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Implementation of the Critical Care Pain Observation Tool

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IMPLEMENTATION OF THE
CRITICAL CARE PAIN OBSERVATION TOOL

A Major Paper Presented

by

Carla Angela Salvadore

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IMPLEMENTATION OF THE
CRITICAL CARE PAIN OBSERVATION TOOL

by

Carla Angela Salvatore

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of the Requirements for the Degree of

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Abstract

In the United States, greater than half of the adult patients who are admitted to critical care experience pain and report poor pain control. Inadequate management of acute pain is associated with negative outcomes, including high blood sugar, insulin resistance, higher infection risk, increased discomfort, decreased satisfaction, and chronic pain. Patients in the intensive care unit (ICU) cannot always express that they are having pain. Recently modified guidelines for the *Sustained Use of Sedatives and Analgesics in the Critically Ill Adult* recommend a reliable and valid pain assessment instrument for patients who are unable to verbalize pain. For the adult critically ill population, the Critical Care Pain Observation Tool (CPOT) and the Behavioral Pain Scale (BPS) were identified as the most reliable and valid instruments. The purpose of this program development was to provide education for nurses in the Cardiovascular Intensive Care Unit (CVICU) on the CPOT to assist in transitioning to the CPOT as part of the CVICU pain assessment. A pretest-posttest design was utilized to evaluate the nurses' knowledge of the CPOT. The intervention consisted of a one-hour education session on pain assessment and the CPOT. Thirteen out of a potential twenty-two nurses (n=13, 59%) participated in the educational session with a mean pretest score of 42.3% and a mean posttest score of 93.1%. There was a 50.8% improvement post-intervention total scores. Findings from this quality improvement education intervention suggest that the CVICU nurses' knowledge increased in both pain assessment and the CPOT following the intervention.

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Implementation of the Critical Care Pain Observation Tool

Background/Statement of the Problem

In the critical care adult population, more than half of the patients admitted experience pain. Many patients disclose inadequate pain management during their intensive care unit (ICU) hospitalization (Reardon, Anger, & Szymita, 2015). Poor control of acute pain is associated with negative outcomes including high blood sugar, insulin resistance, higher infection risk, increase discomfort, decreased patient satisfaction, and chronic pain. To manage pain appropriately in the ICU, it is important to have knowledge of the cause and physiology of pain, use of reliable and valid pain assessment tools, and a combined pharmacological and non-pharmacological treatment plan. Healthcare providers should make adequate pain management a priority in promoting comfort and preventing short and long-term complications from pain (Reardon et al., 2015).

Currently at Charlton Memorial Hospital (CMH) in the critical care units, the pain scale used for patients who are unable to verbalize pain is the Face, Legs, Activity, Cry, Consolability (FLACC) Behavioral Scale created by Merkel, Voepel-Lewis, and Malviya (2005). A systematic review, Crellin, Harrison, Santamaria, and Babi (2015), was performed on the reliability, validity, and feasibility of the FLACC scale in all populations. Results suggested high reliability and validity in the pediatric population but insufficient data to support the use of the FLACC scale in the adult population. Compliance by the nursing staff in the Cardiovascular Intensive Care Unit (CVICU) at CMH with the use of this scale is low according to medical record audits performed by the unit resource nurses. The staff nurses often question whether the FLACC scale is reliable in the adult population because in the mechanical ventilated critically ill patient,

the *cry behavior* cannot be assessed. The inability to assess one of the five behaviors on the assessment scale diminishes the reliability of the tool. After careful review of the current literature on pain assessment instruments, the nurse educator and pharmacy manager decided to discontinue the use of the FLACC scale and implement the Critical Care Pain Observation Tool (CPOT) in the critical care units. The CPOT was chosen over the BPS because of the vocalization parameter in the non-intubated patient.

The CPOT was created to appraise pain in patients who are unable to self-report the presence of pain. It consists of four behavioral indicators of pain: facial expression, body movements, compliance with the ventilator for intubated patients or vocalization for extubated patients, and muscle tension. Each category is scored from 0-2 points with a maximum total score of 8 points (Gelinas, Fillion, Puntillo, Viens, & Fortier, 2006). A CPOT total score of less than or equal to a score of 2 points suggests there is no pain, while a score of 3-8 points indicates the presence of pain. If a CPOT total score ≥ 3 points is evident, pain management is recommended (Barr et al., 2013). The objective in implementing the CPOT is to improve nurses' knowledge of pain and pain appraisal. The hospital leadership team aimed to improve compliance and documentation with pain appraisal, improve patient comfort and satisfaction during the critical care hospitalization, and prevent associated complications of inadequate pain appraisal.

Literature Review

A thorough review of literature was performed searching databases CINAHL Plus with Full Text, MedlinePlus, Medline, PubMed, and PubMed Health using the keywords pain assessment, cardiac surgery, critical-care, adult population, FLACC scale, CPOT, and pain assessment tools. Journals appraised were in English only and dated from 2006 to present. Subheadings discussed below include pain overview: definition, incidence, and current guidelines, current pain assessment practices in critical care, pain assessment tools used to guide pain management, validity and reliability of the CPOT, utilization of the CPOT by nurses, and implementation of CPOT.

Pain Overview: Definition, Incidence, and Current Guidelines

Pain, as defined by the International Association for the Study of Pain (2012), is “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage” (p. 209). Since pain is a subjective occurrence, patient self-report remains the gold standard for pain assessment. Many patients in the critical care adult population are unable to verbalize pain and discomfort. Some patients are nonverbal, require sedation with or without mechanical ventilation, or suffer from acute delirium. Currently, there is no objective measurement to determine pain severity in this population. According to Reardon et al. (2015) about 50% of patients in the ICU have moderate to severe pain. Risk factors for patients having pain in the ICU include primary disease processes, invasive procedures, prolonged immobility, medication administration through peripheral access, and tissue injury from trauma, burns, and surgery (Reardon et al., 2015). The Society of Critical Care Medicine recommends regular pain assessments in every adult ICU patient (Barr et al., 2013).

Treating pain in the critical care setting remains a challenge. Subramanian,

Allcock, James, and Lathlean (2011) performed a qualitative prospective exploratory study to investigate the difficulties critical care nurses face in managing ICU patients' pain. Semi-structured interviews were performed with 21 nurses at a large academic hospital in the United Kingdom using critical intent critique over an 11-month period. Critical intent critique is a process of analyzing observations of human behavior in a specific situation. Nurses chosen for the study ranged from having less than one year of nursing experience to greater than 25 years. Inclusion criteria consisted of the nurses providing patient care in one of the critical care units in the adult population. Framework analysis identified four prevalent themes nurses find challenging in pain management: deficiency in clinical guidelines, insufficient standardized pain assessment instrument, lack of autonomy in making decisions on pain management, and the complexity of the patients' circumstance. Limitations to this study include the inability to generalize these findings for other settings because there are a variety of pain management policies and nursing roles throughout the study. Researchers determined that nurse education and training on pain management and current guidelines are necessary to reduce challenges nurses face in managing pain in the critically ill adult.

Barr et al. (2013) recently modified the "Clinical Practice Guidelines for the Sustained Use of Sedatives and Analgesics in the Critically Ill Adult" issued in 2002. A revision to the guidelines was made to reflect advances in strategies to increase comfort in ICU patients, including the development of valid and reliable behavioral pain assessment instruments. These instruments in particular are attributed to the progress of providing better pain management in the ICU (Barr et al., 2013). The American College of Critical Care Medicine created a 20-person multidisciplinary task force consisting of

experts with knowledge in pain, agitation, and delirium care. There were four subcommittees developed: pain and analgesia, agitation and sedation, delirium, and related ICU outcomes. All committees created pertinent clinical questions and outcomes, reviewed and critiqued the literature, and developed statements and recommendations for practice.

This task force, Barr et al. (2013), reported that adult ICU patients in the medical, surgical, and trauma areas experience pain at rest and with typical ICU care. In the cardiac surgical population, pain is frequent and inadequately treated and women often develop more pain than men. Pain during routine procedures in the adult ICU population is prevalent. Recommendations on pain assessment include routine monitoring in adult ICU patients, use of valid and reliable instruments rather than relying on vital signs alone when individuals cannot self-report pain, and use of vital signs as an indicator for further pain assessment in the adult critical care patient population. The CPOT and Behavioral Pain Scale (BPS) were found to be the most reliable and valid pain appraisal tools in the medical, postoperative, and trauma patients (aside from patients with brain injury) who were unable to report pain. The BPS is a pain scale that has three categories: facial expression, upper limb movements, and compliance with mechanical ventilation. Each category produces a score from 0-4 points with 12 points being the maximum pain score. Pain is suggested with a score ≥ 5 points (ICU Delirium and Cognitive Impairment Study Group, 2013). The task force guidelines were developed to assist in providing multidisciplinary and evidence-based, patient-centered care in the critically ill adult (Barr et al., 2013).

Current Pain Assessment Practice in Critical Care

Current pain assessment and management guidelines recommend routine pain assessments in critically ill adults to facilitate the prompt identification and treatment of pain (Barr et al., 2013). Rose et al. (2012) conducted a study to evaluate ICU nurses understanding and perceptions of pain assessment and treatment routines in Canada. A survey was sent by mail to a total of 3,753 critical care nurses from 12 Canadian professional nursing associations. Survey questions focused on knowledge of pain assessment, pain appraisal instruments, and training received on pain management. Eligibility was based on current employment as a registered nurse in an adult ICU. Nurses who worked only in a pediatric ICU were excluded from the study. There was a 24% response rate and 802 questionnaires were appraised. Results indicated that nurses were not likely to utilize a pain assessment tool in nonverbal patients. Eighty-eight percent of nurses reported patient self-report to be moderately to extremely important, while only 74% felt the use of behavioral pain assessment tool to be moderately to extremely important. Discussion of pain scores during provider handoff was reported by 61% of nurses. Utilization of a pain medication order with pain score parameters was reported by 42% of nurses. Knowledge of professional guidelines from a society for pain assessment and management was described by 29% of participating nurses. An association was found between knowledge of professional guidelines and use of pain assessment instruments. Limitations to this study include the inability to generalize findings, self-report bias, and select bias. Researchers found a significant percentage of critical care nurses (67%) did not report using pain assessment instruments in patients who were unable to verbalize pain and unaware of professional guidelines for pain management and assessment.

