T1 (n = 35)</th>
<th>T2 (n = 48)</th>
<th>T1 (n = 35)</th>
<th>T2 (n = 48)</th>
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<tr>
<td></td>
<td>Number</td>
<td>Percent</td>
<td>Number</td>
<td>Percent</td>
</tr>
<tr>
<td>Helped a lot</td>
<td>8</td>
<td>23</td>
<td>15</td>
<td>31</td>
</tr>
<tr>
<td>Helped</td>
<td>4</td>
<td>11</td>
<td>17</td>
<td>35</td>
</tr>
<tr>
<td>Helped a little</td>
<td>13</td>
<td>37</td>
<td>12</td>
<td>25</td>
</tr>
<tr>
<td>Did not help very much</td>
<td>6</td>
<td>17</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Did not help at all</td>
<td>4</td>
<td>11</td>
<td>0</td>
<td>0</td>
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</table>

¹Categories collapsed for chi-square analyses to adjust for cells with <5 observations.

Pain ratings at the time of the interviews were significantly negatively correlated with ratings of the effectiveness of the medications ($r^2 = 0.32, n = 84, P < 0.01$), while mood ratings were not related to medication effectiveness ratings. Pain and medication effectiveness ratings were not related to satisfaction with either nursing or medical care at either time point. The most frequent response to the open-ended question (33% of all comments at both times) was that doctors and nurses needed to talk with and listen to patients regarding their pain.

**Staff views**

**Pain assessment.** Nurses, physicians, and psychosocial staff did not differ in their use of, or satisfaction with, any of the pain measures, and the findings are presented for all staff together. There was a significant increase from T1 to T2 in the number of dimensions of pain that were assessed (Table 3). The largest increase was with the use of body outlines [$\chi^2 (4, n = 150) = 23.51, P < 0.00$]. Staff reported the greatest improvement in satisfaction with the use of the body outlines to assess pain location [$\chi^2 (4, n = 147) = 28.16, P < 0.00$]. There were significant increases in the degree of staff satisfaction with the word–graphic pain intensity scale [$\chi^2 (4, n = 147) = 11.30, P < 0.05$] and the pain quality word descriptor list [$\chi^2 (3, n = 147) = 9.29, P < 0.05$] between T1 and T2.

**Pain assessment protocol adherence.** Patient medical record review revealed an improvement in the documentation of pain assessment. Pain assessment documentation in accordance with the unit protocol was noted in 30% of 153 charts reviewed prior to T1. This increased to 59% of 86 records reviewed at T2.

**Barriers to optimal pain management.** In response to the open-ended questionnaire, staff expressed concerns about social, psychological, and behavioral issues that confound the expression of pain, and regarding proper dosing and proper use of medications other than narcotics for pain management. Staff also described challenges in working with chronic pain, having access to resources to support the use of adjunctive pain management strategies, maintaining staff consistency, and having the time to assess and treat chronic and recurrent pain appropriately.

**Discussion**

The findings of this study demonstrate that standardized guidelines for pain assessment using tools appropriate to children’s developmental ages, and assessing multiple dimensions of pain where possible, can result in improved pain assessment and responsiveness of staff to patients’ pain. These findings suggest that previously demonstrated poor compliance with pain assessment [13,21,36] may be in part due to limited use of quality improvement strategies or to inadequacies of one-dimensional tools measuring pain intensity for assessing complex pain. Future research should examine motivators and disincentives that affect staff willingness to use pain assessment tools and determine the most effective means for encouraging needed changes in practice.

This study evaluated pain assessment outcomes in the ‘real world’ daily practice of pediatric health care by simultaneously measuring the perceptions of children or their primary caregivers and of the multidisciplinary health care team. Increased use of and satisfaction with pain assessment at T2 was found...
Table 3  Staff reported use of and satisfaction with pain assessment

