Evaluating Pain in Nonverbal Critically Ill Patients

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Abstract

**Background:** Because of the uniqueness and difficulty of pain assessment and management among the nonverbal critically ill, behavioral pain scales have been developed to aid in addressing this issue. The Critical-Care Pain Observation Tool (CPOT) is one such pain scale.

**Objective:** To explore the impact the CPOT has had on patient outcomes and clinical practice among the nonverbal critically ill and to familiarize NURS 4100 Medical-Surgical III (Advanced Med-Surg/Critical Care) nursing students at Dominican University of California with the CPOT.

**Methods:** This teaching intervention consisted of a 20 minute PowerPoint presentation regarding pain assessment utilizing the CPOT to twenty-seven Med-Surg III students (senior-1). An 8 question pre- and posttest was utilized in order to determine if learning occurred.

**Results:** The literature review and critique revealed positive effects the implementation of the CPOT within their respective populations had on clinical practice and patient outcomes. With regards to the teaching intervention, approximately half (4) of the questions demonstrated significant changes in the posttest, indicating that learning did occur and knowledge deficits were addressed by the information in the presentation while the other four questions saw little, if any, change.

**Conclusion:** There is substantial evidence favoring the implementation and highlighting the benefits of the CPOT in critical care settings. Further education and research regarding pain and its assessment and management among the nonverbal critically ill as well as the improvement of existing behavioral pain scales like the CPOT are also avenues to be considered in the future.
Evaluating Pain in Nonverbal Critically Ill Patients

Introduction

Pain is an incredibly ubiquitous experience, one that is encountered by so many on a daily basis whether from the thoracic incision of an open heart surgery or the widespread trauma of a car accident. In the acute care setting, pain becomes even more prominent, with patients being subjected to a variety of unpleasant procedures and treatments on top of the pain from their own disease process or injury. Because of this, the assessment and management of pain is an issue that is of utmost importance to health care professionals. Indeed, so essential is it to patient care that the Joint Commission has recommended that it be considered as the fifth vital sign (Sole, Klein, & Moseley, 2013). For the physicians and nurses who are responsible for evaluating the presence of pain in their patients, such a distinction highlights its significance and the impact it has on their practice. For hospitalized patients, the classification of pain as such is one that plays a crucial role in the treatment and care they receive and their responses, both short and long-term, to those interventions.

If improperly assessed and consequently left under- or untreated, pain can lead to a host of negative outcomes including sleep disturbances, increased anxiety and fear, and disorientation (Sole et al., 2013). Furthermore, pain decreases patient cooperation with various care procedures designed to promote healing such as turning and physical therapy. These factors and more may delay patients’ recovery time as the physiologic responses to pain inhibit the body’s ability to react positively during the healing process. Heart rate and blood pressure increase, tissue perfusion is impaired therefore decreasing oxygen delivery, hyperventilation occurs, and other compensatory mechanisms kick in as the body is stressed due to the presence of pain (Sole et al., 2013). In addition to this, unmanaged pain patients are at an increased risk for developing
chronic pain and post-traumatic stress disorder (PTSD) related to their hospitalization which can have a severe impact on their long-term health and quality of life even after recovering from their initial injury or illness (Rivara et al., 2008; Asmundson & Katz, 2009).

Considering this, it is imperative that careful and accurate pain assessment and management are made priorities in patient care, aspects that are particularly difficult among the intensive care unit (ICU) population where more than 50% of patients experience moderate to severe pain during routine care (Puntillo, White, Morris, Stanik-Hutt, & Thompson, 2001). Because of the extent and severity of their illnesses or injuries, these patients are exposed to many painful procedures not normally experienced by other patients such as endotracheal suctioning, wound drain removal, central venous catheter insertion and removal, among others. Common procedures that normally would not be cause for pain in less critical patients, for example, turning, are also more painful for patients with much more extensive illnesses and injuries. Moreover, while patients’ self-report of pain is considered the “gold standard” of pain assessment, this simple form of communication is altered in many ICU and other critically ill patients. Due to therapies such as mechanical ventilation, sedation, and medically-induced comas as well as a variety of other factors, patients in critical care lose their ability to properly communicate their pain and discomfort to health care professionals thus, increasing their risk for untreated pain.

In light of this, physiologic and behavioral criteria in combination with clinical judgment must then be used to assess pain in this population as recommended by the American College of Critical Care Medicine of the Society of Critical Care Medicine (Jacobi et al., 2002). Several scales and tools focusing on these assessment areas have therefore been developed, namely the Behavior Pain Scale (BPS), the Nonverbal Pain Scale (NVPS), and the Critical-Care Pain
Observation Tool (CPOT). Each tool allows the clinician to score the patient based on a set of parameters, providing assessment and comparison methods. In this critique, the CPOT was used extensively in the literature and will therefore be discussed at length.

Originally developed in French and later translated into English, the CPOT assesses pain in both mechanically ventilated and non-ventilated critical care patients (Gélinas, Fillion, Puntillo, Viens, & Fortier, 2006). It includes four behavioral domains: facial expression, body movements, muscle tension, and compliance with the ventilator (for ventilated patients) or vocalization (for non-ventilated patients). Each category is scored from 0-2 with total scores ranging from 0 to the maximum of 8. Tested among surgical, medical, and trauma ICU patients, this tool was found to have moderate to high interrater reliability while also supporting criterion and discriminant validity, where CPOT scores were higher for patients who self-reported pain than those who had no pain and higher during painful procedures than during rest (Gélinas et al., 2006; Gélinas & Arbour, 2009; Gélinas & Johnston, 2007). Sensitivity and specificity were also explored for a score greater than 2 indicating the presence of pain during nociceptive procedures and found to be 86% and 78%, respectively (Gélinas, Harel, Fillion, Puntillo, & Johnston, 2009).