Gerber, Thevoz, and Ramelet (2014) performed a study to explain what factors impact nurses' clinical judgment and reasoning when appraising pain in ICU patients unable to express complaints of pain. A descriptive observational study took place in a tertiary referral hospital in Western Switzerland in a 36-bed medical-surgical adult ICU. Seven experienced nurses caring for ventilated patients were chosen for this study. Data was collected during real-time by recording nurses' clinical reasoning during care, direct observation by the evaluator without nurse input, and short interviews. Trained nurse researchers analyzed the collected data by using deductive and inductive content analysis and utilized a theoretical framework that was created from a proficient clinical reasoning model. Results indicated that pain management was triggered by physiological instability, difficulty for nurses to differentiate from patients needing sedation versus analgesia, and nurses primarily using working experiences and patterns to expect and prevent pain. Limitations to this study include the small sample size, potential bias from nurses, and the inability to determine the participant's level of expertise. Researchers recommended further research on this topic and to investigate how physiological factors can be utilized in nurses' assessment of pain.

Haslam, Dale, Knechtel, & Rose (2012) examined pain descriptors utilized by nurses in two Level-III mixed medical, surgical, trauma, and cardiothoracic ICUs at teaching hospitals in Toronto, Canada to record the presence of pain in nonverbal adult critical care patients. A retrospective, mixed method, observational chart review of 189 patients was performed. Individuals who were unable to communicate were included in this review. Patients who received paralytics were excluded from this study. Results showed that 28.6% had no description of a pain assessment recorded during their ICU

hospitalization. Behavioral descriptors noted were restlessness, agitation, grimacing, ventilator asynchrony, pulling towards breathing tube, discomfort, vocalizing, combativeness, and muscle tension. Changes in vital signs were described in 14% and descriptors documenting the absence of pain were present in 17% of extracted charts. Description of pain assessment prior to a procedure was 4%. Themes developed from this study include emergent need to intervene to prevent injury to the patient or staff, nurses unable to discriminate between the need for sedation, analgesia, or anti-psychotic medications, and administering pain medications for wakefulness. A limitation to the study was insufficient documentation and the inability to clarify meaning of responses analyzed. Researchers recommend the use of pain assessment descriptors for nonverbal patients to increase documentation and promote adequate pain management.

Pain Assessment Tools Used to Guide Pain Management

Many behavioral pain assessment tools have been published and are currently used in practice (Barr et al., 2013). Pudas-Tahka, Axelin, Aantaa, Lund, and Salanterä (2009) performed a systematic review of pain assessment tools available for adult critically ill patients who are unconscious or sedated. An extensive literature search was performed gathering research from January 1987 to February 2007. Nine papers contained the inclusion criteria of publications in English or Finnish and included a pain appraisal tool or behavioral scale for the nonverbal adult ICU patient. Two researchers assessed the abstracts and three evaluated the chosen articles by utilizing a previously created quality assessment tool that is used to appraise pain assessment tools. Five distinctive pain assessment tools were acknowledged: the BPS, CPOT, Nonverbal Adult Pain Assessment Scale (NVPS), Pain Assessment and Intervention Notation Algorithm

(P.A.I.N), and Pain Assessment Algorithm. Each scale contained behavioral descriptors, and three instruments also included physiological indicators. The psychometric elements of each tool were assessed on quality judgment criteria associated with the tools' reliability and validity. The BPS scored the highest 12/20 while the CPOT and NVPS scored 11/20. All tool scores being low indicate need for additional assessment and validation of the psychometric properties of each instrument. Limitations to this study included that authors did not use unpublished literature or papers in other languages besides English and Finnish. Researchers recommend the use of pain assessment tools during assessment of pain in nonverbal patients and more research on the validity, reliability, and feasibility of each tool is needed to determine which tool is better for use.

Liu, Li, and Herr (2015) evaluated and compared two pain appraisal instruments, the CPOT and BPS, in adult ICU Chinese patients by doing a prospective observational study. The sample included 117 adult patients in the generalized ICU at an academic hospital in China. Patients excluded from this study included individuals with myasthenia gravis, severe brain injury, receiving profound sedation or paralytics, deep coma, and hemodynamic instability. A total of 608 pain assessments utilizing both tools were performed during suctioning (painful procedure) and noninvasive blood pressure measurement (non-painful procedure). Cronbach's alpha coefficients from both scales were highly reliable; the reliability coefficient for CPOT was 0.79 and the BPS 0.79. Test-retest reliability also correlated with the CPOT (0.95) and BPS (0.94). Both instruments' total pain scores increased during the painful procedure compared with the non-painful procedure. A limitation to this study was a potential bias from having only two observers. Results suggested that the CPOT and the BPS are both reliable and valid

instruments for pain appraisal in the nonverbal adult ICU Chinese population.

Kiavar et al. (2016) conducted a prospective study comparing the CPOT and Facial Expression (FE) scale in critically ill intubated patients post cardiac surgery. The sample included 91 intubated patients admitted for coronary artery graft bypass or valve replacement surgery, requiring intubation, without facial damage or neuromuscular problems, 18 years or older, and had not received sedation, analgesics, and paralytics for a minimum of three hours. Exclusion criteria consisted of a history of drug dependency, received sedation, pain medication, or paralytics within three hours of assessment, patients in a coma, spinal cord damage, and patients who required high doses of vasopressors and inotropes. The procedure included measurement of vital signs and pain assessment with both scales (CPOT and FE) starting three hours after admission to the cardiac ICU then every 30 minutes. Results showed that both scales, CPOT (58.2%) and FE (67%), initially recognized severe pain but the CPOT was able to detect increased pain secondary to routine painful procedures. Weighted k coefficients were used to determine the amount of difference between the two raters. The FE did not identify pain on the fourth assessment ($k=0.249$). Between both tools, the greatest agreement was when pain was described as “severe” ($k=0.787$) and “mild” ($k=0.851$). A limitation to this study was the sample size and restricted population making it difficult to generalize findings. Researchers concluded that the CPOT had a higher sensitivity for pain detection than the FE scale in the post cardiac surgery population.

Marmo and Fowler (2010) conducted a descriptive repeated-measures study to compare three pain appraisal instruments: CPOT, NVPS, and FLACC in adult critically ill post cardiac surgery patients unable to verbalize pain. The sample included 25

patients who were 18 years or older, admitted for coronary artery graft bypass or valve surgery, and requiring mechanical ventilation. Individuals excluded had a spinal cord injury, were receiving paralytics, or had a change in sedation or pain management during the study. Four trained nurses collected data at three different time intervals: prior to painful events, one minute after repositioning and endotracheal suctioning, and 20 minutes later. Results demonstrated high reliability in both the CPOT and NVPS with Cronbach alpha coefficients of 0.89. Both the CPOT and NVPS ($r > 0.80$, $p = .00$) moderately correlated with each other and scores were typically moderate to high, with the CPOT being greater. The disagreement between raters was attributed to evaluating the facial component in each instrument. FLACC results were not discussed in depth in this study. Researchers felt that both, the CPOT and NVPS, adequately depicted pain in the nonverbal cardiac surgery patient. Limitations included the utilization of a convenience sample and limited to the open-heart surgery population at one hospital. The authors recommended sufficient nurse education when using the pain scales including pictures for emphasis on the proper assessment of the facial component.

Validity and Reliability of the CPOT

The CPOT is being used in many ICUs at this time. The validity and reliability of the CPOT is largely studied. Gelinas et al. (2006) conducted a study to test validity of the CPOT because there was little research performed on validation of pain assessment tools in the nonverbal, critically ill adult. A quantitative study of 105 patients after cardiac surgery in the ICU, in Canada, was performed using a repeated measures design. Inclusion criteria included patients 18 years or older, admitted for cardiac surgery, French speaking, able to adequately see and hear, and admitted to the ICU following cardiac

surgery. Exclusion criteria consisted of admission for a heart transplant or thoracic aortal aneurysm repair, treatment for chronic pain, an ejection fraction below 25%, history of psychiatric or neurological problems, substance use problems, received paralytics after surgery, or had complications post operatively such as bleeding, delirium, or death. Of the selected participants, 33 were intubated and sedated and 99 were intubated and conscious. All patients in the sample were also assessed after extubation. The principal investigator and critical care nurse evaluated the patient on three different occasions for a total of nine assessments each: at rest, during position changes, and 20 minutes after positioning. Self-report was gathered after extubation and with the conscious intubated patient. Results suggest acceptable reliability and validity of the CPOT. Inter-rater reliability was reinforced by the weighted k coefficients that were considered moderate to high ($k = 0.74$). Associations were found between patients' verbal report and CPOT scores suggesting criterion validity. Discriminant validity is indicated because CPOT scores were increased during position changes compared to being at rest. Limitations included potential bias from only two persons collecting data, small sample size, and population limited to cardiac surgery. Researchers found reliability and validity of the CPOT in the cardiac surgery ICU population but recommend further research on the reliability and validity in other critical care populations.

The CPOT was originally developed and studied in the cardiac surgery populations. Buttes, Keal, Cronin, Stocks, and Stout (2014) conducted a study to evaluate the validity and reliability of the CPOT in the adult critically ill adult population in continuation of Gelinas et al. (2006) research. A prospective study was performed at a community hospital in the critical care units containing a convenience sample size of 75

patients. Inclusion criteria consisted of being 18 years old or older, ability to see, hear, and comprehend English, and no signs of delirium. Individuals with a history of chronic pain treatment were excluded. The procedure performed was similar to Gelinas et al. (2006) as listed above by performing three serial pain assessments: at rest, during position changes, and 20 minutes after positioning. Buttes et al. (2014) had two trained individuals appraise patients by using three pain assessment tools. Pain assessment tools utilized included the CPOT, the FLACC, and the Pain Intensity Numeric Rating Scale (NRS). The FLACC was the current scale available in the critical care units for nonverbal patients at the time the study was being performed. The NRS is used for patients who are able to self-report pain on a pain scale from 0-10, 0 being no pain at all and 10 being the most severe pain was utilized. Results indicated adequate reliability and validity of the CPOT in the adult critical care population ($k = 0.51-0.88$). Inter-rater reliability was acceptable with scores fluctuating from $r = 0.74$ to 0.91 . Criterion-related validity was present between CPOT scores and FLACC ($0.87-0.92$) and NRS ($0.50-0.69$). Discriminate validity was established by the presence of higher CPOT scores during position change with a mean of 1.85, and at rest, mean of 0.60-0.65. Limitations to this study include the inability to utilize random sampling and decreased number of pain observers. Researchers suggest the CPOT is an acceptable tool for the general adult critical care population and more appropriate than the FLACC scale.

