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SPECIAL FEATURE

Assessment of Pain in Non-vocal or Unresponsive ICU Patients

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Dr. Chlan reports that she receives grant/research support from Hospira.

Pain — defined as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage"[1] is a common symptom experienced by critically ill patients. Pain arises from many sources for intensive care unit (ICU) patients — from treatments or procedures, such as endotracheal tube suctioning or chest tube insertion, to incisional pain from surgical wounds. Patients with pre-existing chronic conditions, such as back pain or rheumatoid arthritis, can have their pain exacerbated by bed rest or from inadvertent suspension of home medication therapy. While self reporting using a valid and reliable pain assessment instrument is the most accurate method to assess pain, this is not always possible with ICU patients, particularly those patients who are unresponsive or non-vocal due to intubation and mechanical ventilation.

ICU clinicians may assume that because patients are non-vocal or are unresponsive, they do not experience pain. However, this is an erroneous assumption. Of the millions of patients admitted to the ICU each year, approximately 71% recall experiencing pain during their stay.[2] Thus, regular pain assessment and appropriate intervention strategies are needed to effectively manage pain for all ICU patients, regardless of whether they are vocal and alert. However, pain assessment in non-vocal patients presents an immense challenge for ICU clinicians, which is further compounded in those patients who are unresponsive due to their current medical condition. Appropriate assessment and management of pain among ICU patients is of utmost importance to promote positive outcomes for these patients.

This special feature will review the most commonly

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used instruments for pain assessment with non-vocal or unresponsive ICU patients, and will provide recommendations for assessment. The reader is advised to consult the recently published *Clinical Practice Guidelines for the Management of Pain, Agitation, and Delirium in Adult Patients in the Intensive Care Unit* (ICU-PAD) for suggestions on specific medications for the treatment of pain, as well as the appropriate implementation of non-pharmacological interventions to promote effective pain management for all ICU patients.[3]

BRIEF REVIEW OF RELIABILITY AND VALIDITY OF INSTRUMENTS

A brief review of reliability and validity concepts is warranted to guide the clinician in the selection of a psychometrically sound pain measurement instrument. Any instrument needs to be reliable and valid to effectively manage symptoms such as pain. Generally speaking, reliability is the degree of consistency and repeatability of the scores on an instrument.[4] Validity refers to the ability of an instrument to measure exactly what it is supposed to measure and nothing else.[4] For example with any pain assessment instrument, a valid instrument would measure pain and only pain, not any other symptoms such as anxiety or depression. While there are many different types of reliability and validity, an in-depth discussion of this topic is beyond the scope of this article.

BEHAVIORAL PAIN ASSESSMENT INSTRUMENTS

To determine the presence of pain accurately in non-vocal or unresponsive critically ill patients, a number of instruments that measure pain-related behaviors can be used in practice. The clinician is advised to keep in mind that the most frequently used pain assessment instruments for non-vocal patients only indicate the presence of pain, not the intensity or severity of pain. At the present time, there are no instruments that specifically measure the intensity and severity of pain in non-vocal or unresponsive critically ill patients.

There are a number of instruments that can be used to measure pain in critically ill adults. These instruments include the Pain Assessment and Intervention Notation Algorithm, the Nonverbal Pain Assessment Tool, the Adult Nonverbal Pain Scale, the Behavioral Pain Scale (BPS), and the Critical-Care Pain Observation Tool (CPOT). Another population for which pain assessment is a challenge is in persons with dementia. Two instruments that are frequently used for pain assessment with this population are the Checklist of Nonverbal Pain Indicators and the Pain Assessment in Advanced Dementia. Neither of these instruments has been tested extensively or validated in the ICU setting, and they should not be used for pain assessment in the critically ill. This article will focus on two instruments — BPS and CPOT — that are used most frequently and have good reported reliability and validity (psychometric properties) across a number of studies.

THE BEHAVIORAL PAIN SCALE

The BPS consists of three items identifying unique behaviors in patients undergoing noxious stimuli. Each of the three pain-related behaviors has corresponding descriptors that are scored from 1 to 4, depending on the description judged by the clinician to be present that coincides with each pain-related behavior. A total score on the BPS ranges from 3 (no pain) to 12 (most pain).[5] The individual items on the BPS describe pain-related behaviors associated with facial expression (relaxed = 1, to grimacing = 4), upper limb movements (no movements = 1, to permanently retracted = 4), and compliance with mechanical ventilation (tolerating movement = 1, to unable to control ventilation = 4). Although the BPS yields a "score," any individual score does not correspond with pain intensity, only the presence of behaviors associated with painful or noxious stimuli. In fact, a BPS score of 3 does not necessarily indicate a patient does not have pain; the score reflects an absence of the defined pain-related behaviors corresponding to each item. This is a major limitation of the BPS.

