By Jane Topolovec-Vranic, BSc, PhD, Sonya Canzian, RN, MHSc, CNN, Jennifer Innis, BAA, NP, MA, Mary Ann Pollmann-Mudryj, BSc, PhD, Amanda White McFarlan, BA, RN, and Andrew J. Baker, MD

**Background**
Accurate assessment and management of pain in critically ill patients who are nonverbal or cognitively impaired is challenging. No widely accepted assessment tool is currently in place for assessing pain in these patients.

**Objectives**
To evaluate the effect of implementing a new pain assessment tool in a trauma/neurosurgery intensive care unit.

**Methods**
Staff and patient satisfaction questionnaires and retrospective chart reviews were used before and after implementation of the Nonverbal Pain Scale. The questionnaire responses, frequency of pain documentation, and amount of pain medication given were compared from before to after implementation.

**Results**
Most staff (78%) ranked the tool as easy to use. Implementation of the tool increased staff confidence in assessing pain in nonverbal, sedated patients (57% before vs 81% after implementation, \( P = .02 \)) and increased the number of pain assessments documented by the nursing staff for noncommunicative patients per day in the intensive care unit (2.2 before vs 3.4 after, \( P = .02 \)). Patients reported decreased retrospective pain ratings (8.5 before vs 7.2 after, \( P = .04 \)) and a trend toward a decrease in the time required to receive pain medication (38% before vs 10% after requiring >5 minutes to receive medication, \( P = .06 \)).

**Conclusions**
Implementation of the Nonverbal Pain Scale in a critical care setting improved patients’ ratings of their pain experience, improved documentation by nurses, and increased nurses’ confidence in assessing pain in nonverbal patients. (American Journal of Critical Care. 2010;19:345-355)

**Notice to CE enrollees:**
A closed-book, multiple-choice examination following this article tests your understanding of the following objectives:

1. Understand how implementation of an objective pain rating scale for nonverbal, critically ill patients can improve patients’ ratings of their pain experiences.
2. Recognize that implementation of an objective pain rating scale for nonverbal, critically ill patients can improve the documentation of pain assessments by nurses.
3. Describe how implementation of an objective pain rating scale for nonverbal, critically ill patients affects nurses’ confidence in assessing pain in nonverbal patients.

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This article is followed by an AJCC Patient Care Page on page 356.

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the presence of pain is a common phenomenon among patients in critical care units. Most patients report that their pain was inadequately assessed and managed during their stay in the intensive care unit (ICU). Inadequate pain control is inarguably a problem that represents a major stress experience during a patient’s ICU stay.

In the presence of life-threatening illness or injury, however, pain assessment and management are often overlooked or underappreciated by the health care team.

Accurate evaluation of pain in critically ill patients presents particular challenges. Evaluation of pain is often hindered by a patient’s altered level of consciousness related to induced sedation, head trauma, or altered physiological status. As such, clinicians are often left to interpret pain-related behaviors without appropriate assessment tools. It is well documented that pain is an undertreated condition in hospitalized patients. The reasons for this under-treatment include lack of knowledge related to basic principles of pharmacokinetics and pharmacodynamics of opioids; conservative use of opioids based on unfounded beliefs that opioids can lead to addiction, tolerance, or adverse effects that will lengthen hospital stay; inappropriate interpretation of pain as anxiety or agitation; and lack of appropriate, validated pain assessment tools for nonverbal, sedated patients.

A variety of tools are available for assessing pain in patients. Patients who are alert, with intact cognitive functioning, are able to rate their pain on a scale from 0 (no pain) to 10 (greatest pain) by using, for example, the Visual Analogue Scale or the Wong-Baker FACES Rating Scale. When patients are unable to self-report pain, physiological and behavioral indicators are used to assist clinical decision making related to analgesic requirements; however, these variables are limited, indirect, and nonspecific. Thus, validated standardized pain assessment tools are needed to assess pain accurately and consistently in noncommunicative, sedated, or head-injured patients.

Five potentially useful tools have recently been reviewed. They include the Behavioral Pain Scale (BPS), the Critical-Care Pain Observation Tool, the Pain Assessment and Intervention Notation (PAIN) algorithm, the Pain Assessment algorithm, and the adult Nonverbal Pain Scale (NVPS). The PAIN algorithm, the Pain Assessment algorithm, and the NVPS all include both behavioral and physiological indicators. We chose to investigate the NVPS further because it appeared to be the quickest and easiest to use.

The NVPS was developed by Odhner et al for nonverbal patients in a critical care burn unit. The NVPS comprises both behavioral and physiological indicators. It was adapted from the FLACC (face, legs, activity, cry, consolability) scale, which is used to assess pain in children. The NVPS has 5 categories (facial expression, activity, guarding, physiologic I, and physiologic II), each of which is scored from 0 to 2, for a total score of 0 (no pain) to 10 (greatest pain). This tool has been used in ICU patients, and construct validity and interrater reliability have recently been demonstrated.