Linde et al. (2013) performed a prospective, repeated-measures within-subject design to assess the validity and reliability of CPOT scores for non-painful and painful procedures between two trained nurse evaluators. The study took place at Rhode Island Hospital in an 8-bed cardiothoracic ICU on patients post coronary artery bypass grafting

and/or valve surgery. The sample consisted of 35 patients, 18 years or older, who spoke English, and had elective surgery over a five-month period. Patients were excluded if they had a prior history of stroke, Parkinson disease, spinal cord injury, dementia, and substance abuse or if they were extubated before initial pain assessment, received paralytics post-operatively, and had hemodynamic instability. The final sample contained 30 patients. The principal investigator trained 6 registered nurses on the CPOT in a two-hour educational session. The procedure consisted of the observation of intubated patients in the first eight hours post cardiac surgery with CPOT scores collected before and during turning the patient (painful procedure) and changing a dressing for a central line (non-painful procedure). Results showed that the patients mean CPOT scores did not elevate greatly during dressing changes but increased considerably during turning. The inter-rater reliability Fleiss-Cohen weighted k coefficient of the research nurses was $k = 0.87$, expressing a confidence interval of 95%. Limitations to the study include potential rater bias, small amount of research nurses, and the inability to differentiate agitation, pain, and anxiety. These results support the validity and reliability of the CPOT in appraising pain in the sedated and intubated, critically ill adult post cardiac surgery. The nurses who participated in this study found the CPOT to be easy to use and applicable to this patient population. They reported that it would be feasible to implement this tool in practice, as the nurses who utilized the CPOT in the study required minimal training.

Utilization of the CPOT by Nurses

Asadi-Noghabi, Gholizadeh, Zolfaghari, Mehran, and Sohrabi (2015) performed a pre and post design to evaluate pain management using the CPOT with nonverbal ICU

patients. The study consisted of the observation of 106 ICU nurses in three phases: pre-implementation, implementation, and post-implementation. The pre-implementation phase involved the reviewers observing nurses with a checklist on three different occasions after suctioning and positioning patients. Implementation of the CPOT tool by nurses was followed by the post-implementation phase, which involved a re-evaluation of the nurses' pain management routine by performing the tasks in the pre-implementation phase.

To rank the nurses' performance, the nurse was observed three times. The nurses were observed from an eight item checklist, if a reaction to each of the items was yes, a score of one was given, and if the reaction was no, a score of zero was received. A total score of three indicated a favorable response while a score zero was considered unfavorable. Results showed enhanced diagnosis of pain ($p < 0.001$), treatment actions ($p < 0.001$), and pain reassessment ($p < 0.001$). In regard to increased diagnosis of pain, fewer than half of the nurses were considered favorable ($n = 22.6\%$) pre-intervention while post-intervention greater than half of the nurses ($n = 53.8\%$) were favorable. When evaluating the treatment action, greater than half of the nurses were determined unfavorable ($n = 52.8\%$) pre-intervention, whereas post-intervention, the unfavorable status decreased ($n = 9.4\%$) and many nurses were in the favorable position ($n=39.6\%$). In discussion of pain reassessment most nurses were in the unfavorable status ($n = 71.4\%$) pre-intervention, while post-intervention the unfavorable rank decreased ($n = 16.0\%$) and the majority of nurses were ranked relatively favorable ($n = 54.7\%$). However, utilization of the tool did not improve the documentation of pain or the relief methods performed ($p = 0.209$). Researchers believe CPOT use can improve nurses' pain

sensitivity in the nonverbal critically ill patient and guide them to initiate pain management (Asadi-Noghabi et al., 2015).

Gelinas (2010) conducted a study to assess nurses' thoughts on the feasibility and clinical use of the CPOT when appraising pain in the intubated, critically ill adult population. The researcher performed a descriptive design study in the ICU in a hospital in Canada. The sample consisted of 62 nurses who participated in a one-hour educational session conducted by the principal investigator. The CPOT was utilized to assess 55 intubated patients. Nurses appraised pain with the CPOT while the patient was at rest, during turning and when measuring a noninvasive blood pressure, and 20 minutes after the procedure. After the assessments were performed nurses were asked to complete a questionnaire. Thirty-three surveys were completed and returned for analysis. Results showed greater than 90% of participating nurses felt the CPOT directions were clear and easy to understand. More than 70% acknowledged the CPOT was beneficial to nursing practice and suggested routine use of the instrument. Many stated the CPOT was a standardized way for nurses to appraise pain in the nonverbal patient. Survey results indicated that use of the CPOT influenced half of the participants' nursing practice. Limitations to this study include a small sample size, moderate participation, and use on enrolled patients only. Gelinas (2010) concluded that the behavioral pain assessment tool, CPOT, was found by nurses to be feasible and with positive clinical utility.

Rose, Haslam, Dale, Knechtel, and McGillion (2013) performed a study to evaluate the effect of the CPOT on the regularity of pain assessment documentation and administration of sedation and pain medication to adults in the ICU. Data was collected retrospectively, 72 hours before and after initiation of the CPOT pain assessment

instrument in the CVICU and mixed medical/surgical/trauma ICU. Results showed an increase from 15% to 64% in the CVICU and 22% to 80% on the mixed ICU in frequency of pain assessment with documentation. Opioid dose administration in the CVICU decreased by 1mg ($P < 0.001$) and in the mixed ICU increased by 48mg ($P < 0.001$). Benzodiazepine administration did not change in the mixed ICU but decreased by 10 mg ($P < 0.01$) in the CVICU. Limitations to this study suggest that results may have been influenced by initiating a sedation assessment tool to decrease levels of sedation around the same time as CPOT, recent turnover of physicians and nurses, and ascertainment bias from the individuals who collected data that were not blinded to the study. Authors determined that implementation of the CPOT improved the incidence of pain assessments and documentation, and positively effected the administration of pain medications.

Implementation of the CPOT

Bourbonnais, Malone-Tucker, and Dalton-Kischel (2016) conducted a pilot study to assess the appropriateness of the use of the CPOT as a pain appraisal instrument for the intubated patients in two ICUs at a tertiary care teaching hospital in Eastern Canada. A descriptive design with both quantitative and qualitative methods was used. Participants were currently employed, full or part-time nurses working longer than 6 months in one of the hospital's ICUs. Inclusion criteria included patients 18 years or older, who required mechanical ventilation, and were unable to speak. Individuals excluded were patients who received paralytics or had a history of spinal cord or brain injury. During a 12-hour shift, 23 nurses assessed pain in 23 patients, five appraisals on each patient utilizing the CPOT. In addition, data was collected from questionnaires completed by the nurses after

using the CPOT. To evaluate feasibility of the tool and usefulness in assessing pain, a Likert scale was utilized with a score of 1 indicating very easy to a score of 5 demonstrating very difficult. Results indicated the nurses found the tool helpful to assess pain (n = 1.8) and feasible to use (n = 1.5). Limitations to this study included a small sample size, limited study time period, and lack of inconsistent training to some of the staff utilizing the tool. This study supported the choice to implement the CPOT into practice in the ICUs studied.

Arbour, Gelinas, and Michaud (2011) performed a pilot study with a pre-experimental and post-experimental design to measure the effect of the CPOT on the treatment of pain in intubated patients in the trauma ICU. The author reviewed 30 medical records. Medical files that were excluded include individuals who received paralytics in the first 48 hours of admission to the ICU, presence of a spinal cord injury, and Glasgow Coma Scale of less than four. Fifteen medical records were analyzed one year prior to implementation of the CPOT and 15 charts were reviewed 6 months after implementation of the CPOT. The independent variable was the implementation of the CPOT, while the dependent variables were pain management and clinical outcomes of the intubated trauma ICU patients. For all experimental variables descriptive statistical analysis was performed. Results showed that individuals in the post-implementation (4.69%) received three times more pain assessments (CPOT) than the pre-implementation group (2.32%). Less pain medication and sedatives were administered in the post-implementation group (2.56%) compared with the pre-implementation group (2.59%). There was a decreased length of intubation observed in the post-implementation group (5.06%) in relation to the pre-implementation group (7.37%). The ICU length of stay

was less in the post-implementation group (5.86%) than in the pre-implementation group (11.16%) and the number of complications was also decreased in the post-implementation group (1.69%) compared with the pre-implementation group (5.19%). Limitations to this study include the small sample size, limited population, potential bias from nurses, and inconsistency of analgesic orders. Researchers concluded that use of the CPOT provided more efficient pain management and improved outcomes for patients during their ICU hospitalization.

It is evident from the reviewed literature that pain is prominent in the adult critically ill population and a challenge to assess individuals who are unable to verbalize pain. Reliable and valid pain assessment tools have been recommended for use when a patient is unable to self-report pain. Many research studies have suggested high reliability and validity of the CPOT in the adult critical care population, as well as the post cardiac surgical population. The CPOT has been successfully implemented as part of critical care nurses' pain appraisal in numerous institutions.

Theoretical Framework

To guide this project, the Logic Model was used to assist with program development. Managers, funders, and evaluators determine the feasibility and efficacy of a program typically using the Logic Model. This model consists of two main components: the process component and the outcome component. The process component is the planning element that contains two effects: inputs and activities. Inputs consist of resources needed for the development of the program. Activities are program events that assist in program development. The outcome component identifies intended results and consists of three elements: outputs, outcomes, and impact. Outputs are what outcomes occur following the program events. The outcomes and impact are the changes and gains that are expected to be achieved as a result of the program developed (Bringing Theory to Practice, 2004).

Identified inputs include: support from ICU management team and the Professional Development Department, ability to pay staff for time in training, available technology to provide educational sessions, and access to hard copy handouts for each participant. The activity for the program development was a one-hour educational session consisting of a PowerPoint presentation, demonstration video, case study, and printed materials. Outputs included provision of education to nurses on pain, pain assessment and the CPOT. Outcomes were the increased knowledge of nurses on pain assessment and the CPOT, as well as successful implementation of the CPOT from the previously used FLACC scale. Short-term impact was the adoption of a new pain scale into practice. Long-term impact, not measured in this study, includes more reliable pain scores, consistent documentation, and pain management based on accurate and reliable

appraisal of pain. These outcomes together over time may decrease the long-term complications of acute pain in hospitalized adults in the ICU.

Method

A quality improvement program development methodology was used to promote evidenced-based practice related to pain assessment. The Chief Nursing Officer of the Southcoast Health Group at CMH gave written approval for the project (Appendix A), which was submitted with the proposal. Implementation of the CPOT took place in the CVICU at CMH. This transition was accomplished by providing a one-hour, mandatory educational session to the nursing staff reviewing essential concepts regarding pain appraisal and the use of CPOT. The educational program was developed in October, 2017 and the education of the CPOT took place in December, 2017. To evaluate successful implementation of the CPOT, a pretest was given at the beginning of the educational session and a posttest was given at the end of the educational session to assess the nurses' knowledge of how to appropriately utilize the CPOT.

Purpose/Question

The purpose of this project was to provide education to the nurses in the CVICU on the CPOT to assist in successfully transitioning to the CPOT as part of the CVICU pain appraisal.

Design

Pretest-posttest design was performed to evaluate the nurses' knowledge of the CPOT.

Sample/Participants

All staff nurses who work in the CVICU at Charlton Memorial Hospital were required to participate in the one-hour educational session on the CPOT. The potential sample size was approximately 22 nurses.