Despite the creation and validation of such pain assessment tools, however, their use in clinical settings is still fairly limited and further research on their impact on clinical practice and patient outcomes is an ongoing process. Several such studies are included in the following critique.

**Literature Critique**

Research conducted by Arbour, Gélinas, and Michaud (2011) sought to examine the impact the CPOT had on pain management and clinical outcomes. As highlighted in their literature review, research on the CPOT’s effect on practices and patient outcomes is still lacking
because of this particular tool’s relatively recent conception. This knowledge gap therefore served as the impetus for this study and provided focus for its objectives. To facilitate this, a time series before-and-after design was implemented by the researchers in which data was collected one year prior to and six months after implementation of the CPOT in the ICU of a Canadian university health care center. Data collected at these times were gathered from a total of 30 patient files with 15 pre-implementation and 15 post-implementation which were selected based on specific inclusion and exclusion criteria from an ICU census. Inclusion criteria included patients over 18 years old, admitted after a trauma, and mechanically ventilated for 24 hours or more. Exclusion criteria included patients with spinal injuries, Glasgow Coma Scale (GCS) scores less than 4, or who had received neuromuscular blockers within 48 hours of admission. Chart audit tools were then used by the researchers to collect data from these patient files regarding the variables under consideration as well as demographic information. With regards to implementation of the CPOT, all nurses working on the unit were asked to attend a 90-minute training session in order to learn how to apply the CPOT in their practice. After careful analysis, it was found that the frequency of pain assessments and reassessments after interventions as well as the identification of pain episodes had increased post-implementation. Interestingly, the administration of analgesics was not only less frequent among post-implementation patients but also less potent. However, this finding did not seem to have a negative effect on the efficacy of the pharmacologic interventions since it was noted that they actually appeared more effective post-implementation and in fact, such findings were validated by similar results from previous studies as discussed by the researchers. Lastly, patient outcomes were found to have improved post-implementation with significant decreases reported for duration of mechanical ventilation, length of stay, and number of complications. Considering these findings, Arbour et al. (2011), as
the first study to focus on the CPOT since its creation, provide valuable insight into this relatively unexplored behavioral pain scale which serve to further validate its use as an assessment tool in critical care settings. The positive effects the CPOT was shown to have on both clinical practice and patient outcomes in this study highlight its value in patient care. Of course, this study is not all-inclusive which leaves much to be left explored for future research as the researchers make note of, recommending possible avenues for further study by taking into account the various limitations their own study experienced in addition to their notable findings.

This study is not without its limitations, however, one of which being its use of retrospectively collected data. While convenient and time-saving, the use of a retrospective design greatly limited the amount and type of information available to researchers since they were unable to control many aspects of the initial data collection and documentation. Because of this, they missed opportunities to thoroughly explore the population and variables under study. In addition to the use of secondary data, the researchers further limited their data to only a small number of ICU trauma patients sharing specific characteristics as dictated by the inclusion and exclusion criteria (30 subjects; 15 pre and 15 post-implementation) which constrains generalizability to only other ICU trauma patients. Furthermore, a majority of the subjects in both pre and post-implementation groups were male (14 and 10, respectively) which further limits generalizability. Finally, the inclusion and exclusion criteria for the sample population could have confounded the results. In order for a medical file to be included in the study, the patient must not have had a GCS score of less than 4. However, no upper cut-off score for the GCS was indicated which resulted in six patients (3 pre-implementation and 3 post-implementation) with GCS scores of 11 on a scale on which 15 represents the highest level of consciousness and scores greater than 9 indicates consciousness. With such a score, some of
these patients may still have been able to provide self-report of their pain using behavioral cues such as head nodding or pointing which may have confounded findings to some degree. For these patients, their own self-report of pain remains the most valid assessment if they were in fact conscious and alert enough to do so.

A similar study was conducted by Gélinas, Arbour, Michaud, Vaillant, and Desjardins (2011) which aimed to investigate the CPOT’s effect on pain assessment and management as well as its interrater reliability among ICU nurses in a university-affiliated Canadian health center. Like Arbour et al. (2011), researchers used a time-series before-and-after design to collect data one year prior to and three and 12 months after implementation of the CPOT. To examine pain assessment and management, data from 90 patient files were collected (30 files pre-implementation, 30 files three months, and 30 files 12 months post-implementation). Files were randomly selected from the ICU census and chosen based on inclusion and exclusion criteria. Inclusion criteria included patients 18 years or older, admitted to the ICU, and mechanically ventilated for more than 24 hours and unable to communicate. Exclusion criteria were similar to those by Arbour et al. (2011). Their investigation into interrater reliability, as measured by percentage of agreement, consisted of data collection at two separate intervals after nurses were trained in using the CPOT. During the first part of the training session, the ICU clinical educator, assistant head nurses, and BSN-prepared ICU nurses attended a three-hour lecture on pain, pain assessment, and the CPOT. In the second part, all other ICU nurses were trained by the clinical educator in a 90-minute session. At the end of these training sessions and again 12 months post-implementation, nurses were asked to score the same three videotapes of mechanically ventilated ICU patients at rest and during a nociceptive procedure (turning). Using this data from videotapes, it was discovered that the percentage of agreement when scoring patients during the
turning procedure had improved, going from 73-91% pre-implementation to 86-100% post-implementation. Scoring patients at rest remained high both pre and post-implementation, 95-100%. Using data gathered from the patient files, pain assessments and reassessments were both found to have increased in frequency while administration of analgesics appeared to have decreased post-implementation. Additionally, rates of both assessments and reassessments were maintained over time between three and 12 months post-implementation. Furthermore, while analgesic administration was lower among post-implementation patients, they were found to be even more effective when compared to pre-implementation patients. These findings serve to strengthen the CPOT’s validity as a behavioral pain scale and provide additional insight into its impact on pain assessment and management. Moreover, this study demonstrated the ease with which it can be successfully taught to ICU nurses for use in their practice as shown through the improved percentage of agreement post-implementation. This particular finding would be key in justifying the expansion of the CPOT’s implementation in critical care settings.