<table>
<thead>
<tr>
<th>Use of pain tools</th>
<th>T1 (n = 68)</th>
<th>T2 (n = 82)</th>
<th>Satisfaction with pain tools</th>
<th>T1 (n = 68)</th>
<th>T2 (n = 82)</th>
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<td>n</td>
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<tr>
<td>Pain intensity: 0–10 rating</td>
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<tr>
<td>Never</td>
<td>9</td>
<td>13</td>
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<tr>
<td>Seldom</td>
<td>14</td>
<td>20</td>
<td>16</td>
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<tr>
<td>Usually</td>
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<td>Always</td>
<td>26</td>
<td>38</td>
<td>40</td>
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<td>9</td>
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<td>0</td>
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<tr>
<td>Pain location: Body outlines</td>
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<tr>
<td>Never</td>
<td>33</td>
<td>48</td>
<td>13</td>
<td>16</td>
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<tr>
<td>Seldom</td>
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<td>32</td>
<td>37</td>
<td>45</td>
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<tr>
<td>Usually</td>
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<td>Pain intensity: Faces</td>
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following the combined interventions, including multidisciplinary education about pain management and assessment, more robust pain assessment tools, standardized pain assessment guidelines, and ongoing support from administration. The pre- and post-intervention comparative design used in this uncontrolled study, with participation by additional staff and patients at T2, precludes inference of causality. Randomized controlled trials are needed to determine a causal link between these evidence-based quality improvement strategies and pain management outcomes.

A limitation of the present study is the lack of representation of children younger than three years old. A relatively small proportion of patients (9% of total admissions) in this age group are admitted to the unit each year. Furthermore, the most common reason for infants to be admitted was infection, usually accompanied by fever, and it is possible that they were quickly well medicated so that they indeed did not have pain at the time of the evaluation. A more concerning possibility is that caregivers and staff were operating with the perception that these preverbal children did not have pain and/or that pain assessment is too difficult to pursue for this age group with the pain assessment tools presently available. Understanding and management of infant pain generally needs to be improved in the field of pediatrics and the applicability of our findings must be viewed with caution given that the full range of pediatric age groups was not represented in this sample.

Our combining of caregiver and patient reports in our investigation introduces another limitation to the applicability of our findings. Although parental report is a reasonable proxy measure of children’s pain experience under the circumstances of the study [3,37] we recognize that even when child and parent ratings are highly correlated, different demographic and medical variables may contribute to how children and caregivers arrive at their ratings. We were interested in satisfaction with pain assessment used and our structured interview was appropriate down to the age of five. We ran t-tests on a subsample of participants where we had both caregiver and child ratings available (n = 18 dyads). Caregivers and children were always interviewed separately. There were no significant group differences in any of the patient outcome measures (satisfaction with assessment tools used, satisfaction with staff responsiveness to patients’ pain) based on patient
versus caregiver completion. There were also no differences in reported pain intensity. We also ran *t*-tests for the entire sample comparing patient and caregiver responses. The only significant difference between the patient and caregiver groups was that the children in the group where only caregivers had been interviewed were significantly younger.

Other challenges that we faced reflect the current state of the field of pain assessment and pain management. We selected what we deemed were clinically relevant pain assessment tools based on expert advice and a literature review. However, the tools varied in psychometric robustness. Furthermore, the Faces and APPT have been used with multi-ethnic samples but the ethnic composition of populations of study for the other measures was not always indicated. It is of vital importance to attend to cultural, religious, and ethnic factors in pain assessment and in designing pain relief measures consistent with the beliefs of children and their families. There is some evidence that the Faces scale has cross-cultural applicability [27]. Further research is needed on the applicability of language-based measures across different linguistic groups and of observational pain tools across different cultural groups.

Although we found that patient and caregiver perceptions of staff responsiveness to their complaints of unrelieved pain improved at T2, we also found that >40% of patients at T2 still complained of limited effectiveness of medications. It was not a goal of the present investigation to address in depth aspects of pain management that could have contributed to the latter finding (e.g. dosing and routes of administration of medications and use of adjuvants). In our focus on implementing consistent and sustained assessment, rather than changing medication practices, our purpose was to lay a foundation for more effective management. In the pain field, the link between assessment and management remains problematic [38,39]. Much more systematic study of specifically administering analgesics based on assessment scores is needed, beyond looking for individual responses and trends over time. Staff need to be educated about appropriate use of medications and about appropriate comfort measures for pain of varying intensities and qualities. With the establishment of effective pain measurement, our future investigations will focus on the relationships among pain assessment, patterns of medication administration, and patient functional status. We expect that information gathered from examining these factors will allow us to provide more detailed guidance to staff about how best to use assessments to optimize pain management, particularly for patients with pain of varying etiologies (e.g. SCD and cancer). Finally, ongoing quality improvement efforts and monitoring of compliance with pain assessment documentation are indicated to achieve further improvement in pain assessment documentation.