Site

The one-hour educational session took place in a classroom at Charlton Memorial Hospital during all shifts. CMH is a non-teaching community hospital with approximately 328 beds. There are three critical care units with a total of 24 beds. The CVICU is an 8-bed unit with approximately 22 nurses.

Procedures

Each participant completed a pretest at the beginning of the educational session. The pretest (Appendix B) contained ten multiple-choice questions all with four answer choices. Questions were based on the objectives (Appendix C) of the CPOT training. Experts in the field, including the nurse manager, assistant nurse manager, and nurse educator, performed face validity of the newly created pretest and posttest. A one-hour educational session consisting of verbal and visual information took place (Appendix D). To begin, a PowerPoint presentation (Appendix E) discussed the incidence of pain in the ICU, need for accurate pain assessment, and a description of the CPOT scale. A 13-minute video titled "*The critical care pain observational tool: How to use it in your ICU*" was shown as a demonstration of the recommended instructions to assess pain using the CPOT scale (Elsemore, 2011). A case study (Appendix F) was presented during the educational session with time allotted for a recall of CPOT training and discussion. Educational materials on the CPOT (Appendix G) and PowerPoint presentation (Appendix E) were provided to each nurse. Laminated and color versions of the CPOT (Appendix G) are available in each ICU room for reference when assessing pain. Participant questions were encouraged and answered. To conclude the educational session each participant completed a posttest (Appendix H). The posttest content was the

same as the pretest content.

Measurement

Data was collected from the pretest and posttest total scores to assess the nurses' knowledge of the CPOT. To describe the sample, minimal demographic data was collected. Data collected included number of years as a registered nurse in a range format, sex of the participant, number of years as a critical care nurse in a range format, and last time they had training in pain appraisal.

Anticipated Timeframe

Program development took place in October of 2017. Nursing staff was informed in an informational email (Appendix I) of the upcoming education on CPOT and a sign-up sheet was placed in the CVICU in November of 2017. There were eight educational session times. Sessions were offered before and after change of shift, in both, the morning and night shifts, as well as several daytime sessions. The implementation of the project took place in December of 2017.

Organizational/Systems Factors

Organizational factors consisted of the support of the CVICU Nurse Manager and Nurse Educator. It was required of all staff to participate in this training. Potential barriers included approval from the Institutional Review Board (IRB) from Rhode Island College and Southcoast Health System and potential time constraints on the implementation timing and educating all of the nurses on the unit.

Desired Outcomes

The desired outcome was to have the nurses in the CVICU gain knowledge of the CPOT to appropriately assess pain in the critical care population.

Ethical Concerns

Approval from the IRB from Rhode Island College and Southcoast Health System was needed because this project involved human subjects (nurses). Limited demographic and other identifying factors were collected. To insure both the pretest and posttest were obtained from each participant and their identity protected, the tests were numbered and labeled on the pretest and posttest. There was a pretest and separate posttest envelope for the participants to place their tests. At the top of each test, participants were asked to provide a 4 digit unique number that was only known to the participant. This assisted in data collection using minimal identifying factors. No vulnerable populations were studied. Training all nurses in the CVICU provided equal access to the training.

Evaluation Plan

Analysis of data was obtained from the pretest and posttest total scores comparing prior knowledge of CPOT and post education session knowledge of CPOT. Basic statistical analysis of descriptive factors: mean, median, and mode were performed. Tables and charts were used to display results.

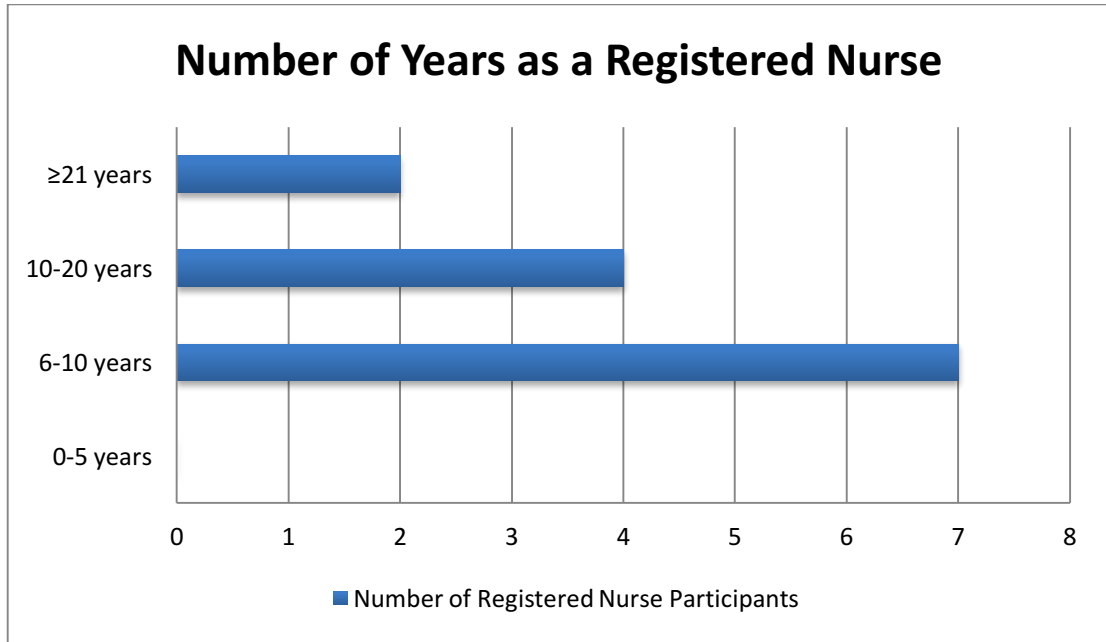
Results

For this evidence-based quality improvement program, the target population was nurses working in the CVICU at CMH (n = 22) during the implementation phase of the program. Thirteen out of a potential twenty-two nurses (59%) participated in the educational session and completed the pretest and posttest. Limited demographic data was collected to describe the sample.

The sample consisted of ten females (77%) and three males (23%). Seven nurses (54%) had six to ten years, four (31%) had ten to twenty years, and two (15%) had greater than twenty-one years of experience as a nurse (Table 1). As for critical care nursing experience, five nurses (38%) had zero to five years, two (15%) had six to ten years, five (38%) had ten to twenty years, and one (8%) had greater than twenty-one years (Table 2). Nine nurses (69%) answered that they received training on pain assessment this year, three nurses (23%) received training last year, and one nurse (8%) received training greater than five years ago (Table 3).

Table 1:

Number of Years as a Registered Nurse

**Table 2:**

Number of Years as a Critical Care Nurse

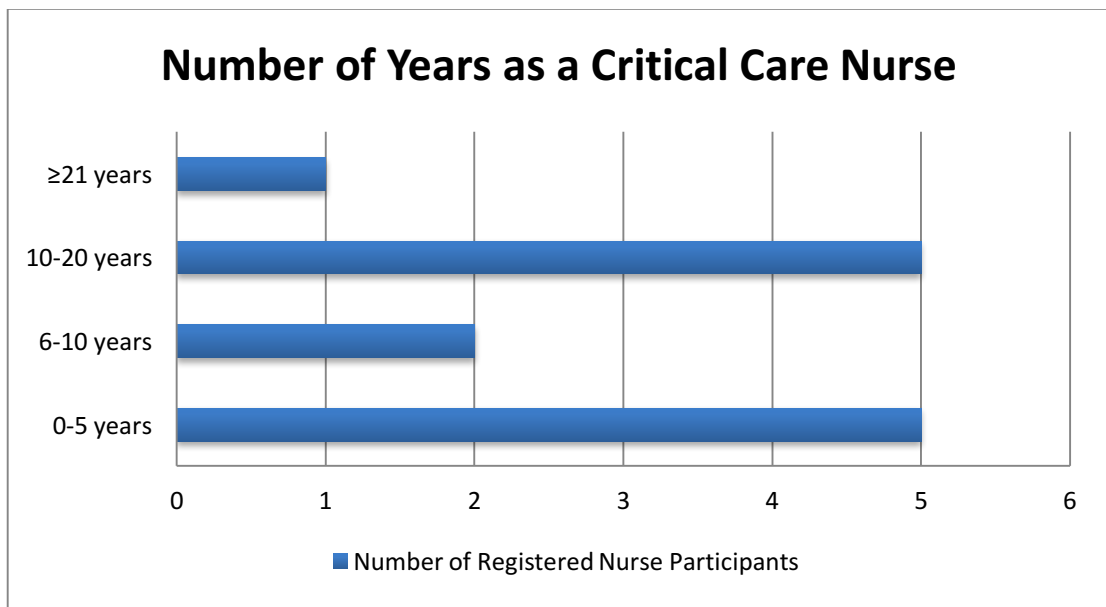
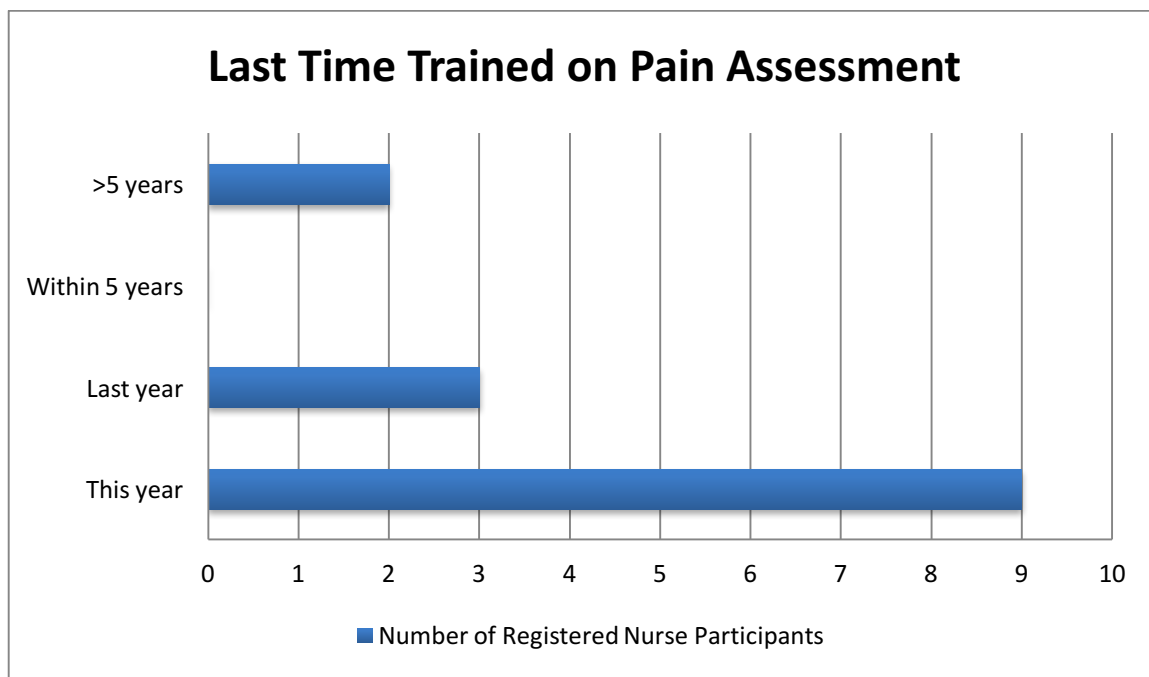


