Behavioral Pain Assessment Tool for Critically Ill Adults Unable to Self-Report Pain
Louise Rose, Lynn Haslam, Craig Dale, Leasa Knechtel and Michael McGillion

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**Behavioral Pain Assessment Tool for Critically Ill Adults Unable to Self-Report Pain**

By Louise Rose, RN, BN, MN, PhD, ICU Cert, Lynn Haslam, RN, BScN(Hons), MN, NP(Hons), Craig Dale, RN, BScN(Hons), MN, CNCC(C), Leasa Knechtel, RN, BScN(Hons), MN, CNCC(C), and Michael McGillion, RN, BScN, PhD

**Background**
Critically ill adults often cannot self-report pain.

**Objective**
To determine the effect of the Critical-Care Pain Observation Tool on frequency of documentation of pain assessment and administration of analgesics and sedatives in critically ill patients unable to self-report pain.

**Methods**
Data on patients in 2 intensive care units of a university-affiliated hospital were collected before and after implementation of the tool. Patients were prospectively screened for eligibility; data were extracted retrospectively.

**Results**
Data were recorded for a maximum of 72 hours before and after implementation of the tool in the cardiovascular intensive care unit (130 patients before and 132 after) and in the medical/surgical/trauma unit (59 patients before and 52 after). Proportion of pain assessment intervals with pain assessment documented increased from 15% to 64% ($P<.001$) in the cardiovascular unit and from 22% to 80% ($P<.001$) in the other unit. Median total dose of opioid analgesics decreased from 5 mg to 4 mg in the cardiovascular unit ($P=.02$) and increased from 27 mg to 75 mg ($P=.002$) in the other unit. Median total dose of benzodiazepines decreased from 12 mg to 2 mg ($P<.001$) in the cardiovascular unit and remained unchanged in the other unit. Increased documentation of pain assessment was associated with increased age in the cardiovascular unit and with decreased maximum scores on the Sequential Organ Failure Assessment in the other unit.

**Conclusion**
Implementation of the tool increased frequency of pain assessment and appeared to influence administration of analgesics in both units. (American Journal of Critical Care. 2013;22:246-255)
Several behavioral pain assessment tools are now available that facilitate detection of pain experienced by critically ill patients unable to communicate. Systematic pain assessment, with either patient self-reporting or use of behavioral pain assessment tools as appropriate, can improve patients’ outcomes. In a large multicenter observational study, pain assessment was associated with reductions in the duration of mechanical ventilation and ICU stay. In a small study involving patients in a neurotrauma ICU, introduction of the Nonverbal Pain Scale increased documentation of pain assessments and decreased recalled severity of the pain patients experienced. More recently, Gélinas et al reported increased pain documentation and decreased administration of analgesics and sedative agents after introduction of the Critical-Care Pain Observation Tool (CPOT) in a small mixed ICU population (30 patients before, 30 at 3 months, and 30 at 12 months after implementation). However, few studies have evaluated the effect of these tools on pain assessment and management practices; most published studies have been conducted by investigators involved in the development and or validation of the tools.

Our goal was to determine the effect of implementing the CPOT in 2 ICUs of a university-affiliated hospital that provide services to a mixed population of patients, including trauma and cardiothoracic surgery patients. We hypothesized that implementation of the CPOT would increase documentation of pain assessment and influence administration of analgesics and sedatives. Our primary objective was to determine the effects on the frequency of documentation of pain assessment (pain scores and narrative) and on the administration of analgesics and sedatives in patients unable to self-report pain. Our secondary objectives were to determine patient factors associated with documented pain assessment and opioid administration and to examine the impact of CPOT implementation on ICU length of stay and the duration of mechanical ventilation.