Before the study, no acceptable standardized tool was in place to assess pain in the trauma and neurosurgical ICU at the study hospital. Although communicative patients were asked to self-report their pain by using the numerical rating scale, nurses felt that no valid tool was available to assess pain in noncommunicative, sedated, or head-injured patients. When documenting assessments of pain, nurses either provided a narrative notation or noted that they were unable to assess the patient’s pain level. Nurses also may have relied on physiological changes as indicators of pain; however, this situation was rarely documented. Given that the NVPS used both behavioral and physiological indicators, that it was quick and simple to use, and that it provided a maximum score of 10, which the

**About the Authors**

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**Corresponding author:** Jane Topolovec-Vranic, BSc, PhD, Trauma and Neurosurgery Program, St Michael’s, 30 Bond Street, Bond 4-016, Toronto, ON M5B 1W8, Canada (e-mail: topolovec-vranic@smh.ca).

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Most patients report that their pain was inadequately assessed and managed in the intensive care unit.
nurses were accustomed to when assessing pain in
their patients, the authors hypothesized that the
NVPS may be appropriate for meeting the needs of
the nurses in the ICU.

The objective of this study was to evaluate the
effect of implementing the NVPS in the trauma and
neurosurgical ICU. The following outcomes were
measured before and after implementation of the
NVPS: staff satisfaction with pain management for
patients in the ICU, staff satisfaction with the
NVPS, patient satisfaction with pain management
in the ICU as assessed after transfer from the ICU
to the general care unit, frequency of documenta-
tion of pain assessment, and amount of pain med-
ication administered.

Methods

This study was approved by the research ethics
board at St Michael’s in Toronto, Ontario, Canada.
Consent to participate in the study was implied by the
participants’ agreement to complete the study surveys.

Study Population

The study setting was the 17-bed regional neu-osurgical and trauma ICU at St Michael’s in Toronto,
Canada. Both neurosurgical and trauma patients
were recruited for the study. Patients were classified
as part of the neurosurgical population if their pri-
mary diagnosis was a brain tumor, subarachnoid
hemorrhage, subdural hemorrhage, intracranial
hemorrhage, spinal fracture, or spinal fusion. Patients
were classified as trauma patients if they sustained
either blunt or penetrating injury. The mean length
of stay for a patient in the ICU was 4.1 days. Given
the severity of their conditions (eg, traumatic injuries,
neuro-oncology and neurovascular cases), the com-
plexity of their clinical course, sedation, and fluctua-
tions in levels of consciousness, approximately 85%
of the ICU patients were unable to self-report pain
at some point during their stay.

Study Procedures

This study had 3 phases: (1) before implementa-
tion, (2) implementation, and (3) after implementa-
tion. The phase before implementation was
conducted for a 4-week period. ICU nurses com-
pleted a questionnaire to determine their satisfac-
tion with current practices for pain assessment and
management in the ICU. Concurrently, patients
who had been admitted to the ICU during the 4-week
period before implementation were approached to
complete a questionnaire within 24 to 48 hours of
their transfer from the ICU to the general care unit
to determine their satisfaction with the management
of their pain during their ICU stay. Chart reviews were
also conducted during this period to measure the fre-
quency of pain documentation in the patients’ charts
and the amount of analgesic medica-
tion administered to the patients.

During the implementation phase, ICU nurses received in-service
training for 2 weeks. The study inves-
tigators conducted repeated 15- to
20-minute small group presentations
in the ICU, capturing 90% of the
nursing staff. The presentation
included the rationale for implemen-
tation of the tool, demonstration of
the tool, and practice case examples. Pocket education cards were distrib-
uted to the nurses, and a poster pres-
enation was placed in the ICU for staff reference. The study investigators developed an NVPS docu-
mentation tool that covered a 48-hour period. The
nurses were instructed to assess and document
patients’ pain scores every 4 hours, as well as before
and after a procedure (eg, suctioning, turning), and
to consider pain management options if the pain
score was greater than 4.

The nurses then pilot tested the tool on all
patients admitted to the ICU during a 4-week period.
Concurrently, patients who had been admitted to
the ICU during this time were approached to com-
plete a questionnaire within 24 to 48 hours of
transfer from the ICU to the general care unit to
determine their satisfaction with the management
of their pain during their ICU stay.

In the phase after implementation, the ICU
nurses were asked to complete an end-of-study ques-
tonnaire to determine their satisfaction with the
assessment tool and with pain management practices.
Patients’ charts were reviewed again
to measure the frequency of pain
documentation and the amount of
analgesic medication administered
to the patients.

Patient Pain Management, Staff
Satisfaction, and Staff End-of-
Study Questionnaires

The Patient Pain Management
Questionnaire was a 12-item survey
of patients’ perceptions regarding
their pain management during their
stay in the ICU. In addition to assessing their satis-
faction with the management of their pain in the
ICU, the questionnaire also asked patients to rate
their worst pain in the ICU as well as their current

Patients’ satisfac-
tion with pain
management in the intensive
care unit was assessed after
transfer from that unit.