Quality improvement projects are important in the area of pediatric pain. We attempted to take a systematic approach to understanding the impact of interventions for achieving consistent pain assessment targeted to different age groups on an inpatient unit. Despite the limitations that are inherent in this type of uncontrolled study we feel that studies such as this complement more controlled evaluations that themselves have limitations of practicality and implementation in the busy hospital milieu. Additionally, our purpose was to address gaps in the literature with regard to the longer-term effectiveness of a quality improvement approach to improving pain assessment and to examine patient and staff variables concurrently for a pediatric sample. We believe that despite the acknowledged limitations of this work, it provides valuable information to other practitioners as they grapple with similar issues of implementing evidence-based changes in day-to-day clinical practice.

**Conclusion**

In conclusion, the present study suggests that improved pain assessment and management practices with resultant increase in patient and staff satisfaction can be achieved and sustained over time using quality improvement strategies. Research is needed to determine whether there is a causal link between standardized pain assessment and improved pain management and to determine the most effective practices for achieving consistent and comprehensive pain assessment and management.

**Acknowledgements**

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**References**


6. American Pain Society Quality of Care Committee. Quality


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## Satisfaction questionnaire

### Pain Management in Pediatric Patients

**Patient Interview (ages 8 and older)**

**Date:**

**MR#:**

**Age:**

**Hospital:**

**Gender:**

**Date and time of admission:**

**Parent involvement this hospitalization:**

**Date and time of interview:**

1. **What is the main reason that you were hospitalized this time?**
   - (Indicate if patient was approached earlier in the hospitalization and was unavailable)

2. **Have you experienced any pain in the past 24 hours?**
   - **Yes**
   - **No**

3. **On this scale, please show how much pain you are having right now:**
   - **No pain**
   - **Little pain**
   - **Medium pain**
   - **Large pain**
   - **Worst possible pain**

4. **How did the pain start?**

5. **On this scale, please show what your mood is right now:**
   - **Very good mood**
   - **Good mood**
   - **Okay mood**
   - **Very bad mood**
   - **Worst possible mood**

6. **How did the nurses and doctors ask you to tell them about your pain?**
   - **Rating 0 to 4**
   - **Rating 0 to 10**
   - **Body outline**
   - **Words to describe pain**
   - **Other**
   - **They did not ask**

7. **Did the tool that you used help you to tell about your pain?**
   - **Helped a lot**
   - **Helped**
   - **Helped a little**
   - **Did not help very much**
   - **Did not help at all**

8. **Did the medicines that you received help your pain?**
   - **Helped a lot**
   - **Helped**
   - **Helped a little**
   - **Did not help very much**
   - **Did not help at all**

9. **If you ever felt the medicine did not help your pain did you tell someone?**
   - **Yes**
   - **No**

10. **Who did you tell?**

11. **What else helped your pain besides medicine?**

12. **How much did these other things that you did for pain help your pain?**
   - **Helped a lot**
   - **Helped**
   - **Helped a little**
   - **Did not help very much**
   - **Did not help at all**

13. **Did your nurses talk to you every day about the plan to manage your pain?**
   - **Yes**
   - **No**

14. **Did your doctors talk to you every day about the plan to manage your pain?**
   - **Yes**
   - **No**

15. **Please indicate how happy you are with the way your nurses treated your pain**
   - **Very happy**
   - **Happy**
   - **Neither happy nor unhappy**
   - **Unhappy**
   - **Very unhappy**

16. **Please indicate how happy you are with the way your doctors treated your pain**
   - **Very happy**
   - **Happy**
   - **Neither happy nor unhappy**
   - **Unhappy**
   - **Very unhappy**

17. **Is there anything else that you think we should know in order to improve the way that we treat patients in pain?**