Table 3:

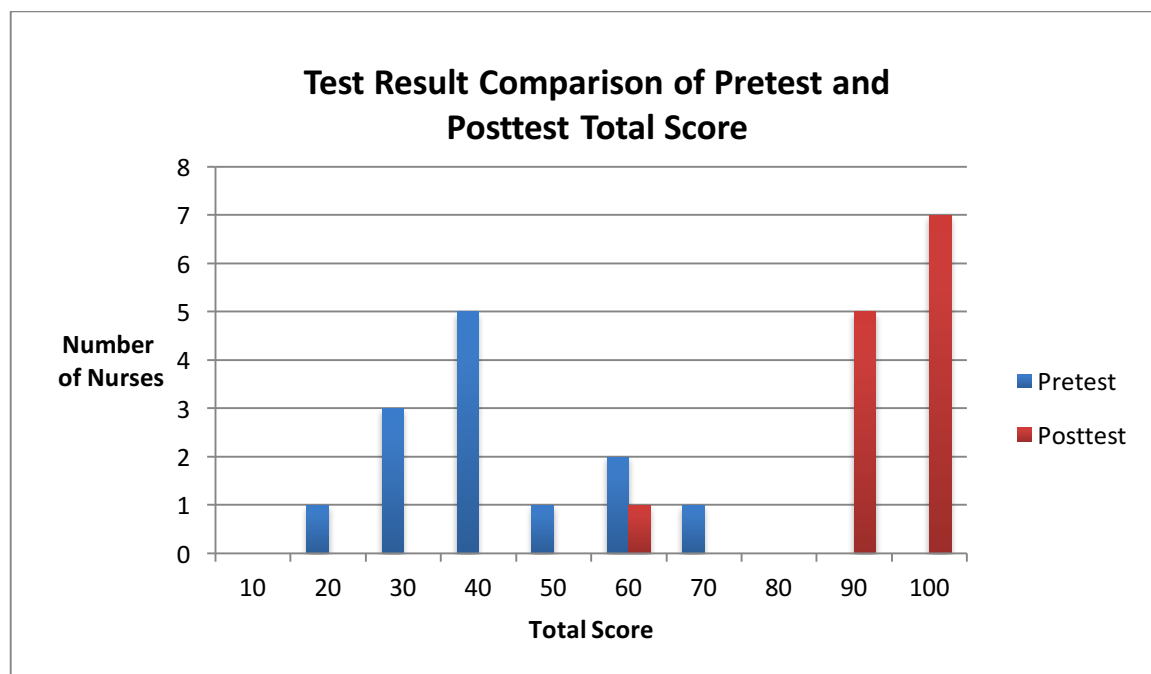
Last Time Trained on Pain Assessment



Every posttest question improved in comparison to the pretest, except for Question 2. Question 2, which asked about the current recommendations from the Society of Critical Care Medicine on pain assessment, in both the pretest and posttest 100% was scored. Pretest total scores ranged from 20 to 70 out of a total of 100, with a mean total score of 42.3%. Both the median and the mode were 40. Posttest total scores ranged from 60 to 100, with a mean total score of 93.1%. Both the median and the mode were 100. The posttest total scores increased by 50.8% compared with the pretest total scores. Table 4 demonstrates test results comparing pretest total and posttest total scores.

Table 4:

Test Result Comparison of Pretest and Posttest Total Score

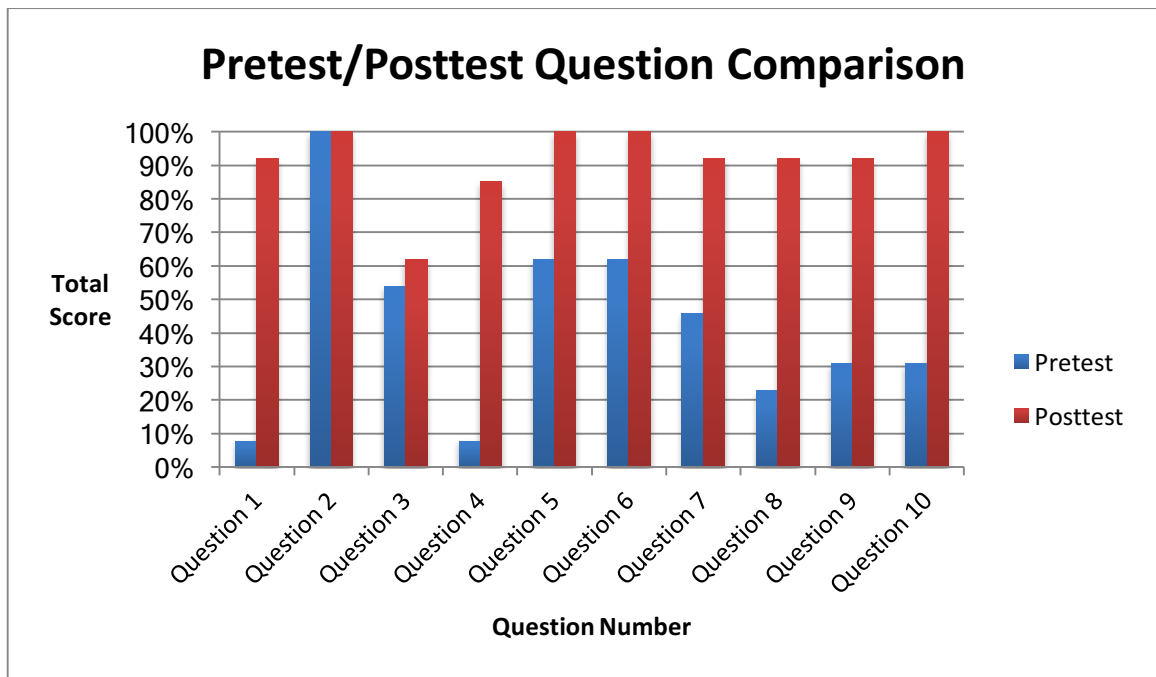


Questions 1 and 4 showed the greatest improvement from the pretest to the posttest with Questions 8, 9, and 10 also demonstrating significant enhancement. In the pretest, both in Questions 1 and 4, only 8% answered correctly. After the one-hour educational session 92% answered Question 1 correctly identifying the incidence of pain the adult ICU population and 85% answered Question 4 correctly determining the appropriate elements in the Southcoast Pain Management Policy. Questions 8, 9, and 10 measured the utilization of the CPOT. Only 23% correctly answered Question 8 in the pretest. In the posttest, 92% were able to determine the CPOT score of a patient experiencing pain. In the pretest in both Questions 9 and 10, 31% answered those questions appropriately. In the posttest after participating in the educational session 92% answered Question 9 correctly by identifying the proper steps in performing the CPOT

and 100% answered Question 10 correctly by determining when to perform the initial CPOT assessment. Table 5 demonstrates the correct percentage of the questions both on the pretest and posttest.

Table 5:

Test Result Comparison of Pretest/Posttest Questions



Summary and Conclusions

In the adult critically ill patient population the incidence of pain affects greater than 50% of patients and many patients have reported insufficient pain management during their ICU hospitalization (Reardon et al., 2015). Inadequate pain control leads to short term negative outcomes including hyperglycemia, insulin resistance, greater infection rate, increased discomfort, and decreased patient satisfaction as well as the long-term poor outcome of chronic pain. Appropriate pain management depends on the knowledge of the cause and physiology of pain, use of reliable and valid pain assessment tools, and a combined pharmacological and non-pharmacological treatment regimen (Reardon et al., 2015).

Barr et al. (2013) revised the “Clinical Practice Guidelines for the Sustained Use of Sedatives and Analgesics in the Critically Ill Adult” that were issued in 2002. They found pain to be prevalent in the adult ICU patient at rest and with typical ICU care. In the cardiac surgical population they found pain to be evident and inadequately treated. This task force recommended that pain assessment should include routine monitoring in adult ICU patients, the use of vital signs to prompt further pain assessment, and use of valid and reliable tools when individuals cannot verbalize pain in the adult critical care population. The Critical Care Pain Observation Tool (CPOT) and the Behavioral Pain Scale (BPS) were found to be the most reliable and valid pain appraisal tools in the medical, postoperative, and trauma (aside from brain injury) patients who were unable to report pain (Barr et al., 2013).

In the critical care units at CMH, the pain scale utilized for patients who are unable to verbalize pain was the FLACC scale. Crellin et al. (2015) performed a systematic review on the reliability, validity, and feasibility of the FLACC scale in all

populations. Results suggested high reliability and validity in the pediatric population but insufficient data to support the use of the FLACC scale in the adult population. According to medical record audits performed by the unit resource nurses, compliance by the nursing staff in the CVICU with use of the FLACC scale was low. The staff nurses questioned whether the FLACC scale was reliable in the adult population because in the intubated and sedated critically ill patient, the *cry behavior* cannot be assessed. After careful review of the current literature on pain assessment scales, the nurse educator and pharmacy manager decided to stop using the FLACC scale and implement the CPOT in the critical care units.

A total of thirteen out of a possible twenty-two nurses participated in a one-hour educational session and completed a pretest and posttest. All posttest questions improved in comparison to the pretest, except for Question two in which both the pretest and posttest 100% was scored. After attending the educational session, the posttest total scores increased by 50.8% compared with the pretest total scores. Each nurse who attended the educational session received a laminated and color version of the CPOT and the PowerPoint presentation. Laminated and color versions of the CPOT are available in each CVICU room for reference when assessing pain.

Prior to the educational session, most nurses were unable to answer the questions correctly on the incidence of pain in the ICU, the elements of the Southcoast Pain Management Policy, and utilization of the CPOT. In the pretest, both in Questions 1 and 4 only 8% answered those questions correctly. After the one-hour educational session 92% answered Question 1 correctly, identifying the incidence of pain the adult ICU population and 85% answered Question 4 correctly, determining the appropriate elements

in the Southcoast Pain Management Policy. In the pretest, in both Questions 9 and 10, 31% answered those questions accurately. In the posttest, after participating in the educational session, 92% answered Question 9 correctly by identifying the proper steps in performing the CPOT and 100% answered Question 10 correctly by determining when to perform the initial CPOT assessment. After attending the educational session, the majority of nurses (85-100%) were able to answer questions accurately in regard to the incidence of pain in the ICU, the content in the Southcoast Pain Policy, and use of the CPOT.

