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Pain Assessment in Non-Communicative Adult Palliative Care Patients

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Synopsis

Palliative care patients who have pain are often unable to self-report their pain placing them at increased risk for under-recognized and under-treated pain. Use of appropriate pain assessment tools significantly enhances the likelihood of effective pain management and improved pain-related outcomes. This paper reviews selected tools and provides palliative care clinicians with a practical approach to selecting a pain assessment tool for non-communicative adult patients.

Keywords

pain assessment; non-communicative or nonverbal patients; palliative care

INTRODUCTION

The International Association for the Study of Pain's(IASP) definition of pain, "An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage"[1] is widely accepted but does not capture the complex multiplicity of physical, psychological, and spiritual dimensions encompassed in the experience of pain. Thus, pain is one of the most challenging clinical phenomena encountered by clinicians.

While pain prevalence estimates vary by population and setting, it is not uncommon for 46-80% of individuals with chronic or terminal illnesses in hospital and hospice environments to have significant pain that causes both physical and psychological distress,

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interferes with activities of daily living, predisposes to development of adverse sequelae, impairs quality of life, and ultimately delays healing and recovery[2,3]. Prevalence estimates in palliative care populations that are not at the end of life are hard to find, and may be even higher than the figures above. Palliative care patients who have pain at any point during their disease trajectory are often unable to self-report the presence, location, severity, or impact of their pain. They are considered at higher risk for under-recognized and under-treated pain, unnecessary suffering, or over-treated pain[4,5]. Recent evidence suggests that while nurses have beliefs about pain assessment and management in non-communicative patients that reflect the American Society for Pain Management Nursing's prevailing clinical practice recommendations[4], their knowledge and reported practices are not always commensurate with these recommendations[6]. The goal of palliative care in any clinical setting is to improve quality of life for patients who are facing life-threatening illness or injury by relieving pain, other symptoms, and psychosocial suffering, even when death is not the anticipated outcome. While effective pain management is an important goal for all palliative care patients, it is especially important in non-communicative patients[5].

Pain management has been identified as a critical aspect of care by the Centers for Medicare and Medicaid Services[7]. From an ethical perspective, healthcare providers universally agree that all individuals have a right to the assessment and management of pain, a view also espoused by the Joint Commission[8]. Multiple position papers, clinical practice guidelines, and educational initiatives address pain management as a means to improve patient and family outcomes[2,4,5,9,10].

Pain has long been considered an integrated "*mind-body*" experience in which the *mind* encompasses perception and interpretation of pain including affective, cognitive, and other responses, and the *body* encompasses pain pathways, central processing, and other phenomena that lead to perception and response. It is impossible to separate mind and body when considering the pain experience, hence the importance of self-report. Yet in non-communicative individuals, the mind-body experience cannot be articulated through self-report. The IASP states, "The inability to communicate verbally does not negate the possibility that an individual is experiencing pain and is in need of appropriate pain-relieving treatment"[1], thus clinicians need effective pain assessment approaches for this population.

The mind-body experience of pain can be conceptualized as having *multiple dimensions* (Table 1), each of which contributes to the overall experience of pain and has a role in pain assessment and management in all populations[11]. In those who cannot communicate, however, the *physiologic and behavioral dimensions* of pain are the most relevant, serving as a foundation for tools that use observable behaviors (e.g., facial grimacing or restlessness) to assess pain, sometimes supplemented by physiologic indicators such as vital signs which are used as cues for more in-depth assessment. Identifying the most appropriate behavioral based pain assessment tools for use in non-communicative patients in any palliative care setting significantly enhances the likelihood of effective pain management and improved pain-related outcomes[5]. To date, few publications focus on development and use of pain behavioral based assessment tools in palliative care, other than in the end of life setting[4].

The *overall purpose* of this paper is to provide palliative care clinicians with a useful approach to selecting and implementing a pain assessment tool for non-communicative adult palliative care patients without dementia in various settings. Because pain assessment in individuals with a diagnosis of dementia is complex and challenging, it is beyond the scope of this review so readers are referred to several comprehensive, evidence-based resources that focus exclusively on assessment of pain in the dementia patient[4,12,13]. The *specific objectives* of this paper are to: 1) describe the psychometric and clinical properties of selected pain assessment tools for non-communicative adult palliative care patients without dementia; 2) discuss key factors in selecting pain assessment tools for this population; and 3) present case studies from selected clinical palliative care settings to illustrate pain assessment in non-communicative patients.

REVIEW OF SELECTED PAIN ASSESSMENT TOOLS

Pain assessment tools developed for use in various non-communicative adult populations without dementia were selected for discussion if they met the following criteria: 1) published in English between 2000 and the present; 2) tested initially and/or subsequently in sample sizes with adequate justification for analyses; 3) demonstrated evidence of reliability and validity, with or without some evidence of clinical usefulness; and 4) tested in at least one clinical setting in which palliative care is delivered even if not acknowledged as such by the authors. Articles that described use of tools translated into non-English languages were excluded based on relevancy for North American readers, but English versions tested in other countries were included because there is no compelling evidence that patients' behavioral or physiologic responses to pain would be different. An iterative search of the PubMed and CINAHL databases yielded seven tools that met these criteria, reviewed below in alphabetical order. Articles detailing each tool's development and articles comparing it with other tools were analyzed on a number of parameters with the aid of methodologic and clinical utility resources and selected published systematic reviews[14-18]. Additional articles were included only if they provided other relevant insights. Table 2 presents specific details on each tool's population/setting, psychometric research, and comments. Table 3 presents information about clinical use of the tools, including administration time, training, clinical utility, scoring interpretation, and comments.

Behavioral Pain Scale (BPS)

The Behavioral Pain Scale (BPS) was developed by Payen and colleagues[19] to assess pain in critically ill sedated and mechanical ventilated patients in a trauma and post-operative care unit. The BPS consists of *three items* using the following scoring system: 1) *Facial Expressions* (1=relaxed, 2= grimacing, 3=lowering eyebrow, and 4=closing eyelid); 2) *Movements of Upper Limbs* (1=no movement, 2=partially bent, 3=fully bent with flexion of finger, and 4=permanently retracted); and 3) *Compliance with Mechanical Ventilation* (1=tolerating movement, 2=coughing but tolerating ventilation for most of the time, 3=fighting ventilator, and 4=unable to control ventilation). The summed total score is unconventional since it ranges from 3-12. Subsequent research in other critically ill populations supported the validity, reliability, and usefulness of the BPS in assessing pain in critically ill, sedated, and primarily ventilated patients who could not self-report[20-22]. In

addition, Ahlers et al.[23] examined the BPS in both conscious sedated patients and deeply sedated patients, demonstrating reliability and validity and suggesting that the BPS might serve as a "bridge" between an observational behavioral scale and a self-report pain assessment tool when patients have varying abilities to communicate pain. Recent comparisons of the BPS with other pain assessment tools in mostly non-communicative intensive care unit patients generally found it valid, reliable, acceptable, and useful[14,18,24]. The BPS is supported by a large body of research and has been recommended for use in critical care settings for "monitoring pain in medical, postoperative, or trauma (except for brain injury) adult ICU patients who are unable to self-report and in whom motor function is intact and behaviors are observable"[25]. It has also been paired with a pain protocol to improve pain outcomes[26,27]. The BPS was later revised to facilitate assessment of pain in non-intubated patients with delirium (BPS-NI), by replacing the *Compliance with Mechanical Ventilation* item with *Vocalization* (1=no pain vocalization, 2=moaning not frequent and not prolonged, 3=moaning frequent or prolonged, 4=howling or verbal complaint), although psychometric testing included patients without delirium and demonstrated preliminary evidence of reliability and validity[28]. A second study used both the BPS and the BPS-NI, treating them as one scale in the analysis[27]. However, there is no information about interpreting similarities or differences in scores between the BPS and BPS-NI. Neither of the BPS versions appears to have been tested in general palliative care patients with a variety of medical conditions, nor in intermediate care or non-critical care clinical settings, even though even some patients, including the mechanically ventilated, are transferred to home or inpatient hospice units directly from a critical care unit. Both versions require additional exploration for use in non-intensive care palliative settings.