For noncommu-
icative patients,
pain assessments
increased after
implementation of
the Nonverbal
Pain Scale.
pain score. The questionnaire was modified from the Patient Outcome Questionnaire developed by the American Pain Society Quality of Care Committee. The Staff Satisfaction Questionnaire and Staff End-of-Study Questionnaire were created by the study team with adaptation from the PAIN tool evaluation form developed by Puntillo et al. The Staff Satisfaction Questionnaire was a 10-item survey of nurses’ perception of the current pain assessment and management practices and their comfort level in assessing and managing pain in both communicative and noncommunicative patients. The last 2 items were open-ended questions regarding nurses’ concerns or perceived barriers to implementation or use of a pain scale in the ICU. The End-of-Study Questionnaire was an 11-item survey of nurses’ satisfaction with the training, utility, and ease of use of the NVPS tool, whether the NVPS tool assisted in their assessment and management of the patient’s pain, and nurses’ comfort level with their ability to assess and manage patients’ pain. The last item was an open-ended question that asked nurses to describe any barriers or concerns they encountered while the NVPS tool was implemented. The ICU nurses were asked to complete the surveys anonymously in an effort to elicit candid and honest responses.

### Pain Assessment Documentation and Analgesic Administration

The medical charts of 40 intubated patients (20 before and 20 after implementation) and 32 nonintubated patients (16 before and 16 after implementation) were reviewed. Data were collected on the frequency and type (narrative vs numerical) of pain documentation and the amount of opioids administered. Intubated patients were chosen because they were noncommunicative. Patients who were on patient-controlled analgesia at any point during their ICU stay were excluded.

### Data Analyses

The mean values and standard errors were calculated for continuous data elements (age, ICU length of stay, pain scores, morphine equivalent units). The data were compared from before to after implementation by using a paired t test for normally distributed data and nonparametric tests for the other data. Frequencies and percentages of categorical data elements (sex, score on the Glasgow Coma Scale [GCS] at admission, injury type, survey responses) were calculated and compared from before to after implementation by using a χ² test. A P value of .05 was used as the cut-off for significance testing.

The qualitative data from the Staff Satisfaction and Staff End-of-Study Questionnaires were collated and grouped into themes. Statistical analyses were not conducted on these data.

### Results

#### Patient Satisfaction Surveys

A total of 64 patients (25 before and 39 after implementation of the NVPS) were approached about their stay in the ICU. Of these 20 (80%) patients before and 32 (82%) patients after implementation of the NVPS had recollection of their ICU stay and agreed to complete the patient satisfaction survey. Some patients were not able to answer all of the questions on the survey (eg, they did not remember, were unwilling to answer the question). The patients did not differ with respect to sex, age, GCS score at admission, or length of ICU stay (Table 1).

**Figure** Patients’ ratings of their pain at the time of the interview (pain right now; n = 20 before, n = 32 after) and during their stay in the intensive care unit (ICU, worst pain in the ICU; n = 19 before, n = 32 after; P = .04). Patients provided ratings before (white bars) and after (gray bars) implementation of the Nonverbal Pain Scale.

### Table 1

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Before (n = 20)</th>
<th>After (n = 32)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male sex, No. (%)</td>
<td>14 (70)</td>
<td>16 (50)</td>
<td>.16</td>
</tr>
<tr>
<td>Age, mean (range), y</td>
<td>44.4 (17-78)</td>
<td>43.8 (17-74)</td>
<td>.50</td>
</tr>
<tr>
<td>Score on Glasgow Coma Scale on admission to intensive care unit, median (range)</td>
<td>14 (3-15)</td>
<td>14.5 (3-15)</td>
<td>.22</td>
</tr>
<tr>
<td>Days in intensive care unit, mean (standard error of the mean)</td>
<td>10.2 (4.3)</td>
<td>5.4 (1.0)</td>
<td>.47</td>
</tr>
<tr>
<td>Injury type, No. (%)</td>
<td></td>
<td></td>
<td>.01</td>
</tr>
<tr>
<td>Traumatic</td>
<td>13 (65)</td>
<td>9 (28)</td>
<td></td>
</tr>
<tr>
<td>Neurosurgical</td>
<td>7 (35)</td>
<td>23 (72)</td>
<td></td>
</tr>
</tbody>
</table>

### Results

#### Patient Satisfaction Surveys

A total of 64 patients (25 before and 39 after implementation of the NVPS) were approached about their stay in the ICU. Of these 20 (80%) patients before and 32 (82%) patients after implementation of the NVPS had recollection of their ICU stay and agreed to complete the patient satisfaction survey. Some patients were not able to answer all of the questions on the survey (eg, they did not remember, were unwilling to answer the question). The patients did not differ with respect to sex, age, GCS score at admission, or length of ICU stay (Table 1).