Limitations were present in this quality improvement program. Although support from management and the resource to reimburse staff for the education were available, it remained difficult to get staff to participate, with a final total of only 59% of nurses completing the program. The nurse educator and pharmacy manager made the decision to transition from the FLACC scale to the CPOT. Nursing was not included in this decision. If nurses participated in the decision-making process, participation in the education program may have been increased. Education sessions over a two-week period were available on eight different occasions before and after shift change, as well as some daytime sessions. Some staff didn't want to stay later after working and others did not want to come in on their day off. It was challenging to obtain coverage to get nurses to the classroom setting for individuals who were working on the day of the sessions. Additional support from leadership was needed for covering nurses' assignments to allow them to participate in the education. An email was sent out three weeks before the first education session notifying staff of the program and a sign-up sheet was posted on the unit at that time. The lack of additional advertising may have contributed to the low

participation rate. The timing of the project being in between Thanksgiving and Christmas may have made it difficult for staff to get to work on their day off. For future educational projects, additional advertising to staff from administration, support from leadership with coverage during work hours, and shared governance decision-making would be helpful.

Generally, the evidence-based quality improvement project was successful in increasing the awareness of the incidence of pain in the adult ICU population, the Society of Critical Care Recommendations on Pain Assessment, the Joint Commission Standards, the Southcoast Pain Management Policy, and the utilization of the CPOT in greater than half of the CVICU nurses at CMH. Future preparation should focus on ways to allow nurses to be able to participate in educational projects during work hours. A barrier to this program was the lack of participation from 41% of the nurses working in the CVICU. Providing nurses with opportunity to participate in the decision making that effect their practice may increase the interest of the nurses. Continuing education is important in maintaining a nurse's license. Obtaining continuing education credits for participation in educational programs may also assist in enhancing nurses' attendance. To assess the long-term success of the entire program, a post program evaluation is needed for future research.

Recommendations and Implications for Advanced Nursing Practice

The advanced practiced registered nurse (APRN) plays an important part in supporting the nursing staff in maintaining an evolving and relevant evidence-based practice. In this quality improvement project, the APRN student recognized that an evidence-based practice regarding pain appraisal had not been previously adopted in the critical care units at CMH and facilitated an education program to close this gap. By assisting in implementation of a new pain appraisal tool, not only was the APRN student able to promote evidence-based practice, but also provided the nurses with the knowledge to successfully utilize the CPOT. With this evidenced-based instrument and increased knowledge of pain assessment, improved compliance with pain appraisal will continue to improve in the CVICU and patients in the CVICU will experience better outcomes related to pain.

Healthcare is a rapidly changing environment as more evidence on illness and management is translated at the bedside. The APRN explores up-to-date and other scholarly publications to promote evidence-based practice and supports change in current practice when indicated. Through leadership and proficient clinical judgment, the APRN assists in advocating for safe practice and enhanced clinical outcomes. In the acute care setting, the APRN can partner with nursing staff to incorporate evidence-based practice, understand and adhere to hospital policies, and implement nurse-driven protocols. As a leader, the APRN can promote the implementation of evidence-based practice, policy change, and serve as a resource to the nursing staff in roles as a Clinical Nurse Specialist, Acute Care Nurse Practitioner (ACNP), and Certified Registered Nurse Anesthetist.

As an ACNP, the APRN orders pharmacologic and non-pharmacologic therapy based on the nurse's pain assessments. Parameters are placed by the APRN on when to

administer which pain medication based on a valid and reliable pain assessment. For patients who are unable to express pain, a reliable and valid pain assessment scale should be utilized to determine the presence of pain. Based on a pain assessment score, medications can then be administered, and patient responses measured within a consistent framework. It is important for the APRN to encourage nurses to use a reliable and valid pain appraisal tool to appropriately administer pain medications. The APRN can assist in educating staff on evidence-based practice such as appropriate pain assessment scales for the particular patient population and assist in successfully transitioning into practice.

In conclusion, the APRN in any environment can promote policy change and evidence-based practice. APRNs can use their advanced knowledge and leadership skills to identify opportunities for practice change, provide resources, and monitor progression to improve outcomes. The APRN can ensure that the staff has up-to-date education on pain assessment and appropriate management to improve patient outcomes. Future research is indicated to distinguish barriers on obtaining coverage for nurses to participate in continuing education during work hours.

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Appendix A

Approval Letter



August 27, 2017

Carla Salvadore BSN, CCRN
363 Highland Ave
Fall River, Massachusetts 02720

Re: Implementation of the Critical Care Pain Observational Tool

Dear Ms. Salvadore:

The Clinical Research Office of Southcoast Health received the request for the above referenced project that you would like to conduct within the Southcoast Health System. The Clinical Research Office (CTO) reviewed the information submitted with the Nursing Administration and has endorsed this clinical trial.

Southcoast does not have an internal IRB and therefore an external Central IRB listed on our Federal Wide Assurance (FWA) must be used. Southcoast Hospitals Group assurance number is FWA00009571.

You have chosen to use the Rhode Island College (RIC) Review Board as your governing IRB. Please submit a copy of this letter from the Southcoast Clinical Trials Office along with your study submission forms to RIC for their approval of the trial.

Rhode Island College Review Board
600 Mount Pleasant Ave.
Providence, RI. 02903

Please provide the Clinical Trials Office with a copy of the RIC approval/disapproval letter for the study when it is received. If you have any questions, please contact me at 508-973-7428 / isdaled@southcoast.org

Sincerely,

A handwritten signature in cursive script that reads 'debora Isdale'.

Debora G. Isdale
Clinical Research Program Director
Southcoast Health

CHARLTON MEMORIAL HOSPITAL
363 Highland Avenue, Fall River MA 02720
508-679-3131

ST. LUKE'S HOSPITAL
101 Page Street, New Bedford MA 02740
508-997-1515

TOBEY HOSPITAL
43 High Street, Wareham MA 02571
508-295-0880

Appendix B

Pretest

Unique number (4 digits) _____

Number of years as a registered nurse (please circle one)

0-5 years 6-10 years 10-20 years ≥ 21 years

Number of years as a critical care nurse (please circle one)

0-5 years 6-10 years 10-20 years ≥ 21 years

Female or male (please circle one)

Last time you received training on pain assessment (please circle one)

This year Last year Within 5 years ≥ 5 years

1. What percentage of ICU patients experience moderate to severe pain?
 - a. >25%
 - b. >50%
 - c. >75%
 - d. >100%

2. Which of the following is **not** recommended by the Society of Critical Care Medicine in regards to pain assessment?
 - a. Self-report is the preferred method of pain assessment.
 - b. For patients who cannot self-report pain a reliable and valid behavior pain scale should be used.
 - c. Vital signs are a single method for pain assessment.
 - d. Adult ICU patients should be routinely monitored for pain.

3. Which of the following is **not** a hospital requirement from the Joint Commission?
 - a. Hospitals treat pain with 30 minutes of knowledge of pain.
 - b. Hospitals use pain assessment methods that are consistent with the patient's age, state, and communication ability.
 - c. Hospitals reassess pain and treat pain based on reassessment findings
 - d. Hospitals provide appropriate pain assessment based on the patient's condition.

4. Which of the following is **not** part of the Southcoast Pain Management Policy?
 - a. In the event a patient is sleeping, documentation of "patient sleeping" and/or "resting comfortably" will serve as reassessment of pain.
 - b. Vital signs may be used as a cue to begin further assessment of pain.
 - c. Pain reassessment will be performed at a minimum of every 8 hours and within 60 minutes after administration of IV, SC, or IM pain medication or within 2 hours after administration of oral pain medication.
 - d. For patients who are unable to report pain a multifaceted approach will be used to assess and reassess pain.

Appendix B (continued)

5. What is the maximum score you can get performing the Critical Care Pain Observation Tool (CPOT)?
 - a. 4
 - b. 8
 - c. 10
 - d. 12

6. Which behaviors are examined when performing the CPOT?
 - a. Facial expression, upper limbs, and compliance with ventilator
 - b. Facial expression, restlessness, muscle tone, vocalization, and consolability
 - c. Facial expression, movement, emotion, verbal cues, and positioning/guarding
 - d. Facial expression, body movement, compliance with ventilator or vocalization, and muscle tension

7. When assessing a patient's facial expression of a tense face such as frowning or brow lowering, what score should you give this patient?
 - a. 0
 - b. 1
 - c. 2
 - d. 3

8. What CPOT score indicates that the patient is in pain?
 - a. ≥ 3
 - b. ≥ 4
 - c. ≥ 5
 - d. ≥ 6

9. Which is **not** a proper step in performing the CPOT?
 - a. The patient must be observed at rest for two minutes to obtain a baseline value of the CPOT.
 - b. The patient should be observed during nociceptive procedures known to be painful (ex. turning, wound care) to detect any changes in the patient's behaviors to pain.
 - c. The patient should be evaluated before and at the peak effect of an analgesic agent to assess whether the treatment was effective or not in relieve pain.
 - d. For the rating of the CPOT, the patient should be attributed the highest observed for each item during the observation period.

Appendix B (continued)

10. In the CVICU when should you perform an initial CPOT assessment?
 - a. Immediately when the patient arrives to the CVICU from the CVOR.
 - b. When the patient is no longer paralyzed determined by the patient breathing over the ventilator or after that patient has received the reversal agent.
 - c. After settling the patient into the CVICU for the CVOR.
 - d. Within one hour of the patient arriving to the CVICU from the CVOR.

Appendix C

Objectives for Educational Sessions

Increase knowledge of pain incidence in the adult ICU population.

Enhance knowledge of the Society of Critical Care Medicine's clinical practice guidelines for pain assessment in the critically ill adult.

Expand knowledge of the Joint Commission standards of pain assessment

Increase knowledge of Southcoast's pain management policy

Enhance knowledge of the Critical Care Pain Observation Tool

Appendix D

Outline of Educational Session

Introduction

Objectives

Pain Definition and Overview

The Society of Critical Care Medicine's Clinical Practice Guidelines for Pain Assessment
in the Critically Ill Adult

The Joint Commission Standards of Pain Assessment

Southcoast Pain Management Policy

Critical Care Pain Observation Tool (CPOT)

CPOT Demonstration Video

Clinical Implications

Case Study

Questions/Discussion

Appendix E

PowerPoint

Implementation of the Critical Care Pain Observation Tool

Carla Salvadore RN, BSN, CCRN
Rhode Island College Student

Objectives

- ❑ Describe pain incidence in the adult ICU patient population.
- ❑ Discuss the key recommendations from the Society of Critical Care Medicine's guidelines for pain assessment in the critically ill adult.
- ❑ Recognize the Joint Commission standards of pain assessment.
- ❑ Explain the Southcoast Health Group's acute pain management policy.
- ❑ Utilize the Critical Care Pain Observation Tool (CPOT) to assess and document acute pain in the ICU setting.