Checklist of Non-verbal Pain Indicators (CNPI)

The Checklist of Non-verbal Pain Indicators (CNPI) was modified from the University of Alabama Pain Behavior Scale as a measure of observable pain behaviors in patients >65 years who had had surgery for a hip fracture and displayed varying levels of cognitive impairment from delirium or dementing illness[29]. The CNPI is a list of six pain-related behaviors (verbal vocalizations, nonverbal vocalizations, grimacing, bracing, rubbing, and restlessness) that are scored as present (1) or absent (0), both at rest and during movement (e.g., transfer from bed to chair). Scores are summed for each condition (rest and movement) for a score ranging from 0-6, and then summed for a total score ranging from 0-12. Since the frequency of behaviors at rest was low, reliability and validity for the CNPI were reported only with movement. Comprehensive psychometric data were provided in a subsequent article[30], showing that the CNPI had beginning evidence of reliability and validity and suggesting that it needed additional testing. For the cognitively impaired group, the CNPI was significantly correlated with the verbal descriptor scale at rest, so the developer suggested that the movement scale is more relevant[31]. Inter-rater reliability has only been reported for the tool as a whole. Interestingly, the cognitively impaired subjects displayed more non-verbal pain indicators than the non-impaired subjects with movement. Since patients who can self-report pain demonstrate behaviors with movement at a less frequent rate, they may blunt pain behaviors with movement. Most tools, including the CNPI, have been tested using an acute pain paradigm, thus their ability to determine underlying pain (e.g., post-operative or persistent pain) is unknown. Some patients may need to be moved or

subjected to pain-inducting procedures in order from them to be scored on the CNPI or other behavioral tools. The CNPI has not been tested in intubated, sedated patients in the ICU, and its vocalization items may not be applicable in this population, thus restricting its use in the ICU setting where there are numerous palliative care/end of life patients. While there is little published evidence of additional psychometric evaluation of the CNPI, subsequent work conducted predominantly in nursing homes has catapulted the CNPI to some prominence as a tool for adults with dementia who are capable of varying levels of self-report[32]. However, the need for further psychometric and clinical evaluation has been highlighted in a study comparing the CNPI with the PAIN-AD[33], including the general palliative care population. The CNPI has been incorporated into electronic medical record systems and used with palliative care patients in an acute care hospital[34] and a hospice setting[35], suggesting that clinicians find it useful in these environments.

Critical Care Pain Observation Tool (CPOT)

The Critical Care Pain Observation Tool (CPOT) was originally developed in French for assessing pain in hospitalized critically ill ventilated patients. It consisted of four behavioral categories – 1) *Facial Expression*, 2) *Body Movements*, 3) *Muscle Tension*, and 4) *Compliance with Mechanical Ventilators* (for ventilated patients) or *Vocalization* (for extubated patients), each of which is scored on a 0 to 2 scale of various verbal descriptors, with a possible total score ranging from 0 to 8[36]. The effect of the two different items (mechanical ventilation compliance and vocalization) has not been explored. A follow-up study[37] evaluated the English version of the CPOT in conscious (with varying levels of ability to self-report) and unconscious critically ill ventilated patients, focusing on reliability and validity and also examining physiologic indicators thought to be associated with pain (mean arterial pressure, heart rate, respiratory rate, and transcutaneous oxygen saturation). Results demonstrated that the CPOT was reliable and valid and that physiologic indicators were not correlated with self-report of pain, leading to a suggestion that they be used as a cue to perform a behavioral pain assessment. This suggestion was subsequently echoed by Chen and Chen[38] when trying to validate physiologic indicators (vital signs) for pain assessment and is consistent with the American Society for Pain Management Nursing Practice Guidelines[2]. Sensitivity and specificity of the CPOT has been assessed in the English[37] and French[39] versions, with varying results, potentially attributable to differences in language or populations, but additional testing is needed. A large proportion of nurses who used the CPOT reported that the instructions were clear and that they found it simple to use, easy to understand, and helpful for their practice[40]. Use of the CPOT has had positive effects on nurses' pain assessment and documentation, and may affect treatment processes, mechanical ventilation time and ICU length of stay[41], but its effects on patients' pain outcomes remain to be evaluated. The CPOT's reliability and validity have been confirmed in several small studies conducted by other investigators[42,43], although one[42] noted lower inter-rater reliability than initial studies and suggested the use of standardized instructions and training. Others have extended the use of the CPOT to neurological intensive care unit patients who had brain surgery[44] and critically ill patients with delirium[45], but unfortunately both French and English versions were used and treated as one in the analysis. Specific details about the translation have not been provided. As neurosurgical and delirium populations are frequently encountered in critical care and palliative care patient

populations, these studies should be replicated removing the confounder of language. Numerous investigators have conducted studies comparing the CPOT to other behavioral pain assessment tools in intensive care units of various types[18,27,46-48]. In most studies, the CPOT performed as well or better than other tools although it did not perform well in the burn population which could self-report[49]. It is noteworthy that none of the initial or subsequent CPOT psychometric studies used samples that were exclusively non-verbal, and furthermore, frequently used the traditional gold standard comparison with self-report measures when assessing concurrent validity. Since non-communicative patients may show more pain behaviors than those who are communicative, the effects of these methodologic differences are unknown[30,50]. The CPOT has the largest body of research supporting its development and similar to the BPS, has been recommended for use in adult critical care settings in post-operative, medical or trauma (except for brain injury) patients who cannot self-report but who have intact motor function and observable behaviors[25]. Its versatility as a pain assessment tool across palliative care settings and patients has not yet been examined.

Face, Legs, Activity, Cry, and Consolability (FLACC) Pain Tool

The Faces, Legs, Activity, Cry, Consolability (FLACC) pain tool originated in the pediatric population as a simple measure of pain severity[51]. The FLACC scores each of five behaviors (*Face, Legs, Activity, Cry, Consolability*) on a scale from 0=representing normal or no findings to 2=representing frequent and intense behaviors for an overall score of 0-10[52]. Although the FLACC was developed and tested in children, a paucity of evidence exists for its use in adults. Voepel-Lewis and colleagues[53] conducted a subsequent study in a small sample of critically ill adults (n=29) and children (n=8) who could not self-report. Using the CNPI (for adults) or the Comfort Scale (for children) as the gold standard, they found acceptable and significant correlations with the FLACC. However, no gold standard has been identified for observational pain scales, the CNPI does not have robust evidence for reliability and validity, and the Comfort scale assesses sedation and pain as a combined construct. Inter-rater reliability was reported separately for both the adult and pediatric population and the FLACC showed higher levels of agreement for each of the items and the overall tool compared to the pediatric population. Factor analysis and discriminant validity were reported for the combined adult and pediatric population, making it impossible to discern how the FLACC performed in the adult population. Based on the combined sample data, the authors suggested that the FLACC might be useful across populations and settings. Two studies, one comparing the FLACC to the CPOT and Nonverbal Pain Scale (see below)[54], and the other comparing the FLACC to the CPOT[46] inexplicably omitted data on the FLACC and focused almost exclusively on the CPOT, thus adding little to knowledge about the FLACC. Although Buttes et al.[46] noted that the two study data collectors thought the CPOT was more appropriate for adults than the FLACC, they did not present an explanation to support this statement. With minimal empirical data on the reliability, validity, and clinical utility of the FLACC pain tool in adult populations, particularly those in palliative care, it is unclear whether the FLACC is suitable for assessing pain in palliative care adults across settings and further study is warranted.