THE CRITICAL-CARE PAIN OBSERVATION TOOL

The CPOT contains four domains and is scored on each domain as 0, 1, or 2 depending on the judgment of the clinician.[7] The four domains of pain-related behaviors include: facial expression (relaxed/neutral observed = 0, to grimacing = 2), body movements (no movement = 0, to restlessness = 2), muscle tension (relaxed = 0, to very tense/rigid = 2), compliance with ventilator (tolerating ventilator = 0, to fighting the ventilator = 2), or vocalization. The vocalization domain for non-intubated patients is scored from talking in normal voice (0) to crying out, sobbing (2). The CPOT can be used in both intubated and non-intubated ICU patients with the addition of the vocalization domain.

The CPOT was developed and tested extensively by nurse-researcher Dr. Celine Gélinas. Interestingly, Dr. Gélinas has conducted studies with nurses themselves evaluating the feasibility of using the CPOT in ICU nursing practice. The findings from this research demonstrate that the ICU nurses appraise the CPOT as clear and simple to use, find it helpful in their practice, and would recommend its use routinely.[7] Further, a replication study of the reliability and validity of the CPOT has been reported by Keane,[8] who found the instrument to be psychometrically sound for pain assessment in the ICU clinical setting. The CPOT is widely used in the United States and Canada. It is available in English and French, and work is underway to translate it into Finnish, Portuguese, Italian, and Swedish.[7]

PAIN ASSESSMENT TIPS AND RECOMMENDATIONS

To reiterate, it is vitally important that ICU clinicians *not* assume that patients who are unresponsive or non-vocal are not experiencing pain. Many ICU patients recall distressing pain after their ICU stays.[2] To manage pain effectively among ICU patients, consistent and systematic assessment of pain presence is needed, using reliable and valid instruments. Any pain assessment instrument needs to be non-burdensome for alert, interactive patients. Further, pain assessment instruments should be easy to use for ICU clinicians, particularly for the ICU nursing staff who have the primary responsibility for pain management. If any instrument is not routinely used to assess pain presence or is not consistently and correctly used in practice to assess pain, infective symptom management will arise that can lead to less than ideal patient outcomes and experiences.

For many years, ICU clinicians used elevations in vital signs, particularly increases in heart rate and blood pressure, as indicators of pain. Research over the past several years has documented that vital signs are extremely inaccurate indicators of pain and should not be used in isolation to guide pain assessment and intervention.[9] Vital signs may be used as a trigger to conduct a pain assessment with a reliable and valid instrument such as the CPOT.

The ICU-PAD clinical practice guidelines[3] highlight the importance of pain as the first symptom that requires regular assessment and reassessment to guide appropriate pharmacological and non-pharmacological treatments to manage pain among ICU patients. The guidelines suggest clinicians employ either the BPS or the CPOT for pain assessment.[3] Since the publication of the ICU-PAD guidelines, additional research has been published to further guide the clinician in selection of the best pain assessment instruments for non-vocal or unresponsive ICU patients. The current best available evidence recommends the CPOT over the BPS.[9] The CPOT has been tested in both verbal and non-verbal ICU patients, which may make the CPOT much more applicable to ICU clinical practice settings.[9] Further, the CPOT has superior reliability and validity, and is thus recommended over the BPS for pain assessment in critically ill patients.[9]

SUMMARY

While pain remains a significant symptom requiring appropriate assessment and management for all ICU patients, non-vocal and unresponsive patients present a unique challenge for ICU clinicians. Self-report should be attempted in any alert patient regardless of whether the patient is receiving mechanical ventilatory support. A set of simple questions can elicit pain presence and intensity. Simply ask the patient, "Are you having pain?" (yes/no). Then ask a patient to rate on a scale of zero (no pain) to 10 (worst pain ever) to get an idea of intensity. If able, have any alert patient point to where the pain is located. Patients can and will engage in symptom assessment if given the opportunity to participate. For those patients who are not alert or are unresponsive, the CPOT is recommended for assessment of pain presence.

A limitation of any of the commonly used behavioral pain scales with ICU patients is that none of the scales truly quantify or describe pain. Alert, verbal patients will frequently use words such as "stabbing" or "burning" when describing their pain. Further, none of the behavioral pain scales used in the ICU do not take into consideration any chronic pain conditions patients may have while receiving care in the critical care setting. However, behavioral pain scales can reliably assess for the presence of pain and should be consistently used to guide pain management in non-vocal or unresponsive ICU patients. ■

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ABSTRACT & COMMENTARY

The Choosing Wisely® Top 5 List in Critical Care Medicine

By Eric C. Walter, MD, MSc

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Dr. Walter reports no financial relationships relevant to this field of study.