**Methods**

**Study Design, Participants, and Setting**

A before-and-after design was used to examine the effect of CPOT implementation in 2 ICUs at Sunnybrook Health Sciences Centre, a 600-bed university-affiliated hospital in Toronto, Ontario. The ICUs were a 20-bed mixed medical/surgical/trauma ICU (CRCU) that admits more than 1100 patients annually and a 14-bed cardiovascular ICU (CVCU) that admits 1150 patients each year. Both ICUs functioned as closed intensivist-led units. Each week, the 20-bed CRCU was overseen by 2 intensivists; the 14-bed CVCU was supervised by 1 intensivist. A team of medical trainees, including fellows and residents, supported each intensivist to provide 24-hour care. These ICUs employed more than 100 (CRCU) and 65 registered nurses (CVCU) in full- and part-time positions.

The CPOT consists of 4 domains: facial expression, body movement, muscle tension, and compliance with the ventilator (or vocalization for nonintubated patients). Each domain is scored from 0 to 2, with a maximum score of 8. The tool has content validity, moderate to high interrater reliability, discriminate validity, and moderate criterion validity.

**About the Authors**

Louise Rose is a Lawrence S. Bloomberg limited-term professor in critical care, Lawrence S. Bloomberg Faculty of Nursing, University of Toronto, Toronto, Ontario, Lynn Haslam is an advanced practice nurse, Department of Anaesthesia, and Leasa Knechtel is the director of nursing education, Sunnybrook Health Sciences Centre, Toronto, Ontario, Craig Dale is an advanced practice nurse, Department of Trauma, Emergency and Critical Care, Sunnybrook Health Sciences Centre, and a PhD candidate, Lawrence S. Bloomberg Faculty of Nursing, and Michael McGillion is an assistant professor, Lawrence S. Bloomberg Faculty of Nursing, and a member of the board of directors of the Canadian Pain Society.

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Two intensive care units were used, a 20-bed mixed unit and a 14-bed cardiovascular unit.

For extraction of pain assessment descriptors, potential behavioral descriptors were compiled from published tools.

validation.7–14,17 Before implementation of the CPOT, the pain management policies of the ICUs did not include use of a behavioral pain assessment tool, although individual nurses self-reported that they used various tools, including the CPOT.18 The recommended frequency of pain assessment, or pain assessment intervals (PAIs), for surgical patients was hourly for 6 hours postoperatively and then a minimum of every 4 hours. Nonsurgical patients were expected to have pain assessment documented a minimum of every 4 hours.

For the baseline phase of the study, patients were recruited from September 2008 to January 2009. After a 4-month implementation phase, patients were recruited from June to October 2009. Patients were eligible if they were unable to communicate verbally or via other means, as determined by documented failure to follow verbal commands or a motor score of 5 or less on the Glasgow Coma Scale. Each patient’s inability to communicate was confirmed with the patient’s bedside nurse. Patients were excluded if they were receiving neuromuscular blockers at the time of screening, were readmitted to the ICU and had previously been enrolled in the study, or were in the ICU during both study phases.

Data Collection

Research staff prospectively screened the eligibility of all consecutive patients admitted to the 2 ICUs. In order to minimize the impact of data collection on critical care nurses’ practices of documenting pain assessment, the relevant data were extracted from each study patient’s record retrospectively after the patient had been discharged from the ICU.

Demographic data included age, sex, admission type, primary reason for ICU admission, and number of invasive catheters or tubes. Additional information collected included frequency and type of documentation (either pain score or narrative description) of pain assessment from the time of inclusion in the study until the patient regained the ability to communicate (indicated by a motor score of 6 on the Glasgow Coma Scale or nursing documentation) or a maximum of 72 hours; type, delivery method, and dose of analgesic and sedative medications administered; and daily scores on the Sequential Organ Failure Assessment (SOFA), duration of mechanical ventilation, and length of ICU stay. In order to guide extraction of narrative descriptions of pain assessment, a reference compendium of potential behavioral descriptors was compiled from published behavioral pain assessment tools.7–11,15–18 Data abstractors were instructed to record verbatim all documentation potentially related to pain assessment and management, including ambiguous documentation. The abstractors excluded any reference to pain behaviors elicited during routine neurological assessment. Random audits of data extraction were done to ensure consistency of nurses’ narratives of pain documentation recorded by research staff.