Multidimensional Observational Pain Assessment Tool (MOPAT)

The Multidimensional Observational Pain Assessment Tool (MOPAT) was adapted from the PACU (Post-Anesthesia Care Unit) Behavioral Pain Rating Scale[55]. The MOPAT was modified to serve as a measure of two dimensions of pain (Behavioral and Physiologic) that could be used in non-communicative individuals across palliative care settings. In the original formulation, the developers included a third dimension, Sensory, focusing on the temporal pattern of pain[56]. The Behavioral Dimension is comprised of four behaviors scored on a scale of 0 (no behavior displayed) to 3 (most severe behavior): 1) *Restlessness*, 2) *Tense muscles*, 3) *Frowning/grimacing*, and 4) *Patient Sounds*, which are summed for a Behavioral Dimension score ranging from 0-12. The MOPAT uses a substitution formula in patients who cannot make any sounds. The Physiologic Dimension is comprised of four physiologic indicators: 1) *Blood Pressure*, 2) *Heart Rate*, 3) *Respirations*, and 4) *Diaphoresis*, each scored dichotomously, with 0 indicating normal or no change from the patient's baseline, and 1 indicating abnormal or a change from baseline, summed for a Physiologic Dimension score ranging from 0-4. These two dimension scores are then summed for a total MOPAT score ranging from 0-16. The Sensory Dimension is designed to assess pattern of pain by using Behavioral and Physiologic ratings over time, in conjunction with knowledge of pain etiology, to choose among three groups of adjectives adapted from the McGill Pain Questionnaire Long Form (brief/momentary/transient; rhythmic/periodic/intermittent; continuous/steady/constant). Several small-scale developmental studies that were conducted in inpatient hospice settings demonstrated initial evidence of reliability, validity, and clinical utility of the Behavioral and Physiologic dimensions, but little use of the Sensory dimension[56]. These results led to full-scale psychometric evaluation of a revised MOPAT consisting of Behavioral and Physiologic dimensions in both the acute care hospital and inpatient hospice settings. In the latter setting, the Blood Pressure item was eliminated from the Physiologic Scale because blood pressure monitoring causes pain and is generally not done in hospice settings. This altered format changed the score on the Physiologic Dimension to a range of 0-3 and the MOPAT Total Score to a range of 0-15[57]. All patients in the study were completely non-communicative, but the different versions of the tool were appropriately tested separately. The acute care hospital sample was primarily from critical care units although some patients were on regular inpatient units. Data from both settings yielded evidence of reliability, validity, and clinical utility when the MOPAT was used cross-sectionally (before/after a pain intervention) and longitudinally in the acute care hospital[58,59], and longitudinally in the inpatient hospice setting[57,60]. Based on the findings, the Physiologic Dimension has undergone some changes. The diaphoresis item has been dropped from the hospice version and is no longer scored in the acute care setting (personal communication, McGuire, 4/28/16). Further exploratory work on this dimension in the acute care setting is underway[61]. The MOPAT has been incorporated into several electronic health record systems and is currently used as the standard of care pain assessment tool for non-communicative palliative care patients in a hospice and an acute care hospital[57,60,62]. Because the MOPAT was not tested in patients with dementia, it is not recommended for use in that group. Ongoing research is examining the helpfulness of the MOPAT in reducing pain and improving pharmacologic management as part of a comprehensive algorithm/order set for palliative care patients in the acute care setting.

Nociceptive Coma Scale

The Nociceptive Coma Scale (NCS) was initially developed in Belgium as a means to assess "nociception" (used as a proxy for pain) in patients who were in a vegetative state (VS) or minimally conscious state (MCS) and unable to self-report their pain[63]. The NCS includes four items: 1) *Motor Response*, 2) *Verbal Response*, 3) *Visual Response*, and 4) *Facial Expression*, each scored from 0-3, with 0 representing none and 3 representing what appear to be increased response levels, for example, "localization to noxious stimulation" for *Motor Response*, or "fixation" for *Visual Response.* The NCS is a new albeit behaviorally-based approach to pain assessment in a specific medical situation (i.e., coma) that is arguably somewhat different from the typical non-communicative population. Initial testing compared the NCS to several well-known behavioral pain assessment tools (e.g., CNPI, FLACC, PAIN-AD), demonstrating validity, reliability, and sensitivity. Scores were higher in patients in a MCS, suggesting the tool's adaptability for assessing nociception in disorders of consciousness. Although the authors used an experimental pain model, they recommended the tool for following patients' behaviors and monitoring treatments to avoid over- or under-treatment. Subsequent research using an experimental pain model demonstrated test-retest reliability[64] and more fully assessed the sensitivity of the NCS by comparing behavioral changes in response to noxious or non-noxious stimulation[65]. Observing that the *Verbal Response* item was not sensitive and when eliminated, almost doubled the sensitivity of the NCS to different levels of consciousness, the investigators created the NCS-R (revised), which omitted the *Verbal Response* item. While acknowledging the lack of psychometric data for the NCS-R, the authors nonetheless concluded (based on the initial validation work) that the NCS-R was valid and sensitive in patients with disorders of consciousness. Another outcome of this study was the identification of a potential cut-off value of 4 for MCS and 3 for VS patients that distinguished noxious from non-noxious stimulation. In more recent research that induced experimental pain, Chatelle and colleagues (66) used positron emission tomography to demonstrate a significant positive correlation between NCS-R scores and glucose metabolism in the anterior cingulate cortex, which is involved in pain processing.[66] used positron emission tomography to demonstrate a significant positive correlation between NCS-R scores and glucose metabolism in the anterior cingulate cortex, which is involved in pain processing. They concluded that NCS-R total scores are related to cortical processing and are therefore an appropriate mechanism for assessing, monitoring, and treating "possible" pain in patients with disorders of consciousness. It is unknown if there would be differences in psychometric findings for clinical pain. One subsequent clinical study demonstrated a significant decrease in NCS-R scores after analgesic administration and suggested further exploration of using 4 as a NCS-R cut-off value to determine analgesic treatment[67]. This intriguing tool has potential for use in comatose palliative care patients across settings, but clearly needs additional research on psychometric properties and clinical utility using clinical populations before any conclusions can be drawn.

Non-Verbal Pain Scale

The Nonverbal Pain Scale (NVPS) was initially developed to assess pain in adult patients on a burn trauma unit[68]. It was "…patterned after the FLACC, but modified to reflect assessment components more appropriate to an adult population."[68, p.262]. Specifically, the

NVPS eliminated the *Legs, Cry,* and *Consolability* components of the FLACC, retained and revised the *Face* and *Activity* components, and added three items identified in previous research as being related to pain or its control: 1) *Guarding*, 2) *Physiologic 1 (vital signs)*, and 3) *Physiologic II* (skin, pupils, perspiration, flushing, diaphoresis, pallor). The Physiologic I component included specific numeric values for vital signs (e.g., heart rate of more than 20 or 25 beats per minute during the previous 4 hours) that were considered evidence of pain, although the rationale was not elucidated[68]. The FLACC's three point scoring system (0-2 range for each component) was retained for the NVPS. The scores for each of the five NVPS components are summed for a total score of 0-10. The study compared the NVPS to the FLACC in wholly non-communicative burn, abdominal surgery, and trauma patients who might potentially have pain. The study provided evidence of discriminant validity for the NVPS, and provided some evidence of the FLACC's limitations for use in adults related to the *Cry* and *Consolability* items. The authors observed that the *Physiologic I* indicator significantly influenced the total score whereas the *Physiologic II* indicator was only moderately correlated, perhaps because its components were somewhat subjective (e.g., dilated pupils). Although the authors suggested the tool was reliable, no results were provided. Clinical utility was also not formally assessed in the study. Topolovec-Vranik and colleagues[69] examined clinical usefulness of the original NVPS by exploring patient satisfaction and documentation of pain assessment and management in a trauma/neurosurgery intensive care unit pre-, during, and post-implementation of the NVPS. While patient satisfaction was not significantly different in the pre and post implementation groups, patient reports of worst pain significantly decreased after implementation, and there was a clinically significant trend in decrease in severe pain and time to receive pain medications. The authors noted that these findings could be related to differences in characteristics of the two groups. Staff nurses found the NVPS easy to use, were more confident in assessing pain in non-verbal sedated patients, were satisfied with the training they received, and were more satisfied in the approach to managing patients' pain. Nurses' documentation of pain assessment increased significantly in non-communicative patients; however, no differences in treatment were noted. Although this study was intended to explore what happened when the NPVS was initiated, the direct impact on patient outcomes was difficult to ascertain. Comparisons of the NPVS to the CPOT revealed poorer interrater reliability in a burn population that included patients who could self-report[49]. The NPVS underwent a revision early in its development, as evidenced in a short publication in which Wegman[70] provided a visual depiction of the NVPS and noted the transformation of the poorly performing *Physiologic II* to an item called *Respiratory.* Kabes and colleagues[71] conducted a comparison study of the NVPS and the NVPS-R (Revised) in adult ICU patients who were unable to verbalize pain, mechanically ventilated, and sedated. Their results demonstrated that the NVPS-R was reliable, valid, and in general performed better because of the *Respiratory* item. Subsequent studies have compared the psychometric properties of the NVPS-R to various forms of the CPOT and the BPS in several populations. In general, the NVPS-R did not perform as well as the other tools or sometimes did not meet acceptable levels[27,48,72], demonstrating that the NVPS-R may need additional work. There is little evidence that the NPVS or the NPVS-R has been used in palliative care populations or settings, and there are ongoing concerns about reliability, validity, and clinical utility. More