Several limitations should be noted when considering this study. First, data was gathered retrospectively, confining the researchers to only patient data that had been originally collected by the health care team involved in care. As a result, the researchers may have missed an opportunity for a more thorough study. Second, the characteristics of the sample population further limits generalizability. Because a majority (63%) of the population were males with mean ages between 59 and 60 years old, generalizing the results to other populations is not feasible unless further research is conducted using a more heterogeneous sample. Third, the number of nurses who participated in the evaluation of interrater reliability post-implementation had decreased by 50% due to high staff turnover, going from 60 nurses pre-implementation to only 29 at the 12 month check-in. Such a drop in participants may have skewed the results since there
were fewer staff to evaluate. Lastly, the change in the hospital’s trauma status may have confounded results. Prior to the 12 month check-in, the institution was designated a tertiary trauma center which provides a more specialized level of care. However, this status was then changed to a secondary trauma center, providing more generalized care for patients who may not be as critical. This change in status may have affected the pharmacologic interventions provided since more serious patients are generally given stronger and more frequent analgesics. The patients admitted under the institution’s secondary trauma center status may have been less serious and therefore, have required less frequent and decreased doses of analgesics.

Rose, Haslam, Knechtel, McGillion, and Dale (2013) conducted a study in two ICUs of a university-affiliated hospital in Toronto, Canada in which they sought to determine the CPOT’s effect on frequency of pain assessment, pharmacologic administration, factors associated with pain assessment and analgesic administration, and patient outcomes. Researchers hypothesized that documentation would increase with implementation of the CPOT and impact pharmacologic administration. Taking into account the findings reported by Gélinas et al. (2011), which were limited to a small sample population, researchers went further in their study, gathering data from a larger population. Once again using a time-series before-and-after design, data was collected retrospectively from the hospital’s mixed medical/surgical/trauma ICU (CRCU) and cardiovascular ICU (CVICU) for four month periods before and four months after implementation of the CPOT. Inclusion criteria included patients who were unable to communicate by any means, were not following commands, and were admitted to either ICUs. Exclusion criteria included patients receiving neuromuscular blockers, those previously enrolled in the study, or were in the ICU during both phases of the study (pre- and post-implementation). A total of 189 patients before and 184 patients after implementation were included in the final
populations. A CPOT training session similar to Arbour et al. (2011) and Gélinas et al. (2011) was employed with all nurses in both ICUs attending educational lectures that included videos of pain behaviors and application of the CPOT. After careful analysis, it was found that narrative pain assessments had increased in the CVICU but remained unchanged in the CRCU. Increases in pain assessment were also seen with increased age in the CVICU and with decreased maximum Sequential Organ Failure Assessment (SOFA) scores (used to measure level of deterioration) in the CRCU. Opioid and benzodiazepine administration experienced a decrease in the CVICU while the CRCU population saw an increase in opioids but no change in benzodiazepines. Differences in opioid administration were also noted between specific groups in the sample population with medical patients in the CVICU receiving more medication. However, the opposite was true for medical patients in the CRCU as they actually received less opioids than surgical or trauma patients. The investigation into pharmacologic interventions also led to the discovery that for 39% and 41% of the patients in the CVICU and CRCU, respectively, whose scores indicated the presence of pain, no analgesics were administered for relief. Finally, no change in duration of mechanical ventilation was found in either ICUs after implementation while length of stay decreased in the CVICU but remained unchanged in the CRCU. In light of these findings, this study provides additional support for its positive influence on the frequency of pain assessment. It also demonstrated the success in implementing the CPOT in ICUs that had never been exposed to the tool since the ICUs in previous studies had all been familiar with the CPOT. However, it also includes some results that oppose previous research which can lead to further research and discussion in the literature in order to fully understand these phenomena. For example, the high rates of untreated pain among both ICU populations is concerning and
should be examined further. Such a finding may suggest the need to emphasize improved management and its link to assessment findings among ICU nurses.

There are several limitations that should be considered with regards to this study. For one, the institution was also implementing a sedation score and algorithm at the time the CPOT was being introduced as well. Such a co-existing initiative in improving clinical practice may have confounded the results to some degree although the exact nature of impact cannot be determined. Additionally, the data collectors who gathered information from the patient files were not blinded to the study or its purpose which may have introduced a certain degree of selection bias into the sample population. This use of secondary data further limits this study as well in the same way it limited the previous studies discussed by Arbour et al. (2011) and Gélinas et al. (2011). In this study specifically, the researchers could not make accurate inferences about the patients’ responses to pharmacologic interventions since assessments were not well-documented by the hospital staff. Lastly, the characteristics of the sample population also limits generalizability. While the sample size was much larger than others previously examined in the literature, over 70% of the patients in both ICUs pre and post-implementation were males with median ages between 54 and 70.