Tool Implementation

Before use of the CPOT was implemented, all nurses attended educational sessions that included video demonstration of pain behaviors and instructions on application of CPOT. Videos were provided by Dr Gélinas, who developed the CPOT and who used the videos in the study of CPOT implementation.14 Existing unit protocols and ICU flow sheets were modified to incorporate the CPOT. Point-of-care CPOT scoring guides were available at every bedside, posters were displayed in prominent locations, and educational materials were posted on the ICUs’ Web portal and published in newsletters. The senior nursing team provided focused 1-on-1 bedside education during implementation and monitored compliance via monthly random chart audits. Results of monthly audits were e-mailed to staff, posted on notice boards, and discussed at staff meetings. Auditing for compliance with the pain assessment policy was incorporated into individual performance reviews. Senior nurses and physicians were involved in tool selection and championed implementation through existing quality and education forums.

Statistical Methods

Assessment of the primary outcome, the frequency of documentation of pain assessment, required a sample size of 524 PAIs (524 before and 524 after) in each participating ICU to detect a 10% difference in the frequency of the documentation with 90% power and α = .05. Descriptive statistics were used to summarize demographic characteristics and doses of medications. Continuous variables were described by using measures of central tendency and spread (means and standard deviations or medians and interquartile ranges, depending on data distribution). Frequencies, proportions, and 95% confidence intervals were used to describe categorical variables. The overall
A total of 189 patients were recruited before implementation of the CPOT and 184 patients after implementation. Demographic characteristics for both study phases according to ICU are shown in Table 1. Patient characteristics in the 2 study phases were similar except for median maximum SOFA scores in the CVICU and number of catheters in the CRCU cohort. In both units, the number of PAIs did not differ significantly during the study phases. In the CVICU, the proportion of PAIs with pain assessment documented increased from 15% to 64% ($P < .001$) and from 22% to 80% ($P < .001$) in the CRCU. The median number of PAIs for each patient with documented pain assessment increased after CPOT implementation in both ICUs (Table 2).

Because an increase in documentation of a behavioral pain score after implementation of the CPOT was anticipated, the frequency of documentation of narrative assessments of behavioral and physiological indicators of pain was determined. The number of narrative assessments increased in the CVICU and were unchanged in the CRCU (Table 2). For the CVICU patients, the median maximum
CPOT score was 0 (interquartile range [IQR], 0-2), and 28 of the 274 documented scores (10%) were 3 or greater, indicating the presence of pain. For 11 of the 28 scores (39%), patients’ medical records had no documentation of administration of an analgesic. For CRCU patients, the median score was 4 (IQR, 1-5), and 104 of the 693 scores (15%) were 3 or greater; for 43 scores (41%), medical records had no documentation of administration of an analgesic.

Table 3 presents median total and hourly doses of analgesic and sedative agents administered before and after CPOT implementation. Median total opioid equivalent doses decreased by 1 mg in the CVICU (P < .001) and increased by 48 mg in the CRCU (P < .001). The total dose of benzodiazepines decreased in the CVICU by 10 mg (P < .001), but remained unchanged in the CRCU. In the CVICU, both before and after CPOT implementation, higher total opioid doses were received by sicker patients (higher maximum SOFA scores) and by patients admitted for medical indications. In the CRCU, after CPOT implementation, patients admitted for medical indications received less total opioid compared with patients admitted after surgery or trauma (P = .001), when adjustments were made for age, sex, number of invasive devices, maximum SOFA score, and duration of ICU stay; no differences were noted before CPOT implementation.