work is warranted to distinguish between the two versions, and to clarify their psychometric properties, appropriate use, and impact on clinical outcomes.

KEY FACTORS IN SELECTING PAIN ASSESSMENT TOOLS

Consistent use of a reliable, valid, and clinically useful pain assessment allows for identification of pain, evaluation of treatments, and communication among health care providers and families. It is a first step toward improving outcomes and begins with the selection of an appropriate tool.

Selection of a pain assessment tool for use in a specific setting and population is an important undertaking because a good fit between the tool and the setting is critical for uptake and improvement in pain-related outcomes. The numerous factors that should be considered in this decision process in any setting[4,13,73] are shown in **Box 1**, with a few factors discussed in more detail because they are especially germane to successful implementation of any pain assessment tool.

When selecting a tool, review articles such as this one may help to narrow the field. When reviewing a tool, it is important to understand that published reliability and validity data are generated from a specific version of a pain assessment tool (Table 2). If a tool is changed, then the psychometric parameters need to be reassessed. Without reliability and validity data from a population and setting similar to the user's, it is unknown if the tool is assessing pain as intended or whether different raters obtain the same response. These issues can cause measurement error and affect the pain ratings in unknown ways.

Although there is no consensus on the components of clinical utility, it is also an important parameter to consider. Clinical utility refers to the usefulness, advantages, and disadvantages of a new technique, technology, or intervention and typically includes such dimensions as appropriateness, accessibility, practicality, feasibility, and acceptability[17]. Similar to reliability and validity, clinical utility findings are specific to the version of the tool that was tested (Table 3). A tool that is valid and reliable but has not been examined for clinical utility may not perform as desired, nor be attractive to clinicians.

Of particular relevance in the selection of a tool is a review of not only of the original articles, but of comparison studies since they may offer useful information on how tools performed in a specific setting when compared to one another[27,73]. In addition, if clinicians are looking for a tool that can be used across several clinical settings, for example, in an acute care setting followed by inpatient rehabilitation or hospice, they need to determine in what settings a tool was used and how it performed. If a tool looks promising but has not been evaluated in that setting, clinicians may want to consider a quality improvement project or a research study to examine its clinical utility in their own setting.

When implementing a new pain assessment tool, it is important to ensure that adequate training and resources are available and to carefully plan a process that includes staff and gets them motivated[71]. Helpful strategies for this process include engaging appropriate committees, enlisting unit-based nurse champions, developing streamlined educational programs that are incorporated into institutional training systems, and mandating the training

with clear deadlines for completion[62]. For behavioral based tools, demonstration, practice sessions and an assessment of competency are imperative upon initiation, when training new staff, and as intermittent refreshers to ensure appropriate and consistent use over time by numerous professional caregivers. Bedside tools such as posters, pocket cards, and tip sheets reinforce training and facilitate implementation[62,69]. Periodic retraining may be needed for nurses who use the tool infrequently.

Incorporating the tool into the institution's documentation system (e.g., electronic health record), and monitoring use and outcomes via a quality improvement process or research study is essential for successful implementation of the tool[34,62]. Because clinical implementation involves the use of a tool in real patients, it is important to establish specific targets and methods to achieve them. Tracking nurses' use and documentation of the tool via audits and providing data-based feedback at the unit and user level are some ways to assess uptake and adherence[6,34,35,41,62,69].

Finally, determining nurses' perceptions of benefits and potential effects on their practice patterns, as well as enlisting their feedback, facilitates nurses' involvement in the practice change, an important change strategy, and also helps to identify problematic areas so that timely corrections can be initiated[62]. Measuring relevant outcomes such as frequency of assessment may be more helpful than trying to gauge increases or decreases in administration of pain medications[41]. It is also important to link assessment results with pain management interventions through development of algorithms that incorporate the pain assessment tool and specify scores or cut-points that trigger pain interventions[26,74] and to consider outcomes such as patient or family caregiver satisfaction[26,69].

CASE STUDIES

Three case studies are presented to illustrate the variety of non-communicative palliative care patients and settings for whom pain assessment is needed. Details of each case's medical condition, pain situation, pain assessment, treatment, and reassessment are described. The description concludes with a brief take-home message that emphasizes key points related to proper assessment and management of pain in each case. The descriptions are deliberately generic with respect to the pain assessment tools used, thus readers are encouraged to select and use a pain assessment tool of their choice when reading through the cases. This exercise may be helpful in exploring the potential use of one of the pain assessment tools described in this paper or in confirming one that is already used in the reader's setting (Boxes 2-4).

CONCLUSIONS

Use of a valid, reliable, and clinically useful behavioral based pain assessment tool for adult non-communicative palliative care patients is only one aspect of pain assessment, and should be combined with a comprehensive pain assessment[4]. However, there are limitations to the use of behavioral based tools that need to be considered. Patients who can provide some level of self-report may display fewer behaviors, raising questions about appropriateness of behavioral based tools for this group. In some patients, a physical exam may need to be

coupled with a pain assessment too, for example, in patients with visceral pain, in order to obtain useful data. In other patients, it may be difficult to distinguish pain from anxiety, so again, using other techniques and information about the patient may be helpful.

There are many patient groups for whom there are no good tools, for example, patients receiving paralytic agents or who are paralyzed, those with chronic/persistent pain, or those with traumatic brain injury or other neurological impairments. Most tools have not been tested in patients who go in and out of non-communicative states, and thus have variable abilities to self-report. When physiologic variables are included in a tool, users need to be aware of previous research suggesting that they are questionable[54]. Many of the tools tested in intubated critically ill patients have not been tested in non-intubated patients[27]. In addition, some conditions may mute behavioral responses, for example, anesthesia[42], and sedatives and other medications[40].

Few behavioral tools can determine level of pain (mild, moderate, severe) as they have not been tested for this function. When using any of these tools, it is important to be able to score the patient on all the tool's items[4]. Some patients may need to be moved or experience a painful procedure in order to mount a response that can be scored with a behavioral tool[34]. Tools with lower reliability and validity may not be as sensitive when patients are at rest[72]. Moreover, not all studies report data on reliability and validity scores at rest and movement, and sometimes scores at rest are lower. Once a tool is complete, it is important to realize that the score cannot be interpreted in the same way as self-report scores, which generally use a continuous scale[72]. Finally, researchers do not always report which version of a tool they are testing, requiring the clinician to try and make this determination.

While this review has provided helpful information about behavioral based pain assessment tools in adult palliative care non-communicative patients, it has also revealed numerous areas for further work. Studies are needed on how pain assessment tools can be used for treatment decision-making, and what scores may actually indicate pain versus other phenomena. More research is needed in a variety of patient populations and settings. The effects of small but significant differences in psychometric properties of tools are unknown, as is how these might affect patient outcomes[27]. When a patient's credibility in self-reporting is unclear, it may be helpful to add a behavioral based tool, however, there is little research in this area so the implications for practice are unknown. Even with these limitations, the tools reviewed herein do offer potential ways to assess pain in the vulnerable population of adult non-communicative palliative care patients, enabling nurses in various settings to make headway in improving reducing pain and improving quality of life.