**Figure** Patients’ ratings of their pain at the time of the interview (pain right now; n = 20 before, n = 32 after) and during their stay in the intensive care unit (ICU, worst pain in the ICU; n = 19 before, n = 32 after; P = .04). Patients provided ratings before (white bars) and after (gray bars) implementation of the Nonverbal Pain Scale.
patients reported lower scores for the “worst pain you had during your ICU stay” after implementation (7.2) than before implementation (8.5, \( P = .04 \); see Figure).

Although the difference was not statistically significant, a smaller proportion of patients reported the intensity of their pain during their ICU stay as severe after implementation (before 55%, after 35%; Table 2), and fewer patients reported that it took more than 5 minutes for them to receive pain medication when they requested it in the ICU after implementation of the NVPS (before 38%, after 10%, \( P = .06 \)). Before and after implementation, a large proportion of patients reported that their physician or nurse explained the importance of pain treatment to them, were satisfied with the way their nurses and physicians responded to their reports of pain, and indicated their belief that the staff in the ICU did everything they could to help control their pain.

**Documentation of Pain Assessment and Administration of Analgesics**

The patients included in the chart reviews (40 noncommunicative and 26 communicative) did not differ from before to after implementation with respect to sex, age, length of ICU stay, or GCS score at admission (Table 3).

For the noncommunicative patients, the total number of documented pain assessments (before 457, after 584), the proportion of numerical assessments (before 131 [29%], after 297 [51%]; \( P < .001 \)), and the number of assessments per patient per ICU day (before 2.2, after 3.4; \( P = .02 \)) increased after implementation of the NVPS.

For the communicative patients, the total number of documented pain assessments (before 90, after 120), and the proportion of numerical assessments (before 8 [9%], after 61 [51%]; \( P < .001 \)) increased after implementation of the NVPS. A trend toward an increase in the number of assessments per patient ICU day was noted (before 6.0, after 10.3; \( P = .07 \)).

No differences were found in the type of opioid analgesics administered or the amount of medication (morphine equivalents) given per patient or per patient per ICU day when compared from before to after implementation.

**Staff Satisfaction Surveys**

Fifty-three surveys (89% of all distributed) were completed by the nursing staff in the ICU before implementation of the NVPS, 32 (50%) were completed after implementation. Some respondents did not answer all of the questions on the survey. Most of the survey respondents after implementation indicated that the NVPS was “easy” or “very easy” to use (78%) and that they were “satisfied” or “very satisfied” with the in-service training provided (80%).

### Table 2

**Proportion of patients reporting the intensity of their pain as severe, moderate, or mild during their stay in the intensive care unit before and after implementation of the Nonverbal Pain Scale**

<table>
<thead>
<tr>
<th>Pain intensity</th>
<th>% of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>Before (n = 20)</td>
</tr>
<tr>
<td></td>
<td>15</td>
</tr>
<tr>
<td>Moderate</td>
<td>30</td>
</tr>
<tr>
<td>Severe</td>
<td>55</td>
</tr>
</tbody>
</table>

### Table 3

**Summary of patients for whom medical chart reviews were completed before and after implementation of the Nonverbal Pain Scale**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Noncommunicative patients</th>
<th>Communicative patients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before (n = 20)</td>
<td>After (n = 20)</td>
</tr>
<tr>
<td>Male sex, No. (%)</td>
<td>13 (65)</td>
<td>16 (80)</td>
</tr>
<tr>
<td>Age, mean (range), y</td>
<td>47.9 (18-84)</td>
<td>48.7 (20-85)</td>
</tr>
<tr>
<td>Score on Glasgow Coma Scale on admission to intensive care unit, median (range)</td>
<td>5.5 (3-15)</td>
<td>7 (3-15)</td>
</tr>
<tr>
<td>Days in intensive care unit, mean (standard error of the mean)</td>
<td>11.9 (2.1)</td>
<td>10.7 (1.7)</td>
</tr>
<tr>
<td>Injury type, No. (%)</td>
<td>15 (75)</td>
<td>9 (45)</td>
</tr>
<tr>
<td>Trauma</td>
<td>5 (25)</td>
<td>11 (55)</td>
</tr>
<tr>
<td>Neurosurgical</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


Most nurses indicated that they were “confident” or “very confident” with their ability to assess pain in conscious verbal patients (before 92%, after 100%; Table 4). Before implementation, significantly fewer nurses indicated that they were “confident” or “very confident” with their ability to assess pain in sedated and/or nonverbal patients (57%) compared with conscious, verbal patients (92%; \(P<.001\)). After implementation, 81% of the nurses indicated that they were “confident” or “very confident” with their ability to assess pain in sedated and/or nonverbal patients (\(P=.02\) compared with the rating before implementation; Table 4). After implementation of the NVPS, nurses were significantly less likely to agree that having an appropriate pain rating scale would (1) ease the assessment of their patients’ pain (\(P=.003\)), (2) make them more confident in requesting less/more analgesic medication for their patient (\(P=.005\)), or (3) improve their practice with respect to pain management (\(P=.004\); Table 5).