Accounting for the number of PAIs, admission category, sex, and maximum SOFA score, increased age was associated with increased documentation of pain assessment in the CVICU. In the CRCU, decreased maximum SOFA scores were associated with increased documentation (Table 4). In the CVICU, the estimated median duration of ICU stay, determined by using the Kaplan-Meier method, decreased from 2.0 (IQR, 1.0-5.0) days to 1.8 (IQR, 1.0-3.0) days (P = .007); no difference was found in the CRCU (median, 5.9; IQR, 2.9-13.6 days before and median, 7.0; IQR, 5.0-14.7 days after). No difference was found in the duration of mechanical ventilation before and after CPOT implementation in either ICU. The CVICU median was 0.6 (IQR, 0.3-0.8) days before CPOT and 0.5 (IQR, 0.3-0.8) days after implementation. The CRCU median was 3.9 (IQR, 1.4-10.7) days before implementation and 5.9 (IQR, 3.0-9.1) days after use of the CPOT began.

Discussion

Our findings indicate successful implementation of the CPOT in terms of improved compliance with regular documentation of pain assessment in 2 ICUs with no previous formal use of this, or any other, behavioral pain assessment tool. Although we showed improved compliance with the policy-recommended frequency of documented pain assessment, we did not achieve compliance rates higher than 80%. Although 100% is obviously preferable, 80% compliance may be acceptable in ICUs with large numbers of nurses, staff turnover, and acutely ill patients. The rate was also a marked improvement from compliance at baseline. A similar compliance rate for documented pain assessment was reported by Topolovec-Vranic et al, whereas Gélinas et al reported a median of 12 documented assessments (every 2 hours) per 24 hours of ICU stay 12 months after CPOT implementation, although compliance cannot be calculated because institutional recommendations for frequency of documentation were not described.

Table 2

<table>
<thead>
<tr>
<th>Documentation</th>
<th>No. of patients, median (IQR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVICU</td>
<td></td>
</tr>
<tr>
<td>Eligible hoursa</td>
<td>1321, 3 (2-6)</td>
</tr>
<tr>
<td>PAIs</td>
<td>633, 3 (2-6)</td>
</tr>
<tr>
<td>PAIs with pain assessment (all)</td>
<td>180, 1 (0-2)</td>
</tr>
<tr>
<td>PAIs with pain assessment (eligible)b</td>
<td>96, 0 (0-1)</td>
</tr>
<tr>
<td>Narrative episodes (all)</td>
<td>254, 1 (0-2)</td>
</tr>
<tr>
<td>Narrative episodes (eligible)</td>
<td>130, 0 (0-1)</td>
</tr>
<tr>
<td>After (n = 132)</td>
<td></td>
</tr>
<tr>
<td>After (n = 59)</td>
<td></td>
</tr>
<tr>
<td>After (n = 52)</td>
<td></td>
</tr>
<tr>
<td>Before (n = 130)</td>
<td></td>
</tr>
<tr>
<td>Before (n = 59)</td>
<td></td>
</tr>
</tbody>
</table>

Abbreviations: CRCU, medical/surgical/trauma unit; CVICU, cardiovascular intensive care unit; IQR, interquartile range; PAIs, pain assessment intervals.

a Refers to the number of hours of data collection during which patients remained eligible for the study.

b Excludes PAIs coded as 2 (ambiguous as to whether documented assessment referred to pain, agitation, or delirium because interventions for management of agitation and delirium coincided with documentation) and 4 (documentation of analgesia given, though no assessment data recorded).
Numerous observational studies24-26 have indicated poor compliance with various evidence-based practice recommendations, indicating that implementation of the recommendations remains a challenge in the ICU. Assessment of the need for medication and of the effect of the medication is a central tenet of medication administration that guides initiation, escalation, and discontinuation of therapy. However, systematic assessment of pain in critically ill patients remains infrequent and is done