SYNOPSIS: The Choosing Wisely Campaign was introduced in 2011 by the American Board of Internal Medicine to identify practices and procedures physicians and patients should question. The critical care top 5 list was developed through a collaborative effort of several critical care societies.

SOURCE: Halpern SD, et al. An official American Thoracic Society/American Association of Critical-Care Nurses/American College of Chest Physicians/Society of Critical Care Medicine policy statement: The Choosing Wisely top 5 list in critical care medicine. *Am J Respir Crit Care Med* 2014;190:818-826.

The Choosing Wisely Campaign began in 2011 in an effort to identify five specialty specific tests and/or interventions that should be avoided, as they are costly and provide minimal benefit to patients. To date, more than 50 specialties have developed their own "Top 5" lists. In 2012, a collaborative task force with members from the American Association of Critical-Care Nurses, the American College of Chest Physicians, the American Thoracic Society, and the Society of Critical Care Medicine convened to develop the critical care top 5 list. The article by Halpern and colleagues describes the nearly year-long process that went into developing the list and presents the final list with rationale and explanation for each item.

The task force's first job was to identify criteria to evaluate proposed items. This allowed for transparency and consistency. The chosen criteria included: 1) strength of evidence, 2) prevalence, 3) aggregate cost, 4) relevance to critical care, and 5) innovation. Using these criteria as guidelines, each author then individually proposed topics to be considered for the top 5. Initially, 58 unique items were proposed by the authors. An iterative process was then carried out to narrow the list down to the final 5:

1. Do not order tests at regular intervals (i.e., daily) but rather in response to clinical questions.
2. Do not transfuse red blood cells (RBC) in hemodynamically stable, nonbleeding ICU patients with a hemoglobin concentration greater than 7 mg/dL.
3. Do not use parenteral nutrition in adequately nourished critically ill patients within the first 7 days of an ICU stay.
4. Do not deeply sedate mechanically ventilated patients without a specific indication and without daily attempts to lighten sedation.
5. Do not continue life support for patients at high risk for death or severely impaired functional recovery without offering patients and their families the alternative of care focused entirely on comfort.

Rationales are provided for each recommendation and include unnecessary expenses, lack of benefit, or potential harm to the patient or family. Often, evidence-based medicine was used to support individual recommendations.

■ COMMENTARY

In this article, Halpern and colleagues present the critical care top 5. They also describe the process through which the list was created and provide a succinct explanation and rationale for each recommendation. All of this helps to add credibility to the list.

Critical care accounts for approximately 3-4% of all health care costs ($100 billion per year). The Choosing Wisely campaign was born out of the philosophy that physicians have a responsibility to practice cost-effective care. As described in the article, the 2002 Physician Charter for Medical Professionalism states that "physicians are required to provide health care that is based on the wise and cost-effective management of limited clinical resources."[1] This requirement was championed by medical ethicist Howard Brody, who recommended each specialty identify a "top 5" list of tests or interventions that are commonly used but do not provide meaningful benefit to patients,[2] which became the Choosing Wisely campaign.

Many will argue that the critical care task force got it wrong. They should have considered antibiotic stewardship, CT scanning, futile care, etc. The fact that there are many tests and interventions that could have been considered should not minimize the value of the final list. To the contrary, it should open all of our eyes to our professional requirement to consider the cost and value for all of our many daily decisions in the ICU. For too long, patients have requested health care and physicians have practiced health care as if resources were not limited. This cannot continue. For all the downsides and red tape associated with payers, whether they be insurance companies or the government, at a minimum they act as a needed brake on an, at times, runaway system. If, as physicians, we do not want this pressure placed upon us then we need to "seize the moral high ground," as Dr. Brody wrote,[2] and take it upon ourselves to practice in a cost-effective manner. ■

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ABSTRACT & COMMENTARY

Can the Physical Layout of an ICU Influence Delirium Rates?

By Linda L. Chlan, PhD, RN, FAAN

SYNOPSIS: Intensive care units that contain multiple beds in one area may increase patient risk for the development of delirium.

SOURCE: Caruso P, et al. ICU architectural design affects the delirium prevalence: A comparison between single-bed and multibed rooms. *Crit Care Med* 2014;42:2204-2210.