Finally, research by Vázquez et al. (2011) provided information unlike that from any of the previous research about the CPOT and its use in clinical settings. This particular study sought to compare behavioral responses to pain, as measured by the CPOT, and physiologic responses before, during, and after a nociceptive procedure (turning) and to determine the differences, if any, between medical and surgical patients and conscious and unconscious patients in terms of their CPOT scores during the procedure. Using a prospective descriptive design, researchers implemented their study in the general ICU of a university hospital in Spain. Inclusion criteria
included patients who were mechanically ventilated and intubated and either conscious or unconscious. Exclusion criteria included patients receiving muscle relaxants, who were hemodynamically unstable, who were experiencing respiratory failure, those with motor or sensory disorders, or those with patient controlled analgesics (PCAs). A total of 96 intubated and mechanically ventilated patients were included in the final sample. Three hundred and thirty observations were then conducted on this population with the majority of patients (64.58%) only participating in one to two observations. During these observations, each patient was first assessed by the researchers one minute prior to turning to establish a baseline at rest, then assessed again during turning, and finally assessed once more 10 minutes after the procedure. To facilitate further analysis of the variables, other pertinent information was gathered including patient demographics and sedation level prior to the procedure as evaluated by the Ramsay scale which indicated that a patient was conscious if they had a score of less than or equal to 4.

Physiologic variables examined included heart rate (HR), respiratory rate (RR), arterial oxygen saturation (SpO2), mean arterial pressure (MAP), and the presence or absence of sweating. It should also be noted that the CPOT had been translated into Spanish for this study. After considering and analyzing these data, it was found that CPOT scores showed significant differences throughout the observation period. The total mean score at rest (baseline) was 0.27 while the mean score during the procedure was 1.93 which decreased to 0.10 after the procedure. Of the five CPOT behavioral indicators, facial expression seemed to demonstrate the most dramatic increase during the procedure, occurring in 52% of the observations. With regards to CPOT score differences, unconscious patients were found to have lower mean scores than conscious patients while surgical patients had higher mean scores than medical patients. Finally, the physiologic variables showed significant changes as well with MAP, HR, and RR increasing
and SpO2 decreasing during the procedure. A relative return to baseline was then observed after the procedure as MAP, HR, and RR decreased while SpO2 increased. However, the relationship between sweating and pain was unable to be determined since patients who sweated before the procedure continued to sweat during the procedure. Aside from this, the physiologic variables seemed to correlate with the behavioral variables; as CPOT scores increased, physiologic variables indicating stress also increased. Considering these findings, this study provides information previously not described in the literature. For one, it offers insight into the trends of CPOT changes when a patient experiences pain which can lead to better anticipatory interventions. The decrease in scores after the procedure when compared to the baseline scores may also indicate patients were more comfortable after positioning which aids in determining the effectiveness of turning, an important nursing intervention. This study also demonstrates differences between patient conditions, a distinction that could help researchers better understand the phenomenon of pain in these populations. Lastly, as this is the first study to use a version of the CPOT translated into Spanish with much success, the expansion of this tool to other Spanish-speaking countries is further strengthened.

However, certain limitations must be considered when reviewing this study. For one, while previous researchers had used a cut off score of >2 to indicate the presence of pain with the CPOT, researchers in this study used a cut off score of >3. This higher threshold may have skewed results in the sense that fewer subjects might have been determined as experiencing pain since those with scores of 2 would not have been counted. Subsequently, this may limit this study’s generalizability to others in the literature. Additionally, the sample population only included medical and surgical patients with a mean age of 62.11. Therefore, applying the findings to trauma or other ICU populations may not be appropriate. The study was also the first
to translate the CPOT into Spanish, as previously stated, which may have resulted in inaccurate translations of certain aspects of the tool although this cannot be directly determined. Lastly, while the inclusion of conscious patients in this study allowed for the comparison of scores between this population and unconscious patients, the use of self-report of pain must still be considered the best option if still appropriate for conscious patients. Sedation in this study was measured by the Ramsay scale, with a score of >4 indicating that the patient was conscious and of 330 observations, 283 had patients with such scores. Considering this, as with Arbour et al. (2011), some of these patients might still have been able to provide self-report of their pain since there was no upper limit for Ramsay scores included in the study. In light of this and in future clinical practice, patients who are conscious enough to describe their pain themselves even with simple gestures should be allowed to do so for the most valid assessment.

**Literature Review**

The CPOT’s effect on the frequency of pain assessment has been documented in the literature. Research conducted by Arbour et al. (2011) found that post-implementation patients were assessed for pain three times more often than pre-implementation patients. This increase in assessments therefore allowed for better identification of pain episodes which was found to be four times higher post-implementation. Similar results were also found by Gélinas et al. (2011) who reported that pain assessments had increased three to four more times following implementation. Lastly, in the study by Rose et al. (2013) narrative pain assessments in the CVICU had increased post-implementation of the CPOT (but were unchanged in the CRCU).

Arbour et al. (2011), Gélinas et al. (2011), and Rose et al. (2013) also shared similar results with regards to the CPOT’s post-implementation effect on pharmacologic interventions. In all three studies, analgesic and sedative (i.e. propofol, benzodiazepines) administration were
shown to have decreased, an interesting finding considering the increase in assessment frequency. Arbour et al. (2011) went further in their research, observing that pre-implementation patients not only received more analgesics at higher doses but also received sedatives twice more often when compared to the post-implementation group. However, it should be noted that there were some differences between the CRCU and CVICU populations in the study by Rose et al. (2013). While analgesic and benzodiazepine doses decreased in the CVICU post-implementation, analgesics increased and benzodiazepines were unchanged in the CRCU. This study further reported a difference in analgesic administration between the various admitting diagnoses with medical patients in the CRCU receiving less opioids than surgical/trauma patients post-implementation. Such a finding could be related to the CPOT scores themselves which were higher among surgical patients in a study by Vázquez et al. (2011). However, in the CVICU, medical patients and sicker patients received more opioids both pre and post-implementation.

Pain reassessments post-implementation of the CPOT was another area of interest among the literature. Arbour et al. (2011) and Gélinas et al. (2011) both reported increases in reassessments after pharmacologic interventions were applied in their respective populations. This surge in reassessments also allowed for further evaluation of the efficacy of the pharmacologic interventions with both studies describing post-implementation interventions to be more effective. Specifically, Gélinas et al. (2011) found that 75% to 80% of interventions post-implementation proved effective in contrast to the less than 65% of effective interventions pre-implementation.

