



**GUIDELINES FOR PAIN ASSESSMENT IN THE**  
**CRITICALLY ILL**

**2020**

**MEDICAL CARE QUALITY SECTION  
MINISTRY OF HEALTH MALAYSIA**

# **Guidelines For Pain Assessment in The Critically Ill**

This document was developed by the Clinical Audit Unit, Medical Care Quality Section of Medical Development Division, Ministry of Health Malaysia and the National Pain Free Program Committee.

Published in July 2020

A copy of this document is also available at MOH Portal: [www.moh.gov.my](http://www.moh.gov.my)

**Copyright © Ministry of Health Malaysia.**

All rights reserved. No part of this publication may be reproduced or distributed in any form or by any means or stored in a database or retrieval system without prior written permission from the Ministry of Health Malaysia.

## **TEAM MEMBERS**

1. Dr Anita binti Alias  
Consultant Intensivist, Hospital Sibu
2. Dr Betty Lee Leh Sieng  
Anaesthesiologist, Hospital Sibu

## **REVIEWER**

1. Dr Shanti Rudra Deva  
Consultant Intensivist, Hospital Kuala Lumpur
2. Dr Kavitha M. Bhojwani  
Head of Department, Anaesthesiology & Intensive Care, Hospital Raja Permaisuri Bainun
3. Dr Ungku Kamariah bt Ungku Ahmad  
Consultant Pain Specialist, Hospital Sultan Ismail

<b>CONTENTS</b>	<b>PAGE</b>
1. Introduction	3
2. Types of pain in critically ill patients	3 - 4
3. Consequences of pain in critically ill patients	4
4. Challenges of assessing pain in critically ill patients	5
5. Guidelines	5
6. Methods of assessing pain in critically ill patients	6 – 12
6.1 Self-assessment method	6 – 8
6.2 Behavioral assessment tools	8 – 12
6.21 Critical Care Pain Observation Tool (CPOT)	9 – 10
6.22 Behavioral Pain Scale (BPS)	11
6.3 Proxy reporters	12
6.4 Physiologic measures	12
7. Conclusion	13
8. Appendix	
a. Appendix 1 Critical-Care Pain Observation Tool (CPOT)	14 – 18
b. Appendix 2 Behavioural Pain Scale (BPS)	19
9. References	20-22

## **1.0 Introduction**

The International Association for the Study of Pain (IASP) defines pain as “an unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage,”.<sup>1</sup> The definition emphasizes the subjective nature of pain and implies that it has to be reported by the person who is experiencing it.<sup>2</sup> However many individuals cannot self-report due to the various factors e.g. patients treated in intensive care units (ICUs). The inability to communicate clearly does not negate a patient’s pain experience or the need for appropriate pain management.<sup>1</sup>

Pain often co-exists with critical illness and treatment. During ICU treatment, up to 40–70% of patients experience moderate to severe pain.<sup>3,4</sup> According to some authors, almost 30% of patients experience pain at rest and 50% during various nursing interventions.<sup>5</sup> However, only 25% of patients are treated. Therefore, it requires special attention and pre-emptive treatment.<sup>6,7</sup>

A fundamental principle of effective pain management is proper identification of the problem.<sup>2</sup> Therefore, the role of clinicians is to assess reliably the pain in patients with limited capability of communication by evaluating pain substitutes.<sup>8</sup> Identification, measurement and proper pain management in critically ill patients is paramount and has been studied for the last 20 years.<sup>9</sup>

## **2.0 Types of pain in critically ill patients**

The pain experienced by critically ill patients occurs at rest and during standard care procedures. It can be also associated with surgical procedures, injuries, burns, neoplastic diseases or nursing-therapeutic interventions.<sup>10-13</sup> Pain can be divided into 4 categories:<sup>14</sup>

- I. Persistent pain associated with invasive procedures/ discomfort.
- II. Acute pain related to an ongoing disease.
- III. Intermittent pain associated with ICU procedures.
- IV. Chronic pain occurring before ICU admission.