Nurses indicated that they were more satisfied with the approach to pain management in the ICU after implementation of the NVPS (before 30% rated “satisfied” or “very satisfied”; after 53% rated “satisfied”; \(P=.04\)). No differences were found in nurses’ confidence in managing patients’ pain before (72%) and after (81%) implementation of the NVPS (\(P=.32\)).

### Table 4  
Nurses’ ratings of their confidence in assessing pain in conscious, verbal patients and sedated and/or nonverbal patients before and after implementation of the Nonverbal Pain Scale

<table>
<thead>
<tr>
<th>Confidence rating</th>
<th>Before (n = 53)</th>
<th>After (n = 32)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confident/very confident</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neutral</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Uncertain/very uncertain</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td><strong>Sedated and or nonverbal patients</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Confident/very confident</td>
<td>57</td>
<td>81</td>
</tr>
<tr>
<td>Neutral</td>
<td>23</td>
<td>13</td>
</tr>
<tr>
<td>Uncertain/very uncertain</td>
<td>21</td>
<td>6</td>
</tr>
</tbody>
</table>

### Table 5  
Nurses’ ratings of their agreement with statements related to having an appropriate pain rating scale

<table>
<thead>
<tr>
<th>Agreement</th>
<th>Before (n = 52)</th>
<th>After (n = 32)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Having an appropriate pain rating scale would ease the assessment of their patients’ pain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agree/strongly agree</td>
<td>58</td>
<td>34</td>
</tr>
<tr>
<td>Neutral</td>
<td>30</td>
<td>22</td>
</tr>
<tr>
<td>Disagree/strongly disagree</td>
<td>12</td>
<td>44</td>
</tr>
<tr>
<td>Having an appropriate pain rating scale would make them more confident in requesting less/more analgesic medication for their patient</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agree/strongly agree</td>
<td>63</td>
<td>28</td>
</tr>
<tr>
<td>Neutral</td>
<td>20</td>
<td>28</td>
</tr>
<tr>
<td>Disagree/strongly disagree</td>
<td>17</td>
<td>44</td>
</tr>
<tr>
<td>Having an appropriate pain rating scale would improve their practice with respect to pain management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agree/strongly agree</td>
<td>58</td>
<td>25</td>
</tr>
<tr>
<td>Neutral</td>
<td>27</td>
<td>31</td>
</tr>
<tr>
<td>Disagree/strongly disagree</td>
<td>15</td>
<td>44</td>
</tr>
</tbody>
</table>

### Qualitative Data: Barriers to Pain Assessment/Management

The nurses were asked to describe any concerns or barriers that they perceived or encountered in implementing or using a pain rating scale for sedated and or nonverbal patients. Five key concerns were identified that related to (1) physician practices related to pain management, (2) inconsistent assessment and management practices and the need for training, (3) personal beliefs and attitudes about competency and practices related to pain assessment and management, (4) characteristics that limit the patient’s ability to self-report pain, and (5) concerns about overuse of analgesia (Table 6).

### Discussion

In the pursuit of improved pain management of critically ill patients, reliable assessment of pain severity is essential. However, few valid tools are available for the assessment of pain in critically ill, nonverbal patients, as recently reviewed. A major barrier to the assessment and even application of assessment tools is the challenge of acceptance and consistent use of new tools. The primary objective of this study was to evaluate a pain assessment tool for nonverbal critically ill patients. This study evaluated end points that would affect the implementation of the NVPS in a trauma and neurosurgical ICU, such as patient and staff satisfaction surveys and frequency of pain assessment documentation in patients’ medical charts. This study was not designed to validate the tool or to evaluate the impact of the tool on pain outcomes. Rather, this study was aimed to evaluate the characteristics of implementation of
the NVPS as a means of establishing a rational basis for the use of the new tool in the ICU and creating a foundation for further research on its effect on pain management.

Implementation of the NVPS in a trauma and neurosurgical ICU decreased patients’ retrospective pain ratings and their recollections of the level of intensity of their pain during their ICU stay. Patients also reported a decrease in the length of time required to receive pain medications while they were in the ICU. Interestingly, patients’ reports of their satisfaction with the way in which their pain was assessed or managed while they were in the ICU did not differ from before to after implementation of the NVPS; generally their levels of satisfaction were high. Of note, these interviews were conducted within 24 to 48 hours of the patients’ discharge from the ICU to the general care unit. Although patients felt comfortable in relating their subjective pain experiences to the interviewer, they may have been less likely to criticize or express dissatisfaction with their care providers, especially because the patients were still receiving care in the hospital. It is possible that their ratings might have differed if they had been interviewed after discharge from the hospital. Results of previous studies indicate that even though patients’ pain scores remain unaltered, patients report higher levels of satisfaction with the way in which their pain was managed following pain education for nursing staff and increased documentation of pain assessments. The regular assessment of pain and the documentation of that assessment in the medical record are important components of high-quality pain management.