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Key Points

1) Pain assessment of non-communicative patients for presence or severity of pain with a reliable and valid tool can provide consistency over time, enhance communication among health care personnel, and enable revision of the pain management plan as needed.

2) Vital signs may or may not provide a cue that pain is present and/or has been relieved.

3) Pre-emptive pain assessment using a valid tool and intervention for pain-producing procedures improves pain management and patient comfort.

4) Some pain assessment tools are effective for assessing both pharmacologic and non-pharmacologic interventions.

5) Incorporation of pain assessment tools into the electronic health record standardizes pain assessment and enables timely interventions and reassessment.

BOX 1

Factors to consider when selecting a pain assessment tool for non-communicative patients

Factor to consider	Why is it important?
Validity	A tool must be *valid* to measure what it is supposed to measure, be well-founded, and correspond accurately to the real world
Reliability	A tool must be *reliable* to produce similar results under consistent conditions, or consistent measures of a particular element over a period of time and between different participants
Clinical utility	The tool needs to be user friendly, acceptable to users, and helpful in managing pain
Patients and settings	Using a tool in a patient population and setting for which it is intended will enhance appropriate use and produce more valid and reliable assessment data
Compatibility with, and relevance for, current clinical practice	If a tool is incompatible with practice patterns or preferences, or is viewed as not relevant, it will not be used
Stakeholders and gate keepers	Individuals who are key to the adoption of a new pain assessment tool must be supportive so that they can facilitate rather than discourage use of the tool
Facilitators and barriers	Identification of these factors will enable development of a realistic implementation plan; examples include nurses' beliefs and attitudes, interest in adopting new innovations, commitment to evidence-based practice, etc.
Education and training	Resources for education and training for adoption of a new tool must be available; compatibility with existing in-service educational systems is essential
Documentation system (e.g., electronic health record)	Incorporation into the setting's documentation system is absolutely essential to ensure consistent use

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BOX 2

Case 1: Neuro-Intensive Care Unit and Transfer to Intermediate Care

Part 1: Admission to the Neuro-Intensive Care Unit

Medical Condition

Mr. X was hit by a car while jogging and experienced a traumatic injury for which he had a right above-the-knee amputation. He is intubated and non-communicative when he arrives on the unit. Mr. X has a Richmond Agitation Scale Score (RASS) of −3 (movement or eye opening to voice but no eye contact) and a Glasgow Coma Scale (GCS) score of 3T (Eye opening to pain=2, Verbal response intubated=T; Best motor response non/untestable=1).

Current Pain Situation

Nursing staff has been routinely administering prn analgesia prior to turning him since during earlier turning episodes Mr. X was constantly frowning and very tense.

Pain Assessment

The nurse assesses pain using an appropriate reliable and valid tool which indicates the presence of pain.

Vital signs

Blood Pressure (BP) 155/87, Heart Rate (HR) 115, Respiratory Rate (RR) 20, and presence of diaphoresis.

Pain Intervention

The nurse administers oxycodone via the nasogastric (NG) tube.

Pain Reassessment

The nurse returns to assess pain and turn the patient in 60 minutes, the approximate time of peak effect for liquid oxycodone administered via NG tube. The pain score indicates that no pain is present.

Vital signs

BP 104/84, HR 94, RR 16 and no diaphoresis.

Take-Home Message

Pain assessment of non-communicative patients for the presence or severity of pain with a reliable and valid tool can provide consistency over time. Vital signs may provide a cue that pain is present and/or has been relieved.

Part 2: Transfer to the Neuro Intermediate Care/Step-down Unit

Medical Condition

Mr. X has been diagnosed with traumatic brain injury. He is extubated but non-communicative when transferred. He now has an infection of the amputation incision. His RASS is +2 agitation (frequent non-purposeful movement) and his GCS is 8 (Eye

opening score 4-spontaneous, Verbal response score 1-not testable, and Best motor response score 3-flexes).

Current Pain Situation

In performing the first dressing change, the nurse notes that Mr. X is restless and groaning, so she surmises that he may have procedural pain and stops.

Pain Assessment

The nurse assesses him for pain in preparation for administering pain medication. The pain score indicates the presence of pain.

Vital signs

BP 149/70, HR 100, RR 20, and no diaphoresis.

Pain Intervention

The nurse administers intravenous (IV) hydromorphone before continuing with the dressing change.

Pain Reassessment

The nurse returns to reassess pain in 30 minutes, the approximate time of peak effect for IV hydromorphone. Reassessment with the pain tool indicates that no pain is present when the patient is at rest, so the nurse completes the dressing change and modifies the pain management plan to include medication prior to dressing changes.

Vital signs

BP 123/69, HR 69, RR 11, and no diaphoresis.

Take Home Message

Pain assessment and reassessment using the same reliable and valid pain assessment tool across clinical settings can help enhance communication among different health care personnel and enable revision of the pain management plan as needed.

BOX 3

Case 2: Medical Intensive Care Unit and Transfer to Inpatient Hospice

Part 1: Medical Intensive Care Unit

Medical Condition

Mrs. Y has been hospitalized for a month with ARDS, COPD, and history of rheumatoid arthritis, has a tracheostomy tube, and is on the ventilator. Weaning off the ventilator has been unsuccessful. She continues to deteriorate and has developed acute kidney failure requiring dialysis. A family meeting is held and the patient's advance directive (AD) was reviewed in relation to her current status. The AD and Medical Orders for Life Sustaining Treatment state that the patient wanted a trial on the ventilator support and dialysis, but would not want to be sustained by these treatments indefinitely.

Current Pain Situation

The nursing staff has routinely been administering analgesics prior to suctioning because Mrs. Y was exhibiting restlessness and body arching when suctioned. The nurse plans to medicate the patient for anticipated procedural pain prior to suctioning.

Pain Assessment

The nurse assesses Mrs. Y with a reliable and valid pain tool before administering pain medication, observing mild restlessness and frowning.

Vital signs

BP 130/66, HR 104, RR 12, no diaphoresis.

Pain Intervention

Based on the patient's previous response to suctioning and consultation with the respiratory therapist, the nurse administers IV hydromorphone to prepare for suctioning.

Reassessment

The nurse returns in 30 minutes, which is the approximate time of peak effect for IV hydromorphone. Assessment with the pain tool demonstrates that no pain is present, and the respiratory therapist suctions the patient. Directly after the suctioning, the nurse reassesses the patient and observes no signs of pain.

Vital signs

BP 120/70, HR 100, RR 11, no diaphoresis.

Take Home Message

Pre-emptive pain assessment and intervention for procedures that are known to cause pain improves pain management and patient comfort.

Part 2: Transfer to Inpatient Hospice

Medical Condition

Mrs. Y has been hospitalized for five weeks. Based on the AD, she was taken off the ventilator and dialysis was stopped. She is in a semi-comatose state and has been transferred to inpatient hospice.

Pain Assessment

The nursing staff has been routinely assessing for pain every two hours using a reliable and valid tool. On one of the assessments, Mrs. Y is very restless and tense.

Vital signs

BP 140/80, HR 90, RR 22, diaphoresis present.

Pain Intervention

The nurse administers oxycodone liquid via the gastrostomy tube.

Pain Reassessment

The nurse returns in 60 minutes, which is the approximate time of peak effect for liquid oxycodone administered via gastrointestinal tube. The pain tool shows moderate restlessness and frowning, so the nurse gives another dose, per existing orders. She returns in 60 minutes and finds the patient calm and relaxed.

Vital signs

BP 136/78, HR 86, RR 18, no diaphoresis.