The procedures and interventions that can potentially cause pain or discomfort include repositioning, change of sheets, endotracheal and oral suctioning, wound care, removal of drains or insertion of catheters, intravenous accesses or intubation.<sup>13</sup>

### **3.0 Consequences of pain in critically ill patients**

The negative physiological and psychological consequences associated with inadequate management of pain are long-term and extremely serious.<sup>2</sup> It has been known for years that the majority of patients identify the pain they experienced during ICU treatment as a source of sleep-related problems after discharge from the ICU.<sup>15</sup> Study by Gélinas *et al* indicates that up to 82% of ICU-discharged patients remember the pain or discomfort associated with the presence of endotracheal tubes while 77% recollect continuous moderate to severe pain.<sup>16</sup> According to Granja *et al*.<sup>17</sup>, 17% of patients remember severe pain during ICU treatment lasting up to 6 months after discharge while 18% have a high risk of post-traumatic stress disorder (PTSD). Schelling *et al*<sup>18</sup>. have demonstrated that in a group of 80 patients under long-term observation (4 years on average) who underwent ICU treatment due to ARDS, the percentage of chronic pain and PTSD was higher (by 38% and 27%, respectively); likewise, the quality of life in this group was lower (by 21%), as compared to the control group.

The pain-induced stress response can lead to disastrous consequences<sup>19</sup>, including increased concentrations of catecholamines, vasoconstriction, impaired tissue perfusion and decreased partial pressure of oxygen in the tissues. Pain can cause hypermetabolism leading to hyperglycaemia, lipolysis or protein catabolism, which result in impaired wound healing and increased risk of infections.<sup>20</sup> Pain also impairs immune system by inhibiting the NK cell activity, decreasing the cytotoxic T lymphocyte count and reducing the phagocytic activity of neutrophils.<sup>21-23</sup> Last but not least, acute pain experienced by patients in various situations can cause cardiac instability and respiratory compromise in ICU.

#### **4.0 Challenges of assessing pain in critically ill patients**

The assessment of pain in ICU patients is a daily challenge for clinicians given the unique features of critically ill patients that include impaired communication, altered mental status, mechanical ventilation, procedures and use of invasive devices, sleep disruption, and immobility/mobility status.<sup>24</sup> Additional difficulties are co-existing neurological and mental disorders (e.g. aphasia, dementia, critical condition-related delirium, psychoses). In view of critical conditions of ICU patients and the issue of pain is not always of utmost importance in critically ill, not enough attention is paid to it by many clinicians/nursing staff.<sup>2</sup> Lack of policies or clinical guidelines also poses a barrier to proper pain assessment in critically ill patients.<sup>25</sup>

#### **5.0 Guidelines**

Over the past 30 years, attention devoted to pain experienced by ICU patients has evolved from recognizing pain as co-existing with ICU illness and treatment (Puntillo 1990) to development of research-based guidelines to support assessment and treatment of pain.<sup>25</sup> The Pain Agitation Delirium Guidelines of

the Society of Critical Care Medicine (PAD SCCM) of 2013<sup>26</sup>, the Pain, Agitation/Sedation, Delirium, Immobility, and Sleep Disruption Guidelines of the Critical Care Medicine (PADIS SCCM) of 2018<sup>24</sup>, Delirium Agitation Sedation (DAS) Guidelines of 2015<sup>27</sup> and early Comfort using Analgesia, minimal Sedatives and maximal Humane care (eCASH concept) of 2016<sup>14</sup>, clearly recommend providing adequate analgesia first (before sedation) to humanize intensive care. Guidelines recommend that monitoring pain in all ICU patients be a routine part of practice. Moreover, the above guidelines highlight the role of pain, agitation and delirium monitoring (called the ICU triad) in critically ill patients using dedicated scales validated for individual populations of patients.

## **6.0 Methods of assessing pain in critically ill patients**

### **6.1 Self-assessment Method**

A patient's self-report of pain is the reference standard for pain assessment in patients who can communicate reliably.<sup>24</sup> Therefore, self-assessment should always be attempted so that patients are involved in determining the level of pain intensity. Among critically ill adults who are able to self-report pain, the 0–10 Numeric Rating Scale (NRS) administered either verbally or visually is a valid and feasible pain scale. According to Chanques *et al.*<sup>28</sup>, who studied the group of 100 patients, the use of NRS in a visual format is the most reliable tool for the assessment of pain intensity among five scales designed for this purpose.