### Table 3

<table>
<thead>
<tr>
<th>Drug</th>
<th>Before (n=130)</th>
<th>No.</th>
<th>After (n=132)</th>
<th>P</th>
<th>No.</th>
<th>Before (n=59)</th>
<th>After (n=52)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fentanyl, total, µg</td>
<td>21</td>
<td>800</td>
<td>11</td>
<td>.17</td>
<td>38</td>
<td>300</td>
<td>44</td>
<td>.003</td>
</tr>
<tr>
<td>Fentanyl, per hour, µg</td>
<td>47</td>
<td>(15-82)</td>
<td>14</td>
<td>.09</td>
<td>10</td>
<td>(4-21)</td>
<td>20</td>
<td>.006</td>
</tr>
<tr>
<td>Hydromorphone, total</td>
<td>94</td>
<td>0.6</td>
<td>104</td>
<td>.26</td>
<td>5</td>
<td>1.6</td>
<td>2</td>
<td>.85</td>
</tr>
<tr>
<td>Hydromorphone, per hour</td>
<td>0.2</td>
<td>(0.1-0.3)</td>
<td>0.2</td>
<td>.84</td>
<td>0.1</td>
<td>(0.0-0.3)</td>
<td>&gt;.99</td>
<td></td>
</tr>
<tr>
<td>Morphine, total</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td>3</td>
<td>15</td>
<td>2</td>
<td>.79</td>
</tr>
<tr>
<td>Morphine, per hour</td>
<td>0.0</td>
<td>(0-0.0)</td>
<td></td>
<td></td>
<td>0.2</td>
<td>(0.0-0.3)</td>
<td>0.2</td>
<td>.79</td>
</tr>
<tr>
<td>Opioid equivalents, total</td>
<td>107</td>
<td>5</td>
<td>112</td>
<td>.02</td>
<td>42</td>
<td>27</td>
<td>45</td>
<td>.002</td>
</tr>
<tr>
<td>Opioid equivalents, per hour</td>
<td>1.4</td>
<td>(0.8-3.0)</td>
<td>1.2</td>
<td>.04</td>
<td>1.0</td>
<td>(0.4-2.3)</td>
<td>2</td>
<td>.008</td>
</tr>
<tr>
<td>Ketamine, total, g</td>
<td>1</td>
<td>1.6</td>
<td>1</td>
<td></td>
<td>36</td>
<td>1</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Ketamine, per hour</td>
<td>24</td>
<td>(24-24)</td>
<td>31</td>
<td></td>
<td>0.2</td>
<td>(0.1-0.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gabapentin, total</td>
<td>16</td>
<td>100</td>
<td>8</td>
<td>.85</td>
<td>2</td>
<td>350</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gabapentin, per hour</td>
<td>14</td>
<td>(9-18)</td>
<td>17</td>
<td>.50</td>
<td>13</td>
<td>(8-18)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acetaminophen, total, g</td>
<td>36</td>
<td>1</td>
<td>16</td>
<td>.95</td>
<td>32</td>
<td>3</td>
<td>33</td>
<td>.17</td>
</tr>
<tr>
<td>Benzodiazepine, total</td>
<td>99</td>
<td>12</td>
<td>63</td>
<td>&lt;.001</td>
<td>21</td>
<td>2</td>
<td>25</td>
<td>.34</td>
</tr>
<tr>
<td>Benzodiazepine, per hour</td>
<td>3</td>
<td>(1-19)</td>
<td>1</td>
<td>&lt;.001</td>
<td>0.1</td>
<td>(0.0-0.2)</td>
<td>0.0</td>
<td>.93</td>
</tr>
<tr>
<td>Propofol, total</td>
<td>11</td>
<td>150</td>
<td>20</td>
<td>.33</td>
<td>20</td>
<td>603</td>
<td>28</td>
<td>.46</td>
</tr>
<tr>
<td>Propofol, per hour</td>
<td>15</td>
<td>(10-50)</td>
<td>15</td>
<td>.43</td>
<td>23</td>
<td>(11-34)</td>
<td>14</td>
<td>.28</td>
</tr>
<tr>
<td>Haloperidol, total</td>
<td>2</td>
<td>5</td>
<td>3</td>
<td>&gt;.99</td>
<td>2</td>
<td>10</td>
<td>3</td>
<td>&gt;.99</td>
</tr>
<tr>
<td>Haloperidol, per hour</td>
<td>0.1</td>
<td>(0.1-0.1)</td>
<td>0.5</td>
<td>.44</td>
<td>0.3</td>
<td>(0.0-1.4)</td>
<td>0.1</td>
<td>.68</td>
</tr>
</tbody>
</table>