The implementation of the CPOT has also demonstrated improvements in patient outcomes though findings do appear conflicted. Arbour et al. (2011) reported that ICU length of stay was reduced by half in post-implementation patients (10.53 mean days to 5.33 mean days)
and that duration of ventilation had experienced a slight decline from nearly seven (6.93) days to four. This study further reported a significant decrease in complications. Likewise, the CVICU population in the study by Rose et al. (2013) had a decreased length of stay after implementation but no difference was observed with the CRCU population. However, duration of ventilation in this study remained unchanged for both ICU populations. Lastly, Vázquez et al. (2011) in their study that sought to compare changes in CPOT scores and behavioral pain indicators before, during, and after positioning procedures reported that scores after positioning were lower than baseline (before) scores, suggesting that patients were more comfortable after the procedure and were able to be more effectively assessed due to the implementation of the CPOT.

However, given these positive effects on clinical practice and patient outcomes, the CPOT is not without its limitations. For one, its criteria for applicable populations are rather specific. Since it has only been validated for mechanically ventilated and non-mechanically ventilated critically ill adult patients with intact motor function and the absence of brain injury, its application for patients who, for example, have brain injuries is not appropriate. Neither can it be applied for critically ill children and adolescents or those who are paralyzed either medically or as the result of an injury or disease process. Specificity such as this obviously limits the populations that may be assessed using this particular tool. Furthermore, while behavior pain scales do not score the severity or intensity of pain, the developing researchers suggested that decreases of 2 or more in the CPOT scores may indicate effective treatment. Such a statement is somewhat confusing and contradictory to the scope of behavioral pain scales and must be clarified in future research.

**Problem and Purpose Statements**
Familiarization with and eventual competency in utilizing the CPOT must of course begin with education, as demonstrated in the various studies previously discussed. While training nurses already established in their own practice to use this tool certainly has its merits and is necessary in many instances (i.e. when implementing this tool into standard practice in hospitals), educating nursing students while still in training is both practical and convenient as it allows them to utilize this resource in their future careers. Because of this particular assessment tool’s relatively recent conception, however, implementation efforts have been geared towards acute care settings and not nursing programs in order to assess its impact on clinical practice and patient outcomes.

The purpose of this thesis, then, is to familiarize NURS 4100 Medical-Surgical III (Advanced Med-Surg/Critical Care) nursing students (senior-1) at Dominican University of California with the CPOT behavioral pain scale. Specifically, the objectives are:

1. To educate Medical-Surgical III nursing students on the uniqueness of the pain phenomenon with regards to assessment and patient experience within in the nonverbal critically ill population.
2. To familiarize Medical-Surgical III nursing students with utilizing the CPOT among the nonverbal critically ill population.

**Theoretical Framework**

The social learning theory will serve as the foundation of this educational endeavor. Developed by Albert Bandura in 1977, this theory is based on the idea that people learn through social interactions, by observing others and then imitating the behavior they have seen. In order for effective observational, or modeling, learning to take place, four steps must be met:
1. **Attention**: an individual must give their full attention to the behavior being modeled or information being taught.

2. **Retention**: an individual must remember the given information or behavior.

3. **Reproduction**: an individual must perform the behavior or repeat the information themselves.

4. **Motivation**: an individual must have incentive or motivation to engage in the behavior or use the information in the future.

In addition to these four steps, several models can facilitate observational learning: (a) the live model in which an actual person demonstrates the behavior; (b) the verbal instruction model which involves an individual describing the behavior and instructing others in how to engage in said behavior; and (c) the symbolic model in which a real or fictional character demonstrates the behavior through the use of media (video, literature, radio, etc.) (Bandura, 1977).

Through a combination of the verbal and symbolic instruction models, instruction on the CPOT and its application will be provided to the students participating in this particular exercise.

**Methods**

This thesis will take the form of a teaching presentation. Students attending Dr. June Wilson’s NURS 4100 Medical-Surgical (Med-Surg) III 9:25 am lecture will be asked to be part of the audience for this presentation in between their Med-Surg lecture and NURS 4030 Pharmacology lecture. After a brief introduction of the project, the students will be asked to complete a short anonymous pretest. A 15-20 minute PowerPoint presentation will then be given. Topics to be discussed include pain and its assessment in verbal patients, the uniqueness of critical illnesses and injuries, the treatment and therapies associated with them, and how they contribute to patients’ pain experience, the difficulties of assessing pain in nonverbal patients,
the consequences of untreated pain, and the CPOT itself, highlighting its application and current research. After the presentation, a short video (Kaiser Foundation, 2011) demonstrating the scoring of the CPOT will be shown in order to give the students a better understanding of the CPOT and its application. At the end of the session, the students will be asked to complete a posttest that will be used to determine if learning occurred.

Results

The presentation took place on March 26, 2013 after Dr. Wilson’s 9:25 NURS 4100 Med-Surg III lecture. Twenty-seven students (senior-1) were present and all twenty-seven participated in the presentation. The project was briefly introduced after which the students were given several minutes to complete the pretest. A PowerPoint presentation was then given covering all the topics previously discussed. However, due to time constraints, the video demonstrating the CPOT’s application was not shown as planned. A brief question & answer session followed for any who had questions or concerns after which the students completed the posttest which was distributed at the beginning of the presentation along with the pretest.