Pain Definition

- ❑ International Association for the Study of Pain (2012) defines pain as
 - ❑ "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage" (p. 209)
- ❑ Gold standard for pain assessment: self-report (challenge in the ICU environment)
- ❑ Inability to verbally communicate pain does not mean the individual is not having pain

International Association for the Study of Pain. (2012). IASP Taxonomy. Retrieved from [https://www.iasp-pain.org/Education/Content.aspx?ItemNumber=1122&PageID=146&Language=EN&Item=1122&ItemNumber=1122&ItemNumber=1122](https://www.iasp-pain.org/Education/Content.aspx?ItemNumber=1122&PageID=146&Language=EN&Item=1122&ItemNumber=1122&ItemNumber=1122&ItemNumber=1122)

Overview of Pain

- ❑ Greater than 50% of ICU patients experience moderate to severe pain
- ❑ Risk factors for pain in the ICU include primary disease processes, invasive procedures, prolonged immobility, tissue injury from trauma, burns, and surgery
- ❑ Poor acute pain control can lead to hyperglycemia, insulin resistance, increased infection risk, greater discomfort, decreased patient satisfaction, and chronic pain
- ❑ Pain sufficiently managed is associated with less analgesic administration, decreased ICU length of stay, and reduced mechanical ventilator duration
- ❑ Reliable and valid pain assessment is key for effective pain management

Reardon, D. P., Angier, K. E., & Szumita, P. M. (2015). Pathophysiology, assessment, and management of pain in critically ill adults. *American Journal of Health-System Pharmacy, 72*, 1531-1543. doi:10.21646/ajhp.140241

The Society of Critical Care Medicine

Clinical Practice Guidelines for Pain Assessment in the Critically Ill Adult

- ❑ Pain Assessment Recommendations and statements
 - ❑ In adult ICU patients procedural pain is common
 - ❑ Pain in the adult cardiac surgery population is typical and inadequately treated
 - ❑ After cardiac surgery women have more pain than men
 - ❑ Adult ICU patients are to be routinely monitored for pain
 - ❑ Self-report is the preferred method of pain assessment (0-10 numerical scale)
 - ❑ For patients who cannot self-report pain a reliable and valid behavioral pain scale should be used
 - ❑ **Critical Care Pain Observation Tool (CPOT)**
 - ❑ Vital signs should be used as a cue for further pain assessment

Bar, J., Frasse, G. L., Parillo, F., Wesley Fu, E., Delmas, C., Dasta, J. F., Zaccopio, R. (2013). Clinical practice guidelines for the management of pain, agitation, and delirium in adult patients in the intensive care unit. *Critical Care Medicine, 41*(10), 2088-2096. doi:10.1097/CCM.0b013e3182902000

Joint Commission Statement on Pain Management

- ❑ Foundational standards
 - ❑ Education on assessing and managing pain is provided by the hospital
 - ❑ Patients have the right to pain management
 - ❑ Pain is assessed and managed
- ❑ Hospital requirements
 - ❑ Hospitals provide appropriate pain assessment based on the patient's condition
 - ❑ Hospitals use pain assessment methods that are consistent with the patient's age, state, and communication ability
 - ❑ Hospitals reassess pain and treat pain based on reassessment findings
 - ❑ Hospitals treat pain or refer the patients for treatment (pharmacological and non-pharmacological)

The Joint Commission. (2016). Joint Commission Statement of Pain Management. Retrieved from <https://www.jointcommission.org/press-releases/2016/06/01/joint-commission-statement-on-pain-management/>

Appendix E (continued)

Southcoast Pain Management Policy

- ❑ Purpose: To provide a safe and standard method of managing and assessing pain for all patients, including acute and chronic pain.
- ❑ When possible pain assessment and reassessment should be completed using patient's self-report (0-10 score).
- ❑ For patients who are unable to report pain a multifaceted approach will be used to assess and reassess pain including the use of pain assessment tools.
- ❑ Pain reassessment will be performed at a minimum of every 8 hours and within 60 minutes after administration of IV, SC, or IM pain medication or within 2 hours after administration of oral pain medication.
- ❑ In the event a patient is sleeping, documentation of "patient sleeping" and/or "resting comfortably" will serve as reassessment of pain.

McCarthy, R. (2016). Pain management policy. Clinical Policy Manual, Southcoast Hospitals Group.

Critical Care Pain Observation Tool

- ❑ Dr. Celine Gellinas created the CPOT in 2006 to appraise pain in patients who are unable to verbalize the presence of pain
- ❑ First studied in the cardiac surgery population
- ❑ Reliable and valid in many studies
 - ❑ Nurses found this tool to be feasible and easy to implement into practice because it has clear directions and is easy to use
- ❑ Consists of four categories of pain assessment (0-8)
 - ❑ Facial expressions (0-2)
 - ❑ Body movement (0-2)
 - ❑ Compliance with ventilator OR vocalization (0-2)
 - ❑ Muscle tension (0-2)

Gellinas, C. (2010). Nurses' evaluations of the feasibility and the clinical utility of the critical care pain observation tool. *Pain Management Nursing*, 11(2), 115-125. doi:10.1016/j.pmn.2009.05.002

Critical Care Pain Observation Tool

Indicator	Score	Description
Facial expression		
Relaxed/neutral	0	No muscle tension observed
Tense	1	Presence of frowning, brow lowering, oral tightening, and/or other contraction or any other change not consistent with nursing (excluding procedure)
Grimacing	2	All previous facial movements plus tightly closed eye (one patient may have mouth open or may be biting the endotracheal tube)
Body movements		
Absence of movements or normal posture	0	Does not move at all (does not necessarily mean absence of pain or normal posture) or movements that are consistent with pain (e.g. rest or normal rest) or a purposeful protective reaction
Protective	1	Slow, cautious movements, touching or rubbing the pain site, shaking attention through movements
Restlessness	2	Pulling tube, attempting to sit up, moaning, thrashing, pulling at clothing, pulling at IV tubing, or pulling at end of bed
Compliance with the ventilator (intubated patients) or vocalization (nonintubated patients)		
Temporarily ventilator or mouthed	0	Alertness/activated, easy ventilation
Coughing but breathing	1	Coughing, alertness may be affected but vital spontaneously
Fighting ventilator	2	Apnea/straw, breathing ventilator, alertness frequently affected
Muscle tension		
Relaxed	0	No resistance to passive movements
Tense/rigid	1	Resistance to passive movements
Very tense or rigid	2	Strong resistance to passive movements, inability to palpate them

© Gellinas, C. with permission from Gellinas et al.

Critical Care Pain Observation Tool

Indicator	Score	Description
Facial expressions		
Relaxed/neutral	0	No muscle tension observed
Tense	1	Presence of frowning, brow lowering, oral tightening and/or other contraction or any other change (e.g. opening eyes, or tearing during nonpurposeful procedure)
Grimacing	2	All previous facial movements plus rigid eyelids (closed) or grimace (press teeth, mouth open or biting the endotracheal tube)

Critical Care Pain Observation Tool

Facial Expressions (0-2)

0 1 2

Critical Care Pain Observation Tool

Body movements		
Absence of movements or normal posture	0	Does not move at all (does not necessarily mean absence of pain or normal posture) or movements that are consistent with pain (e.g. rest or normal rest) or a purposeful protective reaction
Protective	1	Slow, cautious movements, touching or rubbing the pain site, shaking attention through movements
Restlessness/Agitation	2	Pulling tube, attempting to sit up, moaning, thrashing, pulling at clothing, pulling at IV tubing, or pulling at end of bed

Appendix E (continued)

Critical Care Pain Observation Tool			
Compliance with the ventilator (intubated patient)	Tolerating ventilation or extubation	0	Alertness not expected; easy extubation
	Coughing but tolerating	1	Coughing stimuli can be tolerated but may spontaneously occur
	Fighting ventilation	2	Airwaycues: blocking ventilation, alarms frequently activated
OR	Verbalization (extubated patient)		
	Talking at normal tone or so loud	0	Talking at normal tone or so loud
	Sighing, moaning	1	Sighing, moaning
	Crying out, sobbing	2	Crying out, sobbing

Critical Care Pain Observation Tool			
Muscle tension	Relaxed	0	No resistance to passive movements
Extension of upper limbs when patient is at rest or evaluation when patient is being traced	Tense, rigid	1	Resistance to passive movements
	Very tense or rigid	2	Strong resistance to passive movements or incapacity to complete them
Total score: ____/8			A score of ≥ 3 indicates the patient is experiencing pain

Critical Care Pain Observation Tool	
CPOT Directives of Use	
<ol style="list-style-type: none"> 1. The patient must be observed at rest for one minute to obtain a baseline value of the CPOT. 2. Then, the patient should be observed during nociceptive procedures known to be painful (e.g. turning, wound care) to detect any changes in the patient's behaviors to pain. 3. The patient should be evaluated before and at the peak effect of an analgesic agent to assess whether the treatment was effective or not in relieving pain. 4. For the rating of the CPOT, the patient should be attributed the highest score observed for each item during the observation period. 5. The patient should be attributed a score for each behavior included in the CPOT and muscle tension should be evaluated last, especially when the patient is at rest because the stimulation of touch alone (when performing passive flexion and extension of the arm) may lead to behavioral reactions. 	

CPOT Demonstration Video	
http://pointers.audiovideoweb.com/stcaxx/1183win10115/cpot2011-wmv.wmv?play.asx	
<small>Esimore, R. (Director). (2011). The critical care pain observation tool: how to use it in your ICU (Video). Retrieved from http://pointers.audiovideoweb.com/stcaxx/1183win10115/cpot2011-wmv.wmv?play.asx </small>	

Clinical Implications	
<ul style="list-style-type: none"> ■ All studies reviewed of validation and reliability of the CPOT excluded patients who received paralytics ■ When do I initiate the CPOT? <ul style="list-style-type: none"> ■ When the patient receives the reversal agent postoperatively OR when the patient begins to breathe over the ventilator ■ How do I document this? <ul style="list-style-type: none"> ■ When the patient comes out of the CVOR comment in the pain section "CPOT held patient still paralyzed" OR write a note describing omission of CPOT initially ■ How can I administer pain medications immediately postoperatively? <ul style="list-style-type: none"> ■ Assume pain present ■ Initiate CPOT as soon as patient is not paralyzed 	

Clinical Implications (cont.)	
<ul style="list-style-type: none"> ■ If the patient can report pain you defer to the 0-10 numeric scale, not the CPOT ■ The CPOT and verbal score are not interchangeable <ul style="list-style-type: none"> ■ A CPOT score of 5 is not the same as a numeric pain score of 5 ■ The CPOT does not assess the severity of pain it assesses the presence of pain ■ On CPOT reassessment a drop of 2 means good pain management ■ CPOT cannot be used on patients with brain injury or absent motor function (chronic paralysis or chemically induced) 	

Appendix E (continued)

Case Study

- J.B. is a 68 year old female who is POD 0 of a CABG x3. She is to remain intubated overnight and extubated at 6am. She came out of surgery at 1730. It is now 2000 and you go into assess your patient. She is breathing over the ventilator at this time. You plan to perform a CPOT to assess the patient for pain.
- What would you do first?