Take Home Message

Some reliable and valid behavioral pain assessment tools are able to assess both presence and severity of pain. Pain-related behaviors may change over time. Vital signs may or may not fluctuate with different levels of pain severity. Routine use of a pain assessment tool can help identify episodes of breakthrough pain, thereby facilitating optimal pain management.

BOX 4

Case 3: Inpatient Hospice

Medical Condition

Ms. Z has lung cancer, is non-responsive, and is bed-bound.

Current Pain Situation

Three hours ago, the nurse attempted to turn Ms. Z, but when she was moved, she frowned and groaned softly and her body became very stiff. Ms. Z's usual vital signs were HR 90, RR 10, and no diaphoresis, but when she was moved her HR was 122, RR 24, and she became diaphoretic. Because these behaviors and changes in vital signs may indicate pain, the nurse pre-medicated her prior to moving her again, but observes stiffness.

Pain Assessment

The nurse uses a valid and reliable tool that is integrated into the electronic health record to enable a standardized pain assessment. Ms. Z has a pain score which indicates pain is present.

Pain Intervention

The nurse administers oxycodone via an NG tube, turns the patient, and provides a backrub.

Pain Reassessment

The nurse reassess pain after this multimodal intervention using the same tool, and determines that no pain is present.

Take Home Message

Some pain assessment tools are effective for assessing both pharmacologic and non-pharmacologic interventions. Incorporation into the electronic health record standardizes pain assessment and enables timely interventions.

TABLE 1

Dimensions of Pain and Implications for Assessment in Self-reporting (SR) versus Non-communicative (NC) Individuals

Dimension	Physiologic	Sensory	Affective	Cognitive	Behavioral	Sociocultural
Type of Population	Etiology, associated physiologic variables	How pain feels	How pain makes one feel	Percep-tions, attitudes, beliefs	Pain indicating or pain relieving behaviors	Culture, meaning, beliefs, spirituality
SR	Cause of pain or syndrome Neurotrans-Mitters Vital signs	Presence Severity Quality Duration	Mood Anxiety Irritability	Relief Coping Other	Sounds Movement Facial expression Muscle tension Guarding	Expression Management Other
NC	Vital signs may be cues	Does not apply	Does not apply	Does not apply	Behaviors indicating presence and possibly severity of pain	Does not apply

Table 2

Pain Assessment Tools for Patients Who Cannot Provide Self-report of Pain: Population, Setting, Reliability, and Validity

Tool/ Author	Population*,**/ Setting	Reliability			Validity					Comments
		IC	IRR	T/RT	CNCT	PRED	DISC	CONV	FA	
BPS [14,18,19-24]	- Mechanically ventilated (MV), sedated, +/− unconscious medical, surgical and traumatic head injury subjects - Some studies included MV subjects who could communicate at some time points - Single site studies in individual ICUs of various sizes from teaching hospitals or academic medical centers (AMC) in France, Australia, Morocco, Netherlands, the Mid-Atlantic	A	AP	A	A		A	<A	A	- Overall, acceptable levels of IC, IRR, T/RT, CNCT, DISC and construct validity (FA) to recommend use in practice with the critically ill patient - Further testing is recommended in non-critical care units and palliative care patients and settings - Validity and IRR reliability may be inflated in some studies - Across studies, IRR reliability appears high if raters have lots of experience using the BPS or if few raters are used - Sedation, iatrogenic or medically induced, may result in lower BPS scores - Ventilatory mode may affect scores - The upper end of the scale has not been tested
BPS-NI [28]	- Non-intubated/ non-trached medical/surgical ICU subjects +/− delirium - Medium sized ICU in a AMC in France	A	AP				X		X	- Preliminary evidence of IC, IRR, DISC, and Construct validity via EFA - Further testing is recommended in non-critical care units and palliative care patients and settings - IRR reliability may be inflated - A comparison between the BPS and BPS-NI is recommended
CNPI [29-31]	- Predominantly Caucasian, hospitalized elderly female hip fracture subjects from 3 US midwestern urban hospitals. undergoing surgery; of which 53 had on the average, moderate cognitive impairment (CImp) from delirium or	<A	M		<A		<A			- Evidence of moderate IRR, close to acceptable IC and less than acceptable CNCT validity. No gold standard has been identified for patients who cannot self-report and may have influenced CNCT validity - Further psychometric testing is recommended in this, the critically ill, and in palliative care populations and settings

Tool/ Author	Population*,**/ Setting		Reliability			Validity					Comments	
			IC	IRR	T/RT	CNCT	PRED	DISC	CONV	FA		
		dementing illness;73% were able to self-report									-	Limited IRR testing suggests the CNPI: a) may be overestimated, b) needs further testing if only the movement related score is used, and c) may be able to be used accurately by nurses.
											-	IC was low, especially at rest and 3 behaviors were not seen in the study, suggesting the tool does not represent the constellation of pain behaviors seen in this population.
											-	Additional reliability and validity information related to dementia are reported elsewhere
CPOT[27,37,41,43,46-48,54]	-	Conscious/ unconscious mechanically ventilated critically ill medical/surgical (including cardiac, trauma, and neurologic) subjects, including head trauma, some studies say no dementia	A	S to AP		X	X	X			-	Robust evidence of multiple types of reliability and validity in a tool that has also performed well in comparison to several other behavioral tools in critically ill mechanically ventilated patients; further work is suggested in palliative care patients across settings
	-	Small, medium and large size intensive care units in primarily university and teaching hospitals in Canada, and the eastern and central United States									-	The Faces Pain Thermometer, Verbal Descriptor scale and FLACC were used as gold standards, although these tools have not been identified as such
											-	IRR may be overestimated in some studies; however numerous ICU nurses have used the CPOT with a large number of patients caring for a variety of patients, demonstrating it can be reliably used by nurses
											-	Subsequent studies should clearly articulate which CPOT version is being used, the inclusion/exclusion criteria, and the population/setting
											-	English and French version translation process should be clearly described and psychometric properties should be directly compared
											-	Conscious patients may have higher scores than unconscious patients

Tool/ Author	Population*,**/ Setting	Reliability			Validity					Comments
		IC	IRR	T/RT	CNCT	PRED	DISC	CONV	FA	
FLACC [46,53,54]	- Critically ill primarily medical subjects (including cardiac and neurological) or immediate post cardiac surgery but also but also surgical, (including neurosurgical), +/−MV - One small study (n <30) conducted in variety of critical care units from a medical center in the Great Lakes region contributed the most psychometric information; others were small single site studies (a cardiac post-anesthesia care unit in a hospital in Northeast and a community hospital in the Mississippi Valley)		A		A					- Acceptable IRR and CNCT validity, although small sample sizes and incomplete psychometric data (due patient sample and study designs) - Further psychometric testing is recommended in this, the critically ill, and in palliative care populations and settings - Although it has been purported to be the most frequently used tool in the critically ill, there is a lack of content validity (some items such as cry and consolability don't apply to adults) - Populations studied include some that are rarely included (neurological, cardiac and neurosurgical) - IRR may vary by type of painful procedure and may be overstated
MOPAT[56-60] (also personal communication, McGuire, 4-28-16)	Multiple studies using ethnically diverse medical and surgical subjects who were eligible to receive palliative care, many of whom were critically ill (including traumatic brain injury) or at end of life, who were experiencing acute procedural, uncontrolled, or episodic pain treated with a variety of nonpharmacologic and pharmacologic interventions - 22 intensive care and acute care units at an academic medical center in the Mid-Atlantic and inpatient hospice units in the Southeast and Northeast	A	X				X		X	- Demonstrates evidence of IC, IRR and DISC validity and construct validity (FA) in ethnically diverse palliative care patients experiencing acute pain and receiving pharmacologic and non-pharmacologic interventions in across multiple settings (acute care, including critical care, and inpatient hospice settings) - Physiologic Dimension has less than acceptable IC and needs additional exploration - IRR varies by item; moderate levels of agreement for most items and for each dimension overall - The only tool to be assessed for reliability, validity and clinical utility in palliative care populations experiencing uncontrolled or episodic pain - The only tool to be tested for reliability, validity and clinical utility using a longitudinal design in a palliative care patient population

Nurs Clin North Am. Author manuscript; available in PMC 2017 September 01.