Delirium, or acute brain dysfunction, is a syndrome that affects many patients in the intensive care unit (ICU). A number of modifiable and non-modifiable risk factors contribute to the development of delirium, such as illness severity, receipt of benzodiazepine medications, and metabolic alterations. Likewise, clinicians can implement a number of evidence-based interventions that to reduce the incidence of delirium, such as reducing sedation medications and early mobility programs. One area that has not received much attention from researchers is the consideration of the physical design and layout of the ICU itself. The study by Caruso and colleagues was intended to begin to address this knowledge gap.

This retrospective study was conducted in two ICUs contained in a 290-bed Brazilian oncological teaching hospital. The investigators posited that environmental risk factors, specifically the physical architecture of the ICU, can influence the development of delirium. The investigators hypothesized that those patients admitted to multibed ICU areas would have a higher prevalence of delirium due to sleep disruption and exposure to more intense noise, stress, poor lighting control, lack of privacy, and exposure to unknown sounds, conversations, and movements. The multibed

ICUs consisted of 23 beds in two areas. The single-bed ICU had eight beds. A total of 1253 patients admitted to the ICUs from February to November 2011 over the age of 18 years were included in this study. Unit routines included assessing level of consciousness four times daily with either the Richmond Agitation Scale or Glasgow Coma Scale, and delirium assessments twice daily with the Confusion Assessment Method-ICU. A number of demographic and clinical variables were abstracted from the electronic medical record. Main outcomes of interest were delirium prevalence, coma/delirium-free days, the first day in delirium, and the specific subtype of delirium.

There was no difference among patients on clinical characteristics such as mechanical ventilation, ICU-acquired infections, use of renal replacement therapy, ICU length of stay, or mortality. Overall, 13% of the patients developed delirium. Those patients admitted to single-bed ICU rooms had a 6.8% delirium rate, whereas the rate of delirium in the multibed ICUs was 15.5%, which was statistically significant. Significant risk factors found to contribute to delirium were admission to a multibed ICU, older age, ICU-acquired infection, and higher illness severity. There was no difference in coma/delirium-free days, first day in delirium, or delirium sub-type among patients who developed delirium in either the multibed ICUs or patients in the single-bed ICU.

■ COMMENTARY

The study findings reported by Caruso and colleagues highlight an important area for further consideration when investigating factors that might reduce the occurrence of delirium, namely the physical layout of the ICU environment. The ICU clinician should keep in mind, however, that there are many interrelated factors that contribute to and increase the risk for the development of delirium. These factors, among others, include receipt of certain sedative medications, sleep disruption, exposure to more intense noise, stress, poor lighting control, lack of privacy, and exposure to unknown sounds such as conversations. None of these contributing factors were measured or considered in the analysis in this study by Caruso et al.

The overall rate for the development of delirium was low (13%). This rate is significantly lower than those rates reported in other studies, with upwards of 60-80% of patients experiencing delirium during their ICU stay. Regardless of the lower delirium rate reported in the Caruso et al study, enhancing the environment for all ICU patients by reducing noise and intense overhead lighting while promoting exposure to natural light and more "normal" sleep-wake cycles is warranted.

The application and generalizability of the study findings to ICUs in the United States are not known. Further, ICUs that have undergone remodeling or reconfiguring of existing spaces to provide for single-bed rooms and exposure to natural light may promote a more therapeutic milieu for patients. Also, most ICUs in the United States now have private patient rooms. However, as in other studies that examined delirium development risk factors, the study reviewed here also identified older age, infections, and higher illness severity as significant risk factors for the development of delirium among ICU patients. ICU clinicians need to redouble their efforts to reduce risk for the development of delirium when patients fall into these high-risk categories. Enhancing the immediate environment may be one easily implemented area to meet this care need. ■

ABSTRACT & COMMENTARY

Do Arterial Catheters Improve Patient Care in the ICU?

By David J. Pierson, MD, Editor

SYNOPSIS: This large propensity-matched cohort analysis of critically ill, mechanically ventilated patients in 139 U.S. ICUs found no evidence that the use of arterial catheters improved patient outcomes.

SOURCE: Gershengorn HB, et al. Association between arterial catheter use and hospital mortality in intensive care units. *JAMA Intern Med* 2014 Sep 8. [Epub ahead of print].

Gershengorn and colleagues used prospectively collected data from the Project IMPACT database (a nationwide, voluntary, proprietary database for assessing performance of U.S. ICUs with respect to patient outcomes and numerous other variables) to examine the question of whether

the use of arterial catheters (ACs) in critically ill, mechanically ventilated patients was associated with improved survival or other documentable benefits. The data used were gathered from 2001 through 2008 in 139 ICUs in 119 hospitals, and included 60,975 adult patients. The investigators used propensity score matching of patients with and without ACs in an attempt to eliminate differences other than the use of the catheters.