After analyzing the results from both the pre- and posttests, misconceptions and knowledge deficits were highlighted. For one, only 25.9% (7) of the students correctly believed that there is currently no single pain scale chosen for universal use among critically ill nonverbal patients (question 2). Additionally, only 0.07% (2) correctly believed that pain assessment by proxy is a valid form of assessment (question 3). However, in the posttest there was a marked improvement in scores with 48.1% (13) correctly answering question 2 while 66.6% (18) correctly answered question 3. Consequences of untreated pain (question 6) also seemed to cause students some trouble in the pretest. While the majority (85%) recognized that chronic pain, post-traumatic stress disorder (PTSD), poor wound healing, and deep-vein thrombosis were all
potential consequences, there were some who believed that only chronic pain and PTSD were consequences. The posttest, however, showed great improvement as all students answered correctly. Lastly, the “gold standard” of pain assessment (question 7) had only 44.4% (12) of the students correctly answering with the patient’s self-report of pain in the pretest while the rest of the students chose a combination of the self-report, pain assessment tools, patient behavior, and nurse clinical judgment and assessment. The posttest saw a great improvement as 74% (20) subsequently chose the patient’s self-report as the “gold standard.”

The remaining questions, namely questions 1, 4, 5, and 8, showed little, if any, differences between the pre- and posttests. Question 1 regarded pain as the fifth vital sign was correctly answered by all students for both tests thus, no change was seen. Question 8 addressed patients experiencing untreated pain changed only by one in the posttest: 26 correctly answering as opposed to the 25 in the pretest (one test for both pre and post went unanswered). Question 4 also saw minimal change. 74.7% (20) correctly answered that patients’ inability to communicate was the main contributing factor to the difficulty in assessing nonverbal critically ill patients in the pretest. In the posttest, however, the percentage increased slightly to 81.4% (22). Finally, question 5 regarded physiologic indicators of pain and their relationship with behavioral indicators of pain experienced a change similar to question 4. 85.1% (23) correctly answered that vital signs tended to increase as behavioral indicators of pain increased in the pretest. In the posttest, this percentage rose to 92.5% (25).

Discussion

Based on these results, the students who participated in this presentation seemed fairly knowledgeable regarding pain and its assessment in both verbal and nonverbal critically ill patients but also demonstrated certain knowledge deficits. Most of these deficits were addressed
by the presentation as evidenced by the improvement in posttest scores. However, most scores did not see a 100% improvement but rather saw marked, if not minimal, change. Such results could be attributed to time constraints (only 15 minutes was allotted for the presentation), the way in which the information was presented (PowerPoint font too small, room too bright to see projector clearly, etc.), students’ own engagement with the material, or other such factors. Furthermore, students participating in the presentation were senior-1 Med-Surg III students, representing only a small fraction of the nursing student population at Dominican University. This obviously limits the generalizability of these results since they cannot be considered an accurate representation of Dominican University nursing students’ knowledge. Students’ engagement in and subsequent retention of the information presented may be addressed with better utilization of Bandura’s social learning theory. In the original conceived methodology, videos demonstrating the application of the CPOT using real patient examples and nurses explaining the scoring rationale were to be shown. However, due to unforeseen time constraints, these video clips had to be omitted from the final presentation, leading to an inadequate application of Bandura’s social learning theory, specifically the various learning models that facilitate observational learning. While both the verbal and symbolic models were originally planned to be utilized, only the verbal model was applied in the final presentation which may have affected learning to some degree.

Given these factors, more time should be allotted for the presentation of this material (either incorporated into the curriculum of certain courses or simply a longer presentation period), technical issues should be identified and resolved beforehand, students at every level of the nursing program (sophomore-1 to senior-2) should be involved, and actual demonstrations of or even hands-on practice with the CPOT in simulations should be incorporated in similar
presentations. Hands-on practice would also serve to engage students in ways that simply verbal instruction may not be able to achieve since they would be active participants in their own learning which would be supportive of Bandura’s social learning theory. Such considerations may serve to improve learning thus, resulting in maximized teaching, student engagement, and retention of information.

The issue of whether the pre- and posttest questions themselves correlated with the objectives set forth prior to the implementation of the presentation must also be addressed. Due to time constraints, only an eight-question test was able to be utilized in assessing the students’ knowledge before and after the presentation. Therefore, short and rather simple questions were included in the tests which may not have reflected the difficulty and complexity of the objectives. In addition to this, questions specific to the CPOT and its application were not included despite the fact that familiarizing the students with utilizing this tool was one of the objectives. Therefore, assessment as to whether they truly did or did not fulfill this objective could not be accurately obtained. Similar future presentations should then allow for more questions to be included in the pre- and posttests as well as questions that address the CPOT specifically in order to gauge students’ learning more accurately.

Given those limitations, however, the knowledge deficit demonstrated by the students who participated, while not exceedingly dramatic, is something that should be taken note of. In the studies by Arbour et al. (2011), Gélinas et al. (2011), Rose et al. (2013), and Vázquez et al. (2011), results and data on the CPOT’s effect on clinical practice and patient outcomes could only be obtained once the nurses participating in the studies were trained to correctly and accurately apply the tool in their practice. Of course, as competency in utilizing the CPOT and other such assessment tools requires a basic foundation of knowledge on which to lay the
principles utilized by these tools, education is obviously essential. In fact, in addition to training the participating nurses in the application of the CPOT, Gélinas et al. (2011), in their three-hour long training session, included a one-hour discussion on myths and beliefs surrounding pain, the physiology of pain, and complications of untreated pain. Similarly, although much less in depth, was Rose et al. (2013) who offered video demonstrations of pain behaviors to the nurses undergoing CPOT application training. These two training sessions went beyond simply discussing the CPOT and provided background information on the subject at hand. Such use of education serves to further enhance nurses’ knowledge and can be used to clear misconceptions about pain, regardless of the patient population. This obviously contains benefits for nurses and patients alike and is, therefore, in the best interest of both parties.