Tool/ Author	Population*,**/ Setting	Reliability			Validity					Comments
		IC	IRR	T/RT	CNCT	PRED	DISC	CONV	FA	
										- A comparison between the inpatient and hospice versions is recommended
NCS [63-65]	- Subjects in an acute or chronic vegetative state or minimally conscious state experiencing experimental pain - Intensive care, neurology units, and long term care units in university hospitals, rehabilitation centers and long term facilities in Belgium and Italy		S to M	X	A		X			- Psychometric findings are based on experimental pain and demonstrate preliminary evidence of interrater reliability, test/retest reliability, as well as concurrent and discriminant validity; further psychometric testing is recommended in clinical palliative care populations - The NCS did not discriminate between pain and nopain conditions, so it was modified by deleting the visual scale to create the NCS-R - IRR tested by minimal number of raters, none whom are identified as nurses, although it is a simple scale that could likely be used by a nurse; further testing is recommended
NCS-R [65,67]	- Subjects in an acute or chronic vegetative state or minimally conscious state - Intensive care and neurology units in a University Hospital (experimental pain and clinical pain), Neurorehabilitation Centres and Nursing Homes (experimental pain) in Belgium						X			- No reliability testing and minimal validity testing of the NCS-R English version, with one psychometric study using an experimental pain paradigm and one clinical study lending minimal evidence of discriminant validity; additional psychometric testing in a clinical population is recommended - Demonstrates acceptable sensitivity and specificity in an experimental pain condition
NVPS [49,54,68,71]	- Critically ill subjects with trauma, surgery, and burn and open heart surgery - Medium to large critical care units (one mixed ICU and intermediate care) in academic medical centers and community hospitals in the Northeast, Mid-Atlantic, Plains States, and Canada	<A to A	X, F	-	X to A	-	X	-	-	- Demonstrates preliminary evidence of reliability and validity; psychometric properties vary from study to study and may be related to population type - Has been compared to a variety of gold standards to assess concurrent validity although a gold standard has not been identified for behavioral tools - IRR is poor in some burn patient populations

Tool/ Author	Population*,**/ Setting	Reliability			Validity					Comments
		IC	IRR	T/RT	CNCT	PRED	DISC	CONV	FA	
										- The Physiology II scale did not discriminate well between pain states and had the lowest correlations with other items on the scale, suggesting it should be modified
NVPS-R [27,48,70-72]	- Critically ill medical, surgical, trauma, and neuro subjects (half of the latter could self-report) - Medium to large size intensive care units in academic medical centers in a Plains State, the Great Lakes region and Canada - 1 LTC unit and 13 med surg critical care units in 8 hospitals in the Midwest	A	N to S	-	<A	-	A	<M to M	-	- Demonstrates preliminary evidence of reliability and validity, but needs additional work as psychometric properties (may be population based such as ability to self-report or neurologic patients) and in comparisons with other well-established tools, it generally doesn't perform as well - Cronbach's alpha is acceptable, except at rest, while IRR is often lower than desired, even when compared to the NVPS - Demonstrates discriminant validity while convergent validity results are often less than desired, although the Gold Standard selections are questionable - Results are lower when used with patients who can self-report, confirming the importance of self-report

Abbreviations

Reliability: IC = Internal consistency; IRR = Inter-rater; T/RT = Test-retest

Levels of evidence[15]: A = Acceptable; H = High; P = Poor; S = Slight; F = Fair; M = Moderate, Su = Substantial; AP = Almost perfect; I = Ideal

Validity: CNCT = Concurrent; PRED = Predictive; DISC = Discriminant; CONV = Convergent; FA = Exploratory Factor Analysis or Principal Components Analysis

Levels of evidence[15]: A = Acceptable; AR = Acceptable for research; AC = Acceptable for clinical practice (a higher standard); M = Moderate; L= Low; X = assessed

Studies with conflicting levels of evidence: study designs were considered and the average level of evidence across studies was determined.

Studies using statistics other than those in Table 2 of Gélinas et al.[15]: study design and statistical results were considered to assign a rating.

Footnotes

* Unless otherwise specified, subjects were unable to self-report.

** All studies used adult subjects. In rare instances, studies also included 15 to 18 year old subjects. Findings from these studies were included. If studies used a mixture of young pediatric subjects (<15 year olds) and adults, only adult findings are reported.

Table 3

Pain Assessment Tools for Patients Who Cannot Provide Self-report of Pain: Administration Time, Training, Clinical Utility, and Score Interpretation

Tool/ Author	Administration Time	Training*	Clinical Utility**	Score Interpretation***	Comments
BPS [16,18-26]	- 1 minute (min) observation period - 2 to 5 min (includes scoring)	- In general, minimal descriptions and no consensus - Training, 15 day probation period, followed testing on a few patients - Standardized individual bedside training on 10 patients followed up by interrater reliability testing - Pocket card (included BPS and graphic about contacting prescriber for BPS >5)	Assessed as Satisfaction - All agreed it took minimal time - 86% were satisfied with ease of use - 89% thought effective pain reactions during routine pain procedures had been assessed - 93% expected changes in pain assessment/ relief due to the BPS - 25% had concerns about complexity	- Lowest score (3) means no pain, but comparisons of BPS to NRS and other scales implies a score of 3 may indicate pain, suggesting the BPS lacks sensitivity in detecting pain - Assumes a score of 12 is the maximal or highest pain, although no supporting statistical analyses - Several studies identified BPS scores >5 as indicating a need for intervention even though this score is higher than discriminate validity findings that suggest scores >4 indicate pain - Some items have been	- Recommend thorough training description and formal clinical utility analysis in a variety of settings and populations, including palliative care - Administration time is short - Unconventional scoring may be prone to misinterpretation - Needs testing to determine if scores relate to the various levels of pain and validate the score that indicates the need for treatment - Several studies used nurse raters, demonstrating the BPS is appropriate for nurses' use

Nurs Clin North Am. Author manuscript; available in PMC 2017 September 01.

Tool/ Author	Administration Time	Training*	Clinical Utility**	Score Interpretation***	Comments
				reported as ambiguous	
BPS-NI [28]	- Estimated to take 2-5 min to administer	- Standardized individual bedside training on 10 patients with follow-up interrater reliability testing - Training poster and pocket card included BPS and graphic about contacting prescriber for BPS-NI >5	___	- Lowest score is 3 (no pain) and 12 (most pain), but no confirmatory testing - Has not been tested to determine if it can discriminate between pain levels (none, mild, moderate, severe) or comparability to BPS	- Recommend a thorough training description and formal clinical utility analysis in a variety of settings and populations, including palliative care - Short administration time - Unconventional scoring may be prone to misinterpretation - Needs testing to determine a score that indicates treatment is needed and if the BPS-NI can discriminate between different pain levels - Clinical utility needs to be assessed by nurse clinicians
CNPI [29-31]	- No information; appears easy to use	___	___	- Measures presence of pain, not severity - The lack of pain behaviors exhibited at rest suggests the CNPI rest scale is not sensitive and	- Thorough training description and formal clinical utility analysis in a variety of settings and populations, including palliative care are suggested