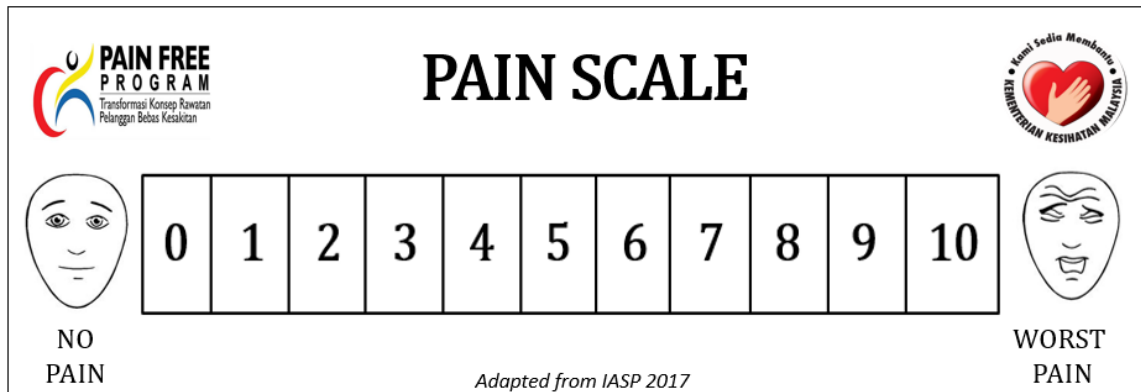


Figure 1 Combined Visual Analog Scale (VAS) and Numerical Rating Scale (NRS) <sup>29</sup>



Figure 2 Combined Visual Analog Scale (VAS) and Numerical Rating Scale (NRS) (Bahasa Malaysia version) <sup>29</sup>

However, this self-report tool assumes patient-caregiver cooperation. Additional difficulties are the effects of sedation, delirium, delirium treatment and other factors affecting the central nervous system. It is worth remembering that even the best tool may be unsuitable for certain groups of patients, e.g. 1) children 2) patients who cannot communicate verbally, 3) those with dementia or 4) patients with mental illness.<sup>2</sup> In many cases, as patients cannot self-report pain due to the above factors, some other tools have been designed which are based on clinical observation of the patient's condition by nurses and physicians. When the patient's self-assessment is not possible, a validated, reliable and easy-to-use tool should be applied. The role of behavioural scales is emphasized, which

allow the routine and repeated assessment of pain intensity, irrespective of the person engaged in the assessment.<sup>2</sup>

## **6.2 Behavioral assessment tools**

The authors of the PADIS SCCM guidelines of 2018 analyzed twelve behavioral scales. The analysis demonstrates that the Behavioral Pain Scale in intubated (BPS) and non-intubated (BPS-NI) patients and the Critical-Care Pain Observation Tool (CPOT) have the greatest validity and reliability for assessing pain in critically ill adults unable to self-report.<sup>24</sup> Although both the BPS and the CPOT have been validated across large samples of medical, surgical, and trauma ICUs, studies involving brain-injured patients using the BPS and CPOT are small. In the brain-injured population, although the construct validity of both scales is supported with higher scores during painful procedures (vs rest and non-painful procedures), patients predominantly expressed pain-related behaviors that were related to level of consciousness; grimacing and muscle rigidity were less frequently observed. An additional study, although not evaluating validity, found that BPS and BPS-NI were feasible and reliable to use in the brain-injured population.<sup>24</sup>

The observational studies have demonstrated that BPS (3–12 total score) and CPOT (0–8 total score) have good psychometric indices and inter-observer agreement of assessments in medical, surgical and trauma patients; yet without cerebral stroke.<sup>30-34</sup> A CPOT score of > 2 indicates the presence of pain; the sensitivity of the test is 86% while its specificity is 78% for the assessment of severe post-surgical pain.<sup>35, 36</sup> The cut-off value suggested for BPS is >5.<sup>37,38</sup>

## 6.21 Critical Care Pain Observation Tool (CPOT)

The CPOT was developed by Gelinas *et al.*<sup>35</sup> in French and shortly afterwards translated into and validated in other languages. The tool was designed to detect pain in critically ill patients and includes 4 behavioral categories — facial expressions, body movements, muscle tension, compliance with a ventilator (for intubated patients) or verbalization (for extubated patients). Each category is scored on a scale of 0–2 (in total 0–8 points). According to the data reported by Gelinas *et al.*,<sup>35</sup> the cut-off point is 2–3, while a score of > 2 indicates the occurrence of pain. The scale is a good tool in order to differentiate between pain-related procedures (e.g. changes in body position) and painless procedures (e.g. non-invasive arterial pressure measurement ( $P \leq 0.001$ )).