**Abbreviations:** CRCU, medical/surgical/trauma unit; CVICU, cardiovascular intensive care unit.

*a Data are median (interquartile range) for hourly dose. All doses are in milligrams unless otherwise indicated. Dashes indicate no data.
CVICU may have thought that most patients had pain related to procedures and incision sites and routinely administered preemptive analgesics. Possibly CPOT implementation enabled nurses to better detect the presence or absence of pain and to titrate administration of analgesics accordingly. Because of the minimal differences in patient characteristics across the 2 ICUs after CPOT implementation, increased administration of opioids in the CRCU might be due to improved detection and management of pain. However, in other studies, implementation of a behavioral pain tool had the opposite effect on opioid administration. Gélinas et al detected a reduction in opioid administration and postulated that this effect was due to improved guidance in pain management decisions and ability to discriminate pain from other symptoms as well as a reduction in the number of trauma patients after implementation. Similarly, decreased use of opiates and better pain control were achieved in a large before-and-after study in which protocols for management of analgesia, sedation, and delirium were implemented that included targeting of analgesia to pain scores. Divergent findings such as these on opioid usage are context dependent and expected. Targeting either increased or decreased administration of analgesics as a desirable outcome has limited clinical usefulness. Rather, administration of analgesics must be based on the intensity and nature of the pain problem for individual patients so that the patients receive appropriate doses of the medications.

Although implementation of CPOT increased documentation of pain assessment and potentially inconsistently. For example, Payen et al found that only half of the patients treated with opioids on day 2 of the patients' ICU stay had documented assessments of pain. Other studies on implementation of behavioral pain assessment tools had low baseline rates of documented pain assessment. In a recent multicenter 1-day point prevalence study of 10 routine care processes involving 50 ICUs and more than 650 patients, variability was detected in compliance in all care practices, but documentation of pain scores was one of the practices with the lowest compliance (35%; IQR, 17%-62%). We noted increased pain documentation for older patients in the CVICU and for patients with decreased organ failure in the CRCU. Possibly nurses thought that older adults need more frequent pain assessments than do younger patients. Competing priorities for nurses' time may influence the nurses' ability to complete and document pain assessment in patients with higher severity of illness.

We found that implementation of CPOT had different effects on opioid and benzodiazepine administration in the 2 study ICUs. In the CVICU, a small but significant decrease occurred in use of opioid analgesics and a large decrease in the administration of benzodiazepines. In the CRCU, the amount of opioid analgesics administered increased dramatically, and benzodiazepine usage was unchanged. The decreases in the CVICU may have been due to both implementation of sedation strategies targeting minimal sedation and provision of the CPOT to guide pain assessment. Before implementation of the CPOT, and in the absence of a systematic pain assessment tool, nurses in the CVICU may have thought that most patients had pain related to procedures and incision sites and routinely administered preemptive analgesics. Possibly CPOT implementation enabled nurses to better detect the presence or absence of pain and to titrate administration of analgesics accordingly.

Because of the minimal differences in patient characteristics across the 2 ICUs after CPOT implementation, increased administration of opioids in the CRCU might be due to improved detection and management of pain. However, in other studies, implementation of a behavioral pain tool had the opposite effect on opioid administration. Gélinas et al detected a reduction in opioid administration and postulated that this effect was due to improved guidance in pain management decisions and ability to discriminate pain from other symptoms as well as a reduction in the number of trauma patients after implementation. Similarly, decreased use of opiates and better pain control were achieved in a large before-and-after study in which protocols for management of analgesia, sedation, and delirium were implemented that included targeting of analgesia to pain scores. Divergent findings such as these on opioid usage are context dependent and expected. Targeting either increased or decreased administration of analgesics as a desirable outcome has limited clinical usefulness. Rather, administration of analgesics must be based on the intensity and nature of the pain problem for individual patients so that the patients receive appropriate doses of the medications.