Tool/ Author	Administration Time	Training*	Clinical Utility**	Score Interpretation***	Comments
				the tool developer suggests using only the movement scales - Has been integrated into an electronic health record (EHR) in an inpatient hospice and acute care setting	- Administration time is short - Uses a 0-12 scale, different from frequently used self-report scales
CPOT [27, 37,40-43,47, 48, 54]	- 15 second to (usually) 1 minute observation time	- Trainings session of various lengths from undefined to <2 hours that includes a description of the CPOT indicators and individual items, directions, scoring and documentation - +/− facial expression drawings; videotaped scenarios; >/= 85 %agreement; demonstration - Implementation study used educational sessions that included video demonstration of pain behaviors and instruction on applying the CPOT; physician and	- All felt directions were clear and the CPOT was simple to understand - Overwhelming majority said it was quick to use, easy to complete, and the training time was sufficient - About three quarters said they would recommend its routine use and that it was helpful for clinical practice - Slightly more than half said it influenced their pain assessment practice - Several nurses commented it offered a standardized, organized way	- Score range 0 – 8, with a different scale and items for patients who are or are not mechanically ventilated without testing for equivalency - Studies of the CPOT English version show it discriminates between pain and no pain with a score > 3 yielded a sensitivity of 66.7% and specificity of 83.3% during turning for a small population of critically ill mainly head trauma patients; however, the	- Demonstrates beginning level of clinical utility in critically ill patients; further work is suggested in palliative care subjects across settings - Psychometric testing of the Compliance with Mechanical Ventilation subscale and the Vocalization scale is suggested - Numerous training scenarios reported, - Unconventional scoring may lead to misinterpretation - Some items may need additional work to ease interpretation

Tool/ Author	Administration Time	Training*	Clinical Utility**	Score Interpretation***	Comments
		nurse champions; senior nurses who provided 1 on 1 bedside education and did compliance audits; compliance feedback sent to users, posted, discussed at staff meetings, and incorporated into individual performance reviews	to assess and communicate pain and that it encouraged sensitivity to nonverbal pain cues - A few individuals expressed concerns about the delay between training and use, the lack of specificity of some items, and that it could not be used with all ICU non-verbal patients - Infrequent use may affect clinical utility perceptions - Implementation significantly increased pain assessments - Analgesic and sedative use, ICU length of stay and duration of mechanical ventilation findings were inconsistent	French version has different statistics that English version studies sometimes use - Varying levels of pain have been tested, but unable to be distinguished with the CPOT - Scores are often restricted to the lower end of the scale	- Time between training and implementation should be short - Comparisons needed between the French and English versions, including additional work on sensitivity and specificity - Pain assessment findings should be paired with analgesic orders
FLACC [46, 53,54]	- 15 seconds to 2 min	- Raters trained to a target 85% agreement	—	- Measures presence of pain, not severity, and uses the familiar 0-10 scale	- Thorough training description and formal clinical utility analysis in a variety of settings and populations, including palliative care are suggested

Tool/ Author	Administration Time	Training*	Clinical Utility**	Score Interpretation***	Comments
					- Short administration time - Purported to be widely used in adult critically ill pts, suggesting clinical utility, despite lack of a formal clinical utility assessment and minimal IRR assessment by nurse raters.
MOPAT 56-64 **plus personal communication, McGuire 4-28-16**	- 1 min observation time plus scoring (personal communication)	- Mandatory training using videotapes with predetermined consensus ratings, +/− bedside demonstrations, +/− unit based nurse champions - Requested and responded to formal and informal feedback from nurse users - For longitudinal use, compliance auditing with frequent feedback (individual user and aggregate unit level data) with documentation requirement reminders, screen shots, and flyers	- An overwhelming majority of nurses (+/− licensed practical nurses) across settings reported that the MOPAT took a reasonable time to complete, was easy to use, was helpful in assessing pain, was helpful in determining the presence of pain or if an intervention was needed, and assisted in communicating about pain - A majority to overwhelming majority reported it was feasible to (or they would) use the MOPAT in their clinical setting and that informal care	- Assesses presence of pain, not severity (in recent unpublished findings, levels indicative of mild, moderate and severe pain have been established) - Sensory dimension was not often used, and has been deleted from the current version - Physiologic Dimension differ in acute care and hospice versions - Physiologic Dimension is not scored in the current version AC	- Thorough training description for hospice and acute care (training in an non-study outpatient hospice setting also described) - Formal clinical utility analysis in acute care and hospice settings demonstrates good to excellent clinical utility when used with palliative care inpatients, including the critically ill, TBI, and end of life patients - All studies used registered nurse +/− licensed practical nurse raters, demonstrating the MOPAT is appropriate for nurse's use

Tool/ Author	Administration Time	Training*	Clinical Utility**	Score Interpretation***	Comments
			givers could use it with training	version and is under revision - Integrated into EHR in an inpatient hospice and AMC - Uses a 0-12 scale, different from frequently used self-report scales - There were scoring differences for	- Uses a 0-12 scale, different from frequently used self-report scales - Testing recommended in informal caregivers
NCS [63-65]	10 – 60 seconds during spontaneous eye opening, to ensure a sufficient level of arousal	---	---	- Scores range from 0 to 12 - A score of 4 did not discriminate well between pain and no pain	- Determine ideal observation time - Specify training - Cut scores indicative of no pain and pain states need validation - Assess clinical utility
NCS-R [65,67]	- 10 to 60 seconds of observation excluding scoring, with more behaviors seen after longer observation periods	- 2 hour training with a video session	-	- Scores range 0 to 9 - A score of 3 or 4 respectively, may discriminate between pain and no pain in VCS or MCS patients; further testing is suggested	- The 0 to 9 scale is different from frequently used self-report scales - Needs testing to determine scores indicative of none, mild, moderate and severe pain - Cut scores indicative of no pain and pain states need validation

Tool/ Author	Administration Time	Training*	Clinical Utility**	Score Interpretation***	Comments
					- Observation periods need standardization - Clinical utility assessment is needed - Comparisons between the NCS and NCS-R should be performed
NVPS [49, 54,69-71]	- 15 second observation time (Marmo)	- Comprehensive educational programs (e.g., 15-20 minutes) that may include the following rationale for tool implementation, demonstration, practice sessions with 85-90% interrater agreement, and use of documentation tool - Bedside aids often used (laminated cards and/or posters containing the tool, pain policy assessment reminders, graphics of behaviors) - Additional clinical implementation suggestions: planning, staff involvement/ motivation, regular	- In 100 ratings, only one individual NVPS item was deemed not applicable once - An overwhelming majority of nurses found it easy to use and were satisfied/ very satisfied with training - Compared to pre-implementation, post-implementation nurses felt it improved their confidence in assessing unconscious patients' pain, but there was no change in their confidence about managing pain - After NVPS implementation nurses were significantly less likely to agree that an appropriate pain score would:	- Assesses presence of pain, not pain severity, but no testing has been done to determine the score that distinguishes between no pain and pain - Scores range from 0 to 10 - Some researchers, other than the developers, have identified anchors for the top and bottom of the scale (e.g., no pain and maximal pain) without statistical validation	- Although no information was provided about the time required for administration, nurses reported it easy to use and were satisfied with the training - Studies provide numerous training program descriptions that focus on clinical implementation and bedside aids that are likely applicable to other behaviorally based pain assessment tools

Tool/ Author	Administration Time	Training*	Clinical Utility**	Score Interpretation***	Comments
		monitoring and feedback by a designated change agent and problem solver	ease assessment, make them more confident in requesting more/less analgesia, or improve their pain management practices		
NVPS-R 27,48,70,71	---	- Training session (< 1 hour) with or without with demonstration, tool practice session or 90% interrater agreement - Clinical implementation suggestions: planning, staff involvement and motivation, training, resources (laminated cards with tool and pain assessment policy reminders), regular monitoring and feedback by a designated change agent/ problem solver	- Quick and easy to use, simple to understand, easy to complete - Median score 7-8 (0=worst, 10 = best) for accuracy, usefulness, and ease of learning - Although there was not a significant difference, nurses had a greater preference for the NVPS (43%) compared to BPS (33%) and CPOT (24%), but preference could be related to previous familiarity	- See NVPS	- See NVPS - Clinical utility comparisons between the NVPS and NVPS-R are needed

Administration Time = Approximate amount of time required for tool completion

Training = Specifics about training used in studies (e.g., amount of time, type of training, resources used)

*Study-related training is not described and if a training time reported by the authors included study procedures, a < sign was placed in front of the time indicating that actual clinical training time will be less

**Clinical utility includes specific information about the usefulness, advantages and disadvantages of the tool or associated documentation process

*** Sensitivity refers to the ability to correctly detect people who are experiencing pain; Specificity refers to the ability to identify those who are not experiencing pain