<b>Facial Expressions</b>	Relaxed 0	Tense 1	Grimacing 2
<b>Body Movements</b>	Absence of movements or normal position 0	Protection 1	Agitation 2
<b>Muscle Tension</b>	Relaxed 0	Tense, rigid 1	Very tense/rigid 2
<b>Compliance with the ventilator (intubated)</b>	Tolerating ventilator or movements 0	Coughing but tolerating 1	Fighting ventilator 2
<b>Vocalization (extubated)</b>	Normal or silent 0	Sighing or moaning 1	Crying out or sobbing 2

**Table 1** Critical-care pain observation tool (CPOT)

Gelinas *et al.*, *AJCC* 2006; 15(4): 420-427<sup>35</sup>

### **Directives of use**

- The patient must have an intact motor function and no brain injury, which could affect the consciousness.
- Observation period
  - 1 minute at rest (baseline)
  - During painful procedures
  - Before and at peak effect of analgesics
- Rating: the highest score observed.
- Assess the muscle tension the last when patient is at rest.
- A score of  $> 2$  indicates the occurrence of pain.
- Does not measure severity of pain.

## 6.22 Behavioral Pain Scale (BPS)

The BPS was developed by Payen *et al.* in order to assess pain in unconscious mechanically ventilated patients.<sup>39</sup> The scale is based on three types (ranges) of behavior: 1) facial expressions, 2) movements of the upper extremities and 3) compliance with a ventilator.

**Table 2 Behavioral pain scale (BPS)**

Item	Description	Score
Facial expression	Relaxed	1
	Partially tightened (e.g. brow lowering)	2
	Fully tightened (e.g. eyelid closing)	3
	Grimacing	4
Upper limb movements	No movement	1
	Partially bent	2
	Fully bent with finger flexion	3
	Permanently retracted	4
Compliance with mechanical ventilation	Tolerating movement	1
	Coughing but tolerating ventilation for the most of time	2
	Fighting ventilator	3
	Unable to control ventilation	4

Payen et al., CCM 2001; 29 (12): 2258-2263<sup>3</sup>

- Total score varies from 3 to 12
- Scores  $\leq 3$  no pain.
- Scores 4-5 mild pain.
- Scores 6-11 an unacceptable amount of pain.
- Scores  $\geq 12$  maximum pain.
- Target score  $< 5$ .

### **6.3 Proxy Reporters**

When appropriate, and when the patient is unable to self-report, family can be involved in their loved one's pain assessment process.<sup>24</sup> Compared with critically ill patients' self-reports, surrogates correctly identified pain presence 74% of the time and pain severity 53% of the time, with a tendency to overestimate pain intensity.<sup>40</sup> There are families who may not want to be involved in pain assessment or situations where family involvement in pain assessment is not appropriate. Family involvement in pain assessment should not substitute for an ICU team's role and commitment to systematic pain assessment and optimal analgesia.<sup>24</sup>

### **6.4 Physiologic Measures**

Vital signs (i.e., heart rate, blood pressure, respiratory rate, oxygen saturation [SpO<sub>2</sub>], and end-tidal CO<sub>2</sub>) are not valid indicators for pain in critically ill adults and should only be used as cues to initiate further assessment using appropriate and validated methods such as the patient's self-report of pain (whenever possible) or a behavioral scale (i.e., BPS, BPS-NI, CPOT).<sup>24,26</sup> Vital signs were found to increase during both nociceptive and non-nociceptive procedures suggesting the lack of validity of these indicators.

## **7.0 Conclusion**

Management of pain for adult ICU patients should be guided by routine pain assessment. Pain experienced by critically ill patients in ICUs has to be identified early in order to implement appropriate treatment. Self-assessment method is the reference standard for pain assessment in patient who can communicate reliably.<sup>24</sup> In patients unable to self-report pain experiences, the behavioral scales (CPOT or BPS) are recommended. Assessment pain should not only be done at rest, but also during care procedures, before and after analgesic treatment. Adoption of well-validated pain assessment methods and a standardized organizational approach to assessment, documentation, and communication of patient pain among ICU team members<sup>25</sup> improve the pain management and quality of life of patients in ICUs and after discharge, enabling them to inform one about their needs and improve their prognosis.