Although implementation of CPOT increased documentation of pain assessment and potentially

<table>
<thead>
<tr>
<th>Admission category</th>
<th>Before CPOT</th>
<th>After CPOT</th>
<th>Before CPOT</th>
<th>After CPOT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgical</td>
<td>IRR (95% CI)</td>
<td>P</td>
<td>IRR (95% CI)</td>
<td>P</td>
</tr>
<tr>
<td>Trauma</td>
<td>1.28 (0.66-2.50)</td>
<td>.46</td>
<td>2.48 (1.27-4.81)</td>
<td>.007</td>
</tr>
<tr>
<td>Medical</td>
<td>1.0 (1.00-1.00)</td>
<td>&gt;.99</td>
<td>1.26 (0.95-1.68)</td>
<td>.10</td>
</tr>
</tbody>
</table>

**Table 4**

Multivariable analysis of patients' characteristics associated with documented pain assessment

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**Abbreviations:** CRCU, medical/surgical/trauma unit; CVICU, cardiovascular intensive care unit; IRR, incidence rate ratio; PAIs, pain assessment intervals; SOFA, Sequential Organ Failure Assessment.
influenced use of analgesics and benzodiazepines, approximately 40% of CPOT scores indicating the presence of pain were not followed by administration of an analgesic. Our intervention included nurse education emphasizing the need for analgesics for patients with CPOT scores of 3 or greater but did not include revision of orders to formalize prescription of an analgesic in response to high CPOT scores. A recent survey of pain assessment practices across Canada indicated infrequent targeting of analgesia to a pain score or other assessment parameters by physicians. However, the potential for improved patient outcomes as a result of implementation of systematic pain assessment linked to an intervention strategy to treat pain and prevent escalation of pain cannot be overlooked. Chanques et al. reported that such a strategy reduced the incidence of pain, pain severity, the duration of mechanical ventilation and rate of nosocomial infections. The lack of influence on duration of ICU stay and mechanical ventilation in our study may have occurred because pain assessment findings were not directly linked to prescribing of analgesics.

**Limitations**

Because of the limitations of the study design, our results may have been influenced by unaccounted confounders such as other ongoing quality initiatives; in particular, a sedation score and algorithm targeting low levels of sedation were introduced at the same time as the CPOT. Other potential confounders include turnover of physicians and nurses and differences in patient characteristics, although the cohort groups were equivalent in terms of measured baseline characteristics except for a lower maximum SOFA scores in the CVICU patients and fewer invasive catheters in the CRCU patients after implementation of the CPOT. Our results may also be subject to performance bias despite our attempts to avoid influencing pain assessment practices by collecting most data from the medical record after patients were discharged from the ICU. Ascertainment bias may have occurred despite random audits of the accuracy of data extraction because the persons who extracted information from nurses’ narratives were not blinded to the study period or the study purpose. Because the data collection was retrospective, we were unable to accurately determine assessment of response to analgesics. The exact time of assessment was not well documented, and the documentation did not directly describe response to treatment; narrative notation is often documented by nurses in retrospect rather than real time. We were 5 PAIs short of our target sample size in the CVICU after CPOT implementation because 5 patients were excluded during data cleaning. Because we used an extremely conservative estimate of effect in calculating our sample size and the observed effect size was large, this limitation does not influence interpretation of our results. Additionally, we were unable to present data on PAIs with documented pain assessment per day of ICU stay; we discontinued data collection as soon as patients were able to communicate, making direct comparison with the results of other studies problematic.

**Conclusion**

Implementation of the CPOT increased the frequency of pain assessment and most likely influenced administration of opioid analgesics in the 2 ICUs. Few episodes of pain were detected by using the CPOT, although approximately 40% of pain episodes were not addressed with administration of analgesia, suggesting the need to link pain management to assessment findings. The effectiveness of the CPOT for optimizing appropriate administration of an analgesic in critically ill patients unable to self-report needs to be evaluated in randomized controlled trials.