Case Study (cont.)

- The patient's face is "tense" and body movements are absent. When the patient coughs the ventilator alarms but then immediately stops. During passive range of motion the nurse feels some resistance. The ventilator alarm is intermittently going off with coughing.
- What is the patient's baseline CPOT score?

Case Study (cont.)

- The patient is observed during turning. The patient's face is grimacing during the turn. She is showing "protective movements" during turning. Tense resistance is felt. The ventilator alarms but resolves with no intervention.
- What is the patient's CPOT score?
- Is the patient experiencing pain according to the CPOT score?

Questions?

References

- Barr, J., Fraser, G. L., Puntillo, K., Wealey P.J., Elinas, C., Grasso, J. F., Scoppa, P. (2013). Clinical practice guidelines for the management of pain, agitation, and delirium in adult patients in the intensive care unit. *Critical Care Medicine*, 41, 263-306. doi:10.1097/CCM.0b013e3182763b72
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- The Joint Commission. (2016). *Joint commission Statement of Pain Management*. Retrieved from <https://www.jointcommission.org/joint-commission-statement-on-pain-management/>

Appendix F

Case Study

Scenario:

J.B. is a 68-year-old female who is POD 0 of a CABG x3. She is to remain intubated overnight and extubated at 6am. She came out of surgery at 1730. It is now 2000 and you go into assess your patient. She is breathing over the ventilator at this time. You plan to perform a CPOT to assess the patient for pain.

1. What would you do first?

Scenario:

The patient's face is "tense" and body movements are absent. When the patient coughs the ventilator alarms but then immediately stops. During passive range of motion the nurse feels some resistance. The ventilator alarm is intermittently going off with coughing.

2. What is the patient's baseline CPOT score?

Scenario:

The patient is observed during turning. The patient's face is grimacing during the turn. She is showing "protective movements" during turning. Tense resistance is felt. The ventilator alarms but resolves with no intervention.

3. What is the patient's CPOT score?
4. Is the patient experiencing pain according to the CPOT score?

Appendix G

Laminated and Color Version of the CPOT

The Critical-Care Pain Observation Tool (CPOT)
(Adapted from Gélinas et al., AJCC 2006; 15(4):420-427)

Indicator	Score	Description	
Facial expressions	Relaxed, neutral	0	No muscle tension observed
	Tense	1	Presence of frowning, brow lowering, orbit tightening and levator contraction or any other change (e.g. opening eyes or tearing during nociceptive procedures)
	Grimacing	2	All previous facial movements plus eyelid tightly closed (the patient may present with mouth open or biting the endotracheal tube)
Body movements	Absence of movements or normal position	0	Does not move at all (doesn't necessarily mean absence of pain) or normal position (movements not aimed toward the pain site or not made for the purpose of protection)
	Protection	1	Slow, cautious movements, touching or rubbing the pain site, seeking attention through movements
	Restlessness/Agitation	2	Pulling tube, attempting to sit up, moving limbs thrashing, not following commands, striking at staff, trying to climb out of bed
Compliance with the ventilator (intubated patients)	Tolerating ventilator or movement	0	Alarms not activated, easy ventilation
	Coughing but tolerating	1	Coughing, alarms may be activated but stop spontaneously
	Fighting ventilator	2	Asynchrony, blocking ventilation, alarms frequently activated
OR			
Vocalization (extubated patients)	Talking in normal tone or no sound	0	Talking in normal tone or no sound
	Sighing, moaning	1	Sighing, moaning
	Crying out, sobbing	2	Crying out, sobbing
Muscle tension Evaluation by passive flexion and extension of upper limbs when patient is at rest or evaluation when patient is being turned	Relaxed	0	No resistance to passive movements
	Tense, rigid	1	Resistance to passive movements
	Very tense or rigid	2	Strong resistance to passive movements or incapacity to complete them
TOTAL		___ / 8	

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For more information about the CPOT use, contact the author at celine.gelinas@mcgill.ca

*Note: when a patient's CPOT is > 3, the team will evaluate pain sources and modify/enhance pain management. CPOT sensitivity=86% and specificity=78% (Gélinas C. J Pain Symp Man 2009).

Appendix G (continued)

Brief description of each CPOT behavior:

Facial expression: The facial expression is one of the best behavioral indicators for pain assessment. A score of 0 is given when there is no muscle tension observable in the patient's face. A score of 1 consists of a tense face which is usually exhibited as frowning or brow lowering. A score of 2 refers to grimacing, which is a contraction of the full face including eyes tightly closed and contraction of the cheek muscles. On occasion, the patient may open his or her mouth, or if intubated, may bite the endotracheal tube. Any other change in facial expression should be described in the chart, and given a score of 1 if different from a relaxed (0) or grimacing (2) face.

Body movements: A score of 0 is given when a patient is not moving at all or remains in a normal position as per the nurse's clinical judgment. A score of 1 refers to protective movements, meaning that the patient performs slow and cautious movements, tries to reach or touch the pain site. A score of 2 is given when the patient is restless or agitated. In this case, the patient exhibits repetitive movements, tries to pull on tubes, tries to sit up in bed, or is not collaborative. Of note, body movements are the less specific behaviors in relation with pain, but are still important in the whole evaluation of the patient's pain.

Compliance with the ventilator: Compliance with the ventilator is used when the patient is mechanically ventilated. A score of 0 refers to easy ventilation. The patient is not coughing nor activating the alarms. A score of 1 means that the patient may be coughing or activating the alarms but this stops spontaneously without the nurse having to intervene. A score of 2 is given when the patient is fighting the ventilator. In this case, the patient may be coughing and activating the alarms, and an asynchrony may be observed. The nurse has to intervene by talking to the patient for reassurance or by administering medication to calm the patient down. It is important that the nurse auscultates the patient to check for the position of the endotracheal tube and the presence of secretions as these factors may influence this item without being indicative of pain.

Vocalization: Vocalization is used in non-intubated patients able to vocalize. A score of 0 refers to the absence of sound or to the patient talking in a normal tone. A score of 1 is given when the patient is sighing or moaning, and a score of 2 when the patient is crying out (Aie! Ouch!) or sobbing.

Muscle tension: Muscle tension is also a very good indicator of pain, and is considered the second best one in the CPOT. When the patient is at rest, it is evaluated by performing a passive flexion and extension of the patient's arm. During turning, the nurse can easily feel the patient's resistance when she is participating in the procedure. A score of 0 is given when no resistance is felt during the passive movements or the turning procedure. A score of 1 refers to resistance during movements or turning. In other words, the patient is tense or rigid. A score of 2 consists of strong resistance. In such cases, the nurse may be unable to complete passive movements or the patient will resist against the movement during turning. The patient may also clench his/her fists.

Appendix H

Posttest

Unique number (4 digits) _____

1. What percentage of ICU patients experience moderate to severe pain?
 - a. >25%
 - b. >50%
 - c. >75%
 - d. >100%

2. Which of the following is **not** recommended by the Society of Critical Care Medicine in regards to pain assessment?
 - a. Self-report is the preferred method of pain assessment.
 - b. For patients who cannot self-report pain a reliable and valid behavior pain scale should be used.
 - c. Vital signs are a single method for pain assessment.
 - d. Adult ICU patients should be routinely monitored for pain.

3. Which of the following is **not** a hospital requirement from the Joint Commission?
 - a. Hospitals treat pain with 30 minutes of knowledge of pain.
 - b. Hospitals use pain assessment methods that are consistent with the patient's age, state, and communication ability.
 - c. Hospitals reassess pain and treat pain based on reassessment findings
 - d. Hospitals provide appropriate pain assessment based on the patient's condition.

4. Which of the following is **not** part of the Southcoast Pain Management Policy?
 - a. In the event a patient is sleeping, documentation of "patient sleeping" and/or "resting comfortably" will serve as reassessment of pain.
 - b. Vital signs may be used as a cue to begin further assessment of pain.
 - c. Pain reassessment will be performed at a minimum of every 8 hours and within 60 minutes after administration of IV, SC, or IM pain medication or within 2 hours after administration of oral pain medication.
 - d. For patients who are unable to report pain a multifaceted approach will be used to assess and reassess pain.

5. What is the maximum score you can get performing the Critical Care Pain Observation Tool (CPOT)?
 - a. 4
 - b. 8
 - c. 10
 - d. 12

Appendix H (continued)

6. Which behaviors are examined when performing the CPOT?
 - a. Facial expression, upper limbs, and compliance with ventilator
 - b. Facial expression, restlessness, muscle tone, vocalization, and consolability
 - c. Facial expression, movement, emotion, verbal cues, and positioning/guarding
 - d. Facial expression, body movement, compliance with ventilator or vocalization, and muscle tension
7. When assessing a patient's facial expression of a tense face such as frowning or brow lowering, what score should you give this patient?
 - a. 0
 - b. 1
 - c. 2
 - d. 3
8. What CPOT score indicates that the patient is in pain?
 - a. ≥ 3
 - b. ≥ 4
 - c. ≥ 5
 - d. ≥ 6
9. Which is **not** a proper step in performing the CPOT?
 - a. The patient must be observed at rest for two minutes to obtain a baseline value of the CPOT.
 - b. The patient should be observed during nociceptive procedures known to be painful (ex. turning, wound care) to detect any changes in the patient's behaviors to pain.
 - c. The patient should be evaluated before and at the peak effect of an analgesic agent to assess whether the treatment was effective or not in relieve pain.
 - d. For the rating of the CPOT, the patient should be attributed the highest observed for each item during the observation period.
10. In the CVICU when should you perform an initial CPOT assessment?
 - a. Immediately when the patient arrives to the CVICU from the CVOR.
 - b. When the patient is no longer paralyzed determined by the patient breathing over the ventilator or after that patient has received the reversal agent.
 - c. After settling the patient into the CVICU for the CVOR.
 - d. Within one hour of the patient arriving to the CVICU from the CVOR.

Appendix I

Informational Email

Hello CVICU Nurses,

The critical care units at Charlton Memorial Hospital are transitioning from the FLACC behavior pain scale to the Critical Care Pain Observation Tool (CPOT). As a Nurse Practitioner Student at Rhode Island College I am assisting in the implementation process for this quality improvement project. A 1-hour educational session will be provided on the CPOT. There will be a sign-up sheet located on the unit's education board of the 8 different classroom times available. Please sign up for one of them. This process will begin December 1st and continue to December 18th.

Please feel free to contact me with any questions or concerns.

Sincerely,

Carla Salvadore, BSN, RN

RIC Student