Pain management practices as evaluated by a retrospective review of medical charts for the amount of opioid analgesia administered did not differ after implementation of the NVPS. This finding was expected because it was unlikely that the use of a new pain assessment tool alone would affect practices related to administration of analgesics. Moreover, in-service training related to pain assessment and the use of the NVPS was provided only to the nursing staff and not to the physicians. The nurses indicated that conservative practice related to pain management among physicians was an important barrier to adequate pain management. A strategy involving a comprehensive pain management algorithm or protocol in addition to the pain assessment tool, as well as including physicians in the education and implementation initiatives, would most likely have a greater effect on pain management practices. Although this study was not designed to identify the differences in or the appropriateness of physicians’ pain management practices, this consideration is important and warrants investigation. During the course of the study, no standard guideline or protocol changes were related to pain management in the ICU, suggesting that the pain management practices were consistent before and after implementation of the NVPS. As indicated earlier, the calculated morphine equivalent units per patient did not differ across the 2 phases further, suggesting consistent practices.

<table>
<thead>
<tr>
<th>Table 6</th>
<th>Examples of nurses’ reported concerns/barriers to implementing or using a pain scale in a trauma and neurosurgical intensive care unit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physicians’ practices related to pain management</strong></td>
<td></td>
</tr>
<tr>
<td>“I find the doctors very hesitant to order pain medication despite advocacy [of nurses for the patients].”</td>
<td></td>
</tr>
<tr>
<td>“Doctors frequently don’t order enough patient meds.”</td>
<td></td>
</tr>
<tr>
<td>“The physicians would be a possible barrier as some tend to prefer less sedation while trying to wean patients off the vent—when they have multiple injuries ie: fractures or open wounds.”</td>
<td></td>
</tr>
<tr>
<td><strong>Inconsistent assessment and management practices; the need for training</strong></td>
<td></td>
</tr>
<tr>
<td>“Inconsistency in use by different staff including allied staff.”</td>
<td></td>
</tr>
<tr>
<td>“Maybe some in-services on proper pain management for more consistency.”</td>
<td></td>
</tr>
<tr>
<td>“My concern is that with any pain scales there is a problem with consistency.”</td>
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<td><strong>Personal beliefs and attitudes about competency and practices related to pain assessment and management</strong></td>
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<td>“I’m confident with using my skills of observation with respect to verbal and non-verbal clues and individual situations.”</td>
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<td>“Most nurses are astute enough to give/decide whether to use morphine/codeine/tylenol.”</td>
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<td>“If we get too dependent on set values for interpretation, we lose the art of nursing and communication.”</td>
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<td>“Pain management is only as good as the RN who is on for that particular shift.”</td>
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<tr>
<td>“Pain assessment is part of our nursing training. Useless paperwork to confirm our conclusions.”</td>
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<td><strong>Characteristics that limit the patient’s ability to self-report pain</strong></td>
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<td>“Postop patients and unconscious patients may be more difficult to assess, and pain management will not be a priority in patient care.”</td>
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<tr>
<td>“Would only work in patients who are oriented and cooperative.”</td>
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<tr>
<td>“Assessment scale limited to small percentage of clients due to nature of injuries.”</td>
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<tr>
<td>“It’s the paralyzed, comatose/sedated patients that I worry the most about—whether receiving too much or too little pain meds.”</td>
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<td>“Language barrier. Everyone’s perception of their pain is different.”</td>
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<tr>
<td><strong>Concerns about overuse of analgesia</strong></td>
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<tr>
<td>“Overuse of analgesia—[it is sometimes] used [for] other [indications] than for pain control.”</td>
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Although the patients selected for the survey and for the retrospective chart reviews were matched for age, sex, admission ICU, and ICU length of stay, they were not matched for injury type. The case mix of the surveyed patients and the noncommunicative patients included in the chart review included more neurosurgical patients after implementation of the NVPS. It is conceivable that neurosurgery patients in general have lower levels of pain than do trauma patients, which may have influenced our findings. In fact, the neurosurgical patients received 70% less opioid analgesia than did their traumatically injured counterparts. Although a patient with an isolated neurosurgical diagnosis may not experience the same type of pain as a trauma patient with multiple injuries, both subsets are likely to experience similar painful procedures commonly performed in the ICU (eg, endotracheal suctioning, insertions of venous catheters). Administration of analgesic agents in patients with neurological impairment may be restricted by health practitioners’ concern for potential adverse effects that may compromise care (eg, hypotension, bradypnea, decreased level of consciousness, and impaired neurological assessment). Research is warranted to address these challenges and optimize pain management for this population of patients.