**ACKNOWLEDGMENTS**

We thank Alex Kiss for his advice and assistance with statistical analyses.

**FINANCIAL DISCLOSURES**

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**REFERENCES**

5. Ethier C, Burry L, Martinez-Motta C, et al; Canadian Critical Care Trials Group. Recall of intensive care unit stay in

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**SEE ALSO**

For more about pain management, visit the Critical Care Nurse Web site, www.ccnonline.org, and read the article by Arbour and Gélinas, “Setting Goals for Pain Management When Using a Behavioral Scale: Example With the Critical-Care Pain Observation Tool.” (December 2011).

www.ajcconline.org


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1. Which of the following has been identified as the most significant barrier to effective assessment and management of pain in the intensive care unit?  
   a. Patient inability to self-report  
   b. Nurses’ perception of pain management  
   c. Family interventions  
   d. Documentation

2. Those conducting the Critical-Care Pain Observation Tool (CPOT) study hypothesized that implementation of CPOT would do which of the following?  
   a. Not affect documentation of pain assessment and would increase administration of analgesics  
   b. Negatively affect documentation and decrease administration of analgesics  
   c. Increase documentation of pain assessment and influence administration of analgesics  
   d. Decrease documentation of pain assessment and increase administration of sedatives

3. Which of the following is the recommended pain assessment interval for postsurgical patients?  
   a. Every 15 minutes for 1 hour then a minimum of every 2 hours  
   b. Hourly for 6 hours then a minimum of every 4 hours  
   c. Hourly for 2 hours then every 2 hours for 12 hours  
   d. Hourly for the entire shift and as needed

4. Patients were eligible for the study if they met 1 of 2 criteria. The first criterion refers to the patient’s inability to communicate as determined by not being able to follow verbal commands. What was the second criterion?  
   a. A Mini-Mental Status Exam score less than 24  
   b. A motor score of 5 or less on the Glasgow Coma Scale  
   c. A vital capacity greater than 15 mL/kg body weight  
   d. Ability to maintain a mean arterial blood pressure between 70 and 110 mmHg

5. Data abstractors excluded reference to pain behaviors during which of the following interventions?  
   a. Routine neurological assessments  
   b. Pain assessment after narcotic administration  
   c. Administration of analgesia for mild pain  
   d. Patient mobility

6. Which of the following was used to examine prospectively chosen patient factors associated with pain assessment in each intensive care unit (ICU)?  
   a. Kaplan-Meier method  
   b. Nonlinear regression  
   c. Multiple Poisson regression  
   d. Discriminant analysis

7. Which of the following admissions categories provided the most patients for the study?  
   a. Surgical  
   b. Trauma  
   c. Medical  
   d. Respiratory

8. As a result of CPOT implementation, the median number of pain assessment intervals for each patient:  
   a. Increased  
   b. Decreased  
   c. Did not change

9. Study findings indicated successful implementation of the CPOT was associated with which of the following?  
   a. Increased patient assessment intervals  
   b. Minimized analgesia administration  
   c. Better detection for the presence of pain  
   d. Compliance with pain assessment documentation.

10. Which of the following supported the assumption that CPOT implementation resulted in improved detection and use of opioids in the medical/surgical/trauma ICU?  
    a. Frequency of analgesic use was targeted and met.  
    b. Protocols created provided guidelines for pain discrimination.  
    c. There was improved benchmarking and compliance.  
    d. There were minimal differences in patient characteristics.

11. Which of the following outcomes is anticipated with implementation of a systematic pain assessment to treat and prevent escalation of pain?  
    a. Decreased length of stay  
    b. Improved patient satisfaction  
    c. Improved patient outcomes  
    d. Decreased postsurgical infection rates

12. Which of the following measures did the authors employ to minimize performance bias relating to pain assessment practices?  
    a. Data was collected from the medical record following discharge from the ICU.  
    b. Participant criteria were focused on the patient’s ability to communicate.  
    c. Nursing staff was required to complete education prior to the study.  
    d. Data was recorded for 2 weeks before and after CPOT implementation.