**Nursing Implications**

As life-long learners, nurses are in a unique position to continue to expand their knowledge throughout their career, and it is a commitment we should pursue wholeheartedly. Considering this, the future of this profession would benefit greatly from further education and research on the complex phenomenon that is pain. It is an experience so familiar and relevant to all that nurses and other healthcare professionals must consider its assessment and management as essential to practice. As we move forward, nurses must be knowledgeable about the pain phenomenon and its unique impact on patients of all populations and providing opportunities for advancing education or even simply clarifying fundamental concepts would be incredibly valuable for all involved.

In the critical care setting, especially, pain assessment and management is crucial when confronted with patients who cannot effectively communicate their pain. Ensuring that nurses are properly trained to address this issue through education is something that should be a concern.
As demonstrated through Arbour et al. (2011), Gélinas et al. (2011), Rose et al. (2013), Vazquez et al. (2011), and this thesis presentation, pain assessment and management among the nonverbal critically ill are areas that need to be emphasized in order to increase and promote competency, and tools like the CPOT may aid in this effort. Currently, the CPOT is recommended for use by the American Society for Pain Management Nurses and is the most valid and reliable tool, along with the BPS, for medical, surgical, and trauma ICU patients (Gélinas, Puntillo, Joffé, & Barr, 2013). Despite this, however, neither the CPOT nor the BPS is universally implemented and there is currently no single scale that has been proven to be superior for use among nonverbal critically ill patients (Paulson-Conger, Leske, Maidl, Hanson, and Dziadulewicz, 2011) although it has been gaining ground around the country and in Canada as more of the medical community is exposed to this tool. Furthermore, the CPOT and other similar scales are not without their flaws and must continue to be improved. The CPOT, specifically, is currently limited to critically ill adult patients with intact motor function and the absence of brain injury. In the future, children and adolescents as well as those with brain injuries and non-intact motor functions may be considered in revisions of the tool or in new tools altogether.

Given that, it is essential that we continue to encourage the utilization of behavioral pain scales like the CPOT while also supporting research aimed at advancing our knowledge of this particular area. With the CPOT being a relatively new tool, its limitations are still being explored and what we know about its effect on patient outcomes and clinical practice is still evolving and therefore, the opportunities for future research is endless.

**Conclusion**

In light of the information currently available, it is clear that pain assessment and management with the nonverbal critically ill is still an area in which improvement is necessary.
and indeed, possible. Creating opportunities for further education and research with regards to pain itself and the current tools for its assessment in this population are endeavors that would allow for great strides towards progress. Nurses in particular are in a unique position to be especially knowledgeable about these tools because of their close patient contact and intimate involvement with care. Even if scales like the CPOT are not formally standard clinical practice in all ICUs and other critical care settings at the present time, nurses may still use the principles and indicators behind these tools in order to guide their practice and provide better patient care. It is the hope, however, that with the findings of the studies previously discussed along with that of future research, support for the implementation of these behavioral pain scales will continue to strengthen and eventually lead to more standardized pain assessments and effective pain management among the nonverbal critically ill.
References


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Appendix B

Evaluating Pain in Nonverbal Critically Ill Patients

Pre/Post-test

1. True/False  Pain is considered the “fifth vital sign.”

2. True/False  There is currently a pain scale that has been chosen for universal use among critically ill nonverbal patients.

3. True/False  Asking a nonverbal patient’s family member to identify the patient’s pain behaviors during a suspected pain episode is a valid form of pain assessment.

4. What is the main contributing factor to the difficulty in assessing nonverbal critically ill patients?
   a. Their pain levels
   b. Their decreased cooperation
   c. Their inability to communicate
   d. Their illness/injuries
   e. Their decreased level of consciousness

5. Which of the following have been found to correlate with behavioral indicators of pain (moaning, grimacing, guarding, etc.), where an increase in ________ corresponds to an increase in behavioral indicators of pain?
   a. Urine output
   b. Vital signs
   c. Level of consciousness
   d. Blood glucose
   e. Intracranial pressure

6. Untreated pain puts patients at risk for developing which of the following?
   a. Chronic pain
   b. Post-traumatic stress disorder (PTSD)
   c. Poor wound healing
   d. Deep-vein thrombosis (DVT)
   e. All of the above

7. What is considered the “gold standard” with regards to pain assessment?
a. Patient’s self-report of pain
b. Pain assessment tools i.e. FLACC, NIPS scales
c. Patient behavior
d. Nurse’s clinical judgment and assessment
e. All of the above

8. Which of the following patients is most likely experiencing untreated pain?

a. A 65 year old woman with a tracheostomy who is frowning while watching a game show.
b. A 29 year old man 5 days after surviving a gunshot wound to his abdomen who is reading to his daughter.
c. A 50 year old woman with traction on her left leg who is quietly knitting in bed.
d. A 43 year old man who is biting his endotracheal tube and squirming restlessly in bed.