Studies8,13,29,30 have repeatedly demonstrated that pain documentation in patients’ files is incomplete or inadequate. Implementation of the NVPS increased the frequency of documentation of pain assessment by nursing staff from 2.2 to 3.4 assessments per patient per ICU day for noncommunicative patients and from 6.0 to 10.3 assessments per patient per ICU day for the communicative patients. Less frequent documentation of assessments of noncommunicative patients is indicative of the challenges in assessing pain in this population. Even though the number of documented assessments increased, they were still considerably less than recommended by best practice guidelines.

The American Pain Society recommends routine and around-the-clock monitoring, as well as monitoring with painful activities and before and after pain medication is given.25 Further research is required to address the barriers to documentation of pain assessment and to provide alternative strategies. Presumably having a valid and objective tool for pain assessment would improve practices related to documentation of pain assessment, because nurses indicated that they are often unable to assess pain in nonverbal, sedated patients.

Most nurses rated the tool as easy to use. Although most nurses felt very comfortable assessing pain in conscious verbal patients, implementation of the NVPS increased the nurses’ confidence in assessing pain in nonverbal, sedated patients. This increase in confidence may have been attributed to the in-service training provided related to pain assessment in these patients or to the provision of the tool itself. Interestingly, after implementation of the NVPS, nurses reported less agreement with statements suggesting that an appropriate pain rating scale would ease and improve their pain management practices.

The nurses questioned the utility of the rating scale after it was implemented and indicated that they did not think that the implementation of the tool changed their pain management practices. However, as noted, both patients’ satisfaction and nurses’ documentation of pain assessment improved markedly. This reluctance to adopt a new assessment tool could be attributed to several factors, including a resistance to change, a perception of increased workload, and/or a lack of data on the positive effects of introducing the tool. Perhaps the ratings would have been different if the results of the patient satisfaction survey had been shared with the nurses before they completed the postimplementation surveys. In addition, incorporation of the tool into current nursing documentation forms, rather than as a separate document as used in the study, may improve nurses’ acceptance of the tool.

Several important barriers to implementing or using a pain scale in a trauma and neurosurgical ICU were identified by the nurses. Identification of these barriers provides opportunities for improvement. For example, nurses identified inconsistency in assessment and management practices, personal beliefs and attitudes about pain assessment and management practices, and fear of overuse of analgesia as important areas of concern. Each of these concerns could be addressed with educational initiatives and the implementation of pain management algorithms or protocols as suggested previously with respect to physicians’ practices related to pain management. Given these potential areas for optimization of pain assessment and management practices for nonverbal critically ill patients, further research addressing the perceived barriers is warranted.

A limitation of this study was the fact that the staff satisfaction and end-of-study surveys were not matched by respondents from before and after the...
intervention for analyses. During conception of the study, the authors thought that it was important to elicit anonymous responses to the survey questions to encourage honest, candid feedback from the nurses in the ICU. This anonymity was especially important because one of the members of the study team (SC) was the clinical manager of the ICU during the study. Identifiers on the surveys were not elicited, thereby making it impossible to match the respondents before and after implementation of the NVPS. However, we think that the results of the study are valid because the survey respondents were drawn from a similar sample of nurses before and after implementation of the NVPS. The nurses in the ICU represent a fairly homogeneous sample with respect to educational background and qualifications: all must complete a specialized neuro–critical care course before working in the ICU. Also, little turnover in nursing staff occurred from before to after implementation of the NVPS (only 4 new nurses joined the ICU and 7 nurses left). Thus, even though the surveys were not matched with respect to individual respondents from before to after implementation, the sample pool was similar at both time points.

An additional limitation of the study was a potential selection bias in the patient surveys toward patients who were able to complete the interview within 24 to 48 hours of discharge from the ICU. These patients were presumably less injured/ill than others, which is consistent with the higher GCS scores at admission and shorter lengths of stay than the cohort of intubated patients for whom the medical chart reviews were conducted. The patients surveyed were most likely not the ones who would have derived the maximum benefit from the implementation of the NVPS. However, the fact that they did report lower retrospective pain ratings and pain intensity levels suggests that implementation of the NVPS and the in-service training associated with it improved pain assessment practices in general.

The issue of pain recall bias when asking patients to retrospectively assess their pain experience is important and unresolved in the literature. Although results of some studies35-34 have indicated that patients tend to overestimate previous pain, other studies35-37 have demonstrated strong associations between recall and average pain ratings, even up to 30 days later. In a study39 of 39 cardiac surgery ICU patients, the ICU pain recalled later by patients was less severe than that reported during their ICU stay. Although potential exists for recall bias in the present study, patients were not informed as to which phase of the study they were in, thus any potential bias such as “wanting to please” or perceived increased attention by the nursing staff would have been equal before and after implementation of the NVPS.