A propensity score is a measure reflecting the propensity of a patient, based on other characteristics, to receive a particular intervention, in this case placement of an AC. Propensity matching is a technique used with a retrospective patient cohort to match individuals who received the intervention (an AC) with those who did not but had the same propensity to do so, creating a case-control study. With hospital mortality as the main outcome variable, the authors examined the overall cohort of mechanically ventilated patients by four alternative methods of comparison, and also investigated nine secondary cohorts in the same ICUs to assess the generalizability of the findings.

Propensity score matching yielded 13,603 pairs of patients who did and did not receive an AC. The patients were critically ill, with 63.5% mechanically ventilated on ICU admission and 44.5% requiring vasopressors. Hospital mortality in both groups was approximately 36%. Among the patients, 73% of the patients had central venous catheters and 5% had pulmonary artery catheters (PACs). By multiple statistical techniques, there was no association between AC use and hospital mortality in the overall cohort (odds ratio for not having an AC, 0.98; 95% CI 0.93-1.03). In eight of the nine secondary cohorts, there was no association between AC use and hospital mortality by propensity-matched analysis; in the secondary cohort of patients requiring vasopressors, the odds of death were increased in patients who received an AC (OR, 1.08; 95% CI, 1.02-1.14; $P = 0.008$). From this retrospective study, the authors concluded that ACs do not improve the ability to care for critically ill ICU patients and could cause harm. They call for prospective studies to validate the associations found and assess causation.

■ COMMENTARY

This study is reminiscent of the landmark study by Connors et al 20 years ago[1] that first documented the lack of outcome benefit from the use of PACs in critically ill patients. As Gershengorn and colleagues note, the Connors study — an association study like this one that could not establish causality — ushered in a series of randomized controlled trials that ultimately confirmed the findings that PACs do not, in and of themselves, improve patients' likelihood of survival from critical illness. The magnitude of practice change resulting from those trials is illustrated by the finding that only one patient in 20 in the present study got a PAC; 20 years ago, most if not all of them would probably have had a PAC in addition to an AC.

If the Gershengorn study is followed by prospective trials of the outcome benefits from ACs (a substantial "if," given the current funding environment and the more modest commercial implications of ACs as compared to PACs), and if they confirm the present findings, it may be that ACs will be as uncommon in our ICUs as PACs a couple of decades from now. ■

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CME OBJECTIVES

Upon completion of this educational activity, participants should be able to:

- identify the particular clinical, legal, or scientific issues related to critical care;
- describe how those issues affect physicians, nurses, health care workers, hospitals, or the health care industry; and
- cite solutions to the problems associated with those issues.

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CME QUESTIONS

1. Which of the following statements correctly identifies a reliable method for pain assessment in a non-vocal ICU patient?

a. Elevations in heart rate indicate the presence of pain.

b. Elevations in blood pressure indicate the presence of pain.

c. Observing a facial grimace while turning a patient.

d. Both A and B.

e. None of the above.

2. Which of the following is included in the Critical Care Choosing Wisely Top 5 list?

a. Do not order tests at regular intervals (i.e., daily) but rather in response to clinical questions.

b. Do not transfuse red blood cells (RBC) in hemodynamically stable, nonbleeding ICU patients with a hemoglobin concentration greater than 7 mg/dL.

c. Do not use parenteral nutrition in adequately nourished critically ill patients within the first 7 days of an ICU stay.

d. Do not continue life support for patients at high risk for death or severely impaired functional recovery without offering patients and their families the alternative of care focused entirely on comfort.

e. All of the above

3. Which of the following statements is true concerning the physical layout of intensive care units and the development of delirium?

a. There is no influence of the ICU environment on delirium.

b. Younger, adult trauma patients are more susceptible to the development of delirium because of more equipment in the room.

c. Patients in single-bed ICUs may experience less delirium than those patients in multiple bed ICUs.

d. The strongest contributor to the development of delirium is having a roommate in the ICU.

e. None of the above

4. In the study of hospital mortality in critically ill patients, who did and did not receive an arterial catheter?

a. Mortality was significantly lower in patients who received arterial catheters.

b. Mortality was significantly lower only in patients who required vasopressors.

c. Mortality was the same in all patient groups examined.

d. Mortality was significantly higher in the secondary cohort of patients requiring vasopressors.

e. Mortality was significantly higher in all groups that received arterial catheters.

[IN FUTURE ISSUES]

Should Long-acting Broncodialators Be Used in Acute Exacerbations of COPD?