Thank you for participating!
Appendix C
Evaluating Pain in Nonverbal Critically Ill Patients

Teaching Outline

I. Introduction
   A. Danielle Alfaro is a senior 2 nursing student graduating in May
   B. This thesis focuses on the evaluation of pain in nonverbal critically ill patients and the application of the CPOT in assessing this particular population

II. What is pain?
   A. “Whatever the person says it is, existing whenever they say it does.”
   B. The “fifth vital sign”

III. Consequences of Untreated/Undertreated Pain
   A. Short-term
      1. Suppressed immune system predisposing to poor wound healing, pneumonia, sepsis, etc.
      2. Decreased mobility predisposing to DVTs, PEs, pneumonia, etc.
      3. Sleep disturbances
      4. Psychological distress (anxiety, fear, disorientation)
      5. Decreased patient cooperation
   B. Long-term
      1. Delayed recovery time
      2. Chronic pain
      3. Post-traumatic stress disorder (PTSD)

IV. Pain in Critical Care
   A. More than 30% experience significant pain at rest
   B. More than 50% experience moderate to severe pain during routine care (ETT suctioning, turning, wound care, etc.)
   C. Estimated 71% remember experiencing pain
   D. Uniqueness:
      1. Extent and severity of illnesses/injuries: trauma, multi-organ system involvement, rapid deterioration, etc.
      2. Noise: vents, IVs, monitors, codes, rapid response
      3. Fear of dying, disability

V. Pain in Nonverbal Critically Ill
   A. Challenge: communication is altered for many patients
      1. Difficult assessment
      2. Increased risk for untreated/undertreated pain

VI. Assessment
   A. Vital signs: avoid use as primary assessment of pain; to be used in conjunction with other evidence
   B. Patient behaviors
C. By proxy: family member or loved one; to be used in conjunction with other evidence (suggested by American Association of Critical Care Nurses)

D. Tools: Behavioral Pain Scale (BPS), Nonverbal Pain Scale (NVPS), Critical Care Pain Observation Tool (CPOT)
   1. Do not rate the severity of pain but rather its presence or absence

E. Remember: patient’s self-report of pain is considered the gold standard even if answer is simple “yes” or “no”

VII. Critical Care Pain Observation Tool (CPOT)
A. Background
   1. French to English translation
   2. Population: Mechanically ventilated and non-ventilated critical care adult patients with intact motor function and absence of brain injury
   3. Four behavioral domains
   4. Scoring: 0-8 scale; each category scored from 0-2
      a) cut off for scores greater than or equal to 2 (indicate pain)
      b) decrease of 2 or more may indicate effective treatment
   5. Validated among surgical, medical, and trauma ICU patients

B. Behavioral domains (with picture of CPOT)
   1. Facial expression: relaxed, tense, grimacing
   2. Body movements: absent, protection/guarding, restlessness
   3. Muscle tension: evaluated last; relaxed, tense/rigid, very rigid
   4. Compliance with ventilator (for ventilated patients): tolerating, coughing but tolerating, fighting vent OR
   5. Vocalization (for non-ventilated patients): normal talking/tone, sighing/moaning, crying out
   6. Patients given highest score for each behavior observed

C. Application
   1. Observe patient’s face/body for 1 minute
   2. Score all items except muscle tension
   3. Perform passive extension/flexion on patient’s arm (for baseline)
   4. Score muscle tension

D. Current Research
   1. Increase in frequency of pain assessments and reassessments and identification of pain episodes
   2. Analgesic administration less frequent and less potent in post-implementation patients but more effective
   3. Decreases in duration of mechanical ventilation, length of stay, number of complications (nosocomial infections)
   4. Successfully taught to ICU nurses

E. Future Research
   1. Application for brain injured patients: since the CPOT is currently not approved for use among brain injured patients, further research is being conducted in order to revise the tool to accommodate this population
F. Implications for Practice

1. Assessment and intervention is crucial

2. CPOT is recommended for use by American Society for Pain Management Nurses
   - a) Most valid and reliable tool, along with the BPS, for medical, surgical, and trauma patients in ICUs but is not universally implemented
Evaluating Pain in Nonverbal Critically Ill Patients

BY: DANIELLE ALFARO
What is pain?

- “Whatever the person says it is, existing whenever they say it does.”
  - Gold standard of assessment: patient self-report
  - The “fifth vital sign”
Consequences of untreated/undertreated pain

- **Short-term**
  - Suppressed immune system
  - Decreased mobility
  - Sleep disturbances
  - Decreased patient cooperation

- **Long-term**
  - Delayed recovery time
  - Chronic pain
  - Post-traumatic stress disorder (PTSD)
Pain in Critical Care

- More than 30% experience significant pain at rest
- More than 50% experience moderate to severe pain during routine care
- Uniqueness
  - Extent and severity of illnesses/injuries
  - Fear of dying/disability
Pain in Nonverbal Critically Ill

- Challenge: communication is altered for many patients
  - Difficult assessment
  - Increased risk for untreated/undertreated pain
Assessment

- Vital signs
- Patient behaviors
- By proxy: family member or loved one
- Tools: Behavioral Pain Scale (BPS), Nonverbal Pain Scale (NVPS), Critical Care Pain Observation Tool (CPOT)
  - Do not rate severity of pain but rather its presence or absence
- Remember: patient’s self-report of pain is considered the gold standard
Critical Care Pain Observation Tool (CPOT)

- Population: mechanically ventilated and non-mechanically ventilated critical care adult patients with intact motor function and absence of brain injury
- Four behavioral categories
- Scoring: 0-8 scale; each category scored 0-2
  - Cut off for scores greater than or equal to 2 (indicate pain)
  - Decrease of 2 or more may indicate effective treatment
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Application

- Observe patient’s face/body for 1 minute
- Score all items except muscle tension
- Perform passive extension/flexion on patient’s arm (for baseline)
- Score muscle tension
Current Research

- Increase in frequency of pain assessments and reassessments and identification of pain episodes
- Analgesic administration less frequent and less potent but more effective
- Decrease in duration of mechanical ventilation, length of stay, number of complications
- Successful and easily taught to ICU nurses
Future Research

- Application for brain injured patients
- Effect on long-term effects of pain
Implications for Practice

- Assessment and intervention is crucial
- CPOT is recommended for use by American Society for Pain Management Nurses
  - Most valid and reliable tool along with the BPS but not universally implemented
Appendix E
Pre/Posttest Answer Key

1. True
2. False
3. True
4. C
5. B
6. E
7. A
8. D