Another potential limitation of the study is in the choice of the tool itself. The only published study22 in which the NVPS was evaluated demonstrated moderately high internal consistency of the tool (coefficient α, 0.78). The authors reported no significant differences between nurses’ paired ratings using the tool; however, interrater reliability estimates were not reported. We did not evaluate psychometric properties of the tool itself in the present study; a future study aims to do so. Li et al35 have suggested that the NVPS has limited content validity and reliability as a pain measure for nonverbal patients. They indicated that the behavioral indicators such as smiling or lack of movement and physiological indicators such as vital signs cannot reliably be equated with a nonpainful state. Also, they questioned the method by which the vital sign indicators are scored when the tool is used. Further research is required to evaluate the construct validity, content validity, and reliability of the NVPS.

It is not possible to discern from the results of our study whether it was the tool itself or the education and awareness related to pain assessment that accounted for the differences in ratings before and after implementation. It is likely that the implementation of any tool will increase awareness and may increase documentation of pain assessment. However, the fact that changes were observed, with apparent benefit to the patient, provides support for the importance of regular pain assessment in nonverbal critically ill patients. How to translate this increased awareness and documentation into improved pain management strategies is an important area for further research.

Conclusions

Implementation of an objective pain rating scale for the assessment of pain in nonverbal, critically ill patients can improve patients’ ratings of their pain experience, improve the documentation of pain assessments by nurses, and increase nurses’ confidence in assessing pain in nonverbal patients. Given the dearth of publications on pain assessment in this population of patients, further research is essential to validate the use of objective tools for pain assessment in these vulnerable patients and to address some of the actual and perceived barriers to

Patients’ satisfaction and pain ratings improved after implementation of the Nonverbal Pain Scale.
optimal assessment and management of pain for nonverbal critically ill patients.

FINANCIAL DISCLOSURES
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REFERENCES

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1. Why was the Nonverbal Pain Scale (NVPS) chosen to be investigated in this study?
   a. It appeared to be the quickest and easiest tool to use.
   b. Its construct validity has been demonstrated.
   c. It has been used to assess critically ill patients.
   d. Its interrater reliability has been demonstrated.

2. Which of the following best describes the NVPS?
   a. It includes both behavioral and physiological indicators.
   b. It was developed for nonverbal patients in a coronary care unit.
   c. It has 4 categories that are scored from 0 to 2.
   d. It was adapted from the Pediatric Pain Questionnaire.

3. Approximately what percentage of the study population was unable to self-report pain at some point during their intensive care unit (ICU) stay?
   a. 25%
   b. 45%
   c. 65%
   d. 85%

4. In addition to before and after a painful procedure, how often were nurses instructed to assess and document patients' pain scores?
   a. Every 2 hours
   b. Every 4 hours
   c. Every 6 hours
   d. Every 8 hours

5. Nurses were instructed to consider pain management options if a patient's pain score was greater than which of the following?
   a. 1
   b. 2
   c. 3
   d. 4

6. Which of the following types of patients were excluded from this study?
   a. Patients older than 80
   b. Patients with an admission Glasgow Coma Scale less than 5
   c. Patients who used patient-controlled analgesia at any point during their ICU stay
   d. Endotracheally intubated patients

7. No differences were noted in which of the following parameters following implementation of the NVPS?
   a. Total number of documented pain assessments
   b. Amount of analgesic medication given per patient
   c. Proportion of numerical assessments
   d. Number of assessments per patient per ICU day

8. What percentage of nurses indicated they felt confident or very confident in assessing pain in sedated and/or nonverbal patients before implementation of the NVPS?
   a. 13%
   b. 21%
   c. 57%
   d. 81%

9. What percentage of nurses surveyed in the study indicated they felt confident or very confident in assessing pain in sedated or nonverbal patients after implementation of the NVPS?
   a. 13%
   b. 21%
   c. 57%
   d. 81%

10. After implementation of the NVPS, which of the following did the nurses indicate?
    a. They were more confident in managing patients' pain.
    b. They were more satisfied with the approach to pain management in the ICU.
    c. They were more confident in requesting additional analgesic medication for their patients.
    d. They perceived improvement in their practice with respect to pain management.

11. Which of the following was the primary objective of this study?
    a. Evaluate a pain assessment tool for nonverbal critically ill patients
    b. Identify appropriateness of physicians’ pain management practices
    c. Explore nurses’ personal beliefs and attitudes about pain management
    d. Demonstrate the impact of the NVPS on pain outcomes

12. According to patient satisfaction surveys, which of the following resulted after implementation of the NVPS?
    a. Increase in patients’ retrospective pain ratings
    b. Improved patient satisfaction with pain assessment
    c. Decrease in length of time required to receive pain medication
    d. Improved patient satisfaction with pain management

Test: A1019042 Contact hours: 1.0 Form expires: July 1, 2012 Test Answers: Mark only one box for your answer to each question. You may photocopy this form.
Patient Satisfaction and Documentation of Pain Assessments and Management After Implementing the Adult Nonverbal Pain Scale
Jane Topolovec-Vranic, Sonya Canzian, Jennifer Innis, Mary Ann Pollmann-Mudryj, Amanda White McFarlan and Andrew J. Baker

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