## 8.1 Appendix 1

### Critical-care pain observation tool (CPOT)

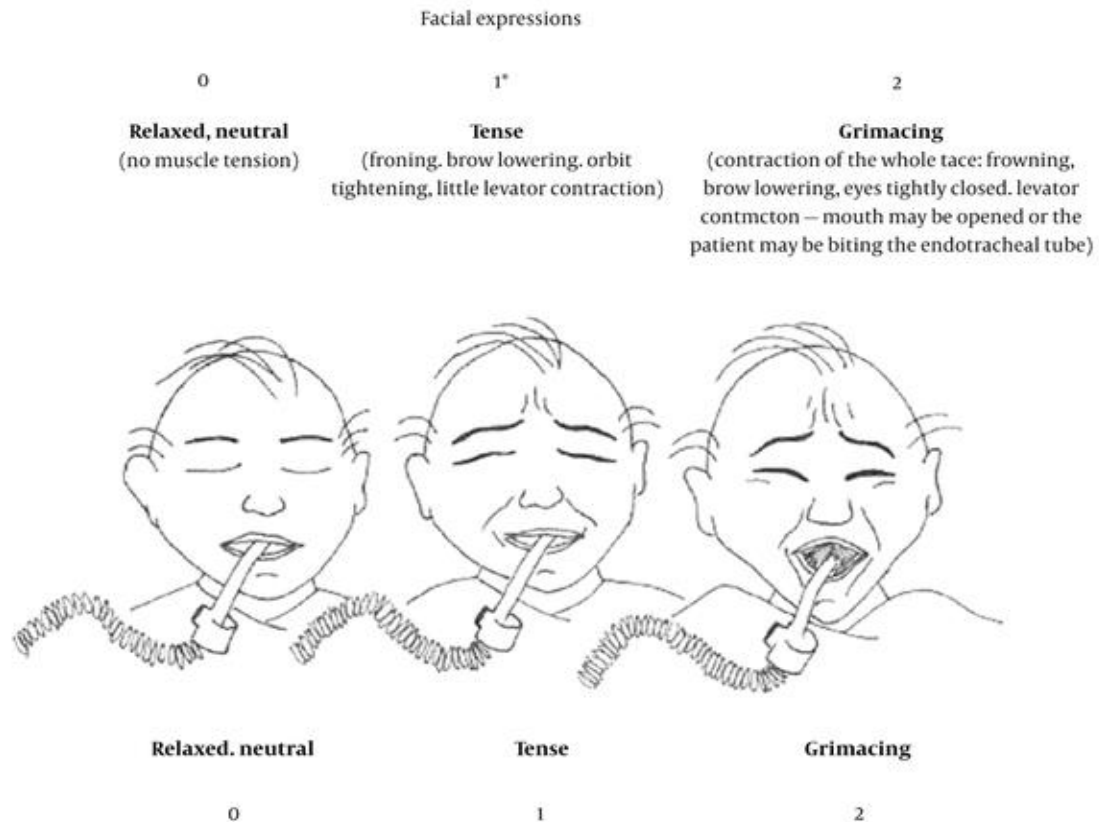



FIGURE 3 GRAPHIC BY CAROLINE ARBOUR, RN, B.Sc., PHD(STUDENT) SCHOOL OF NURSING, MCGILL UNIVERSITY

\* A score of 1 may be attributed when a change in the patient's facial expression is observed compared with rest assessment (e.g. open eyes, tearing).

Inspired by: Prkachin, K. M. (1992). The consistency of facial expressions of pain : a comparison across modalities. *Pain*, 51, 297-306.



**TABLE 3 CRITICAL-CARE PAIN OBSERVATION TOOL.**

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

<sup>a</sup> Adapted with permission from Gélinas et al.<sup>1</sup>

### **Brief description of each CPOT behavior<sup>41</sup>:**

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

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

**Compliance with the ventilator:** Compliance with the ventilator is used when the patient is mechanically ventilated. A score of 0 refers to easy ventilation. The patient is not coughing nor activating the alarms. A score of 1 means that the patient may be coughing or activating the alarms but this stops spontaneously without the nurse having to intervene. A score of 2 is given when the patient is fighting the ventilator. In this case, the patient may be coughing and activating the alarms, and an asynchrony may be observed. The nurse has to intervene by talking to the patient for reassurance or by administering medication to calm the patient down.

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

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

### **Directives of use of the CPOT**

1. The patient must be observed at rest for one minute to obtain a baseline value of the CPOT.
2. Then, the patient should be observed during nociceptive procedures (e.g. turning, wound care) to detect any changes in the patient's behaviors to pain.
3. The patient should be evaluated before and at the peak effect of an analgesic agent to assess whether the treatment was effective or not in relieving pain.
4. For the rating of the CPOT, the patient should be attributed the highest score observed during the observation period.
5. The patient should be attributed a score for each behavior included in the CPOT and muscle tension should be evaluated last, especially when the patient is at rest because the

stimulation of touch alone (when performing passive flexion and extension of the arm) may lead to behavioral reactions.

### **Observation of patient at rest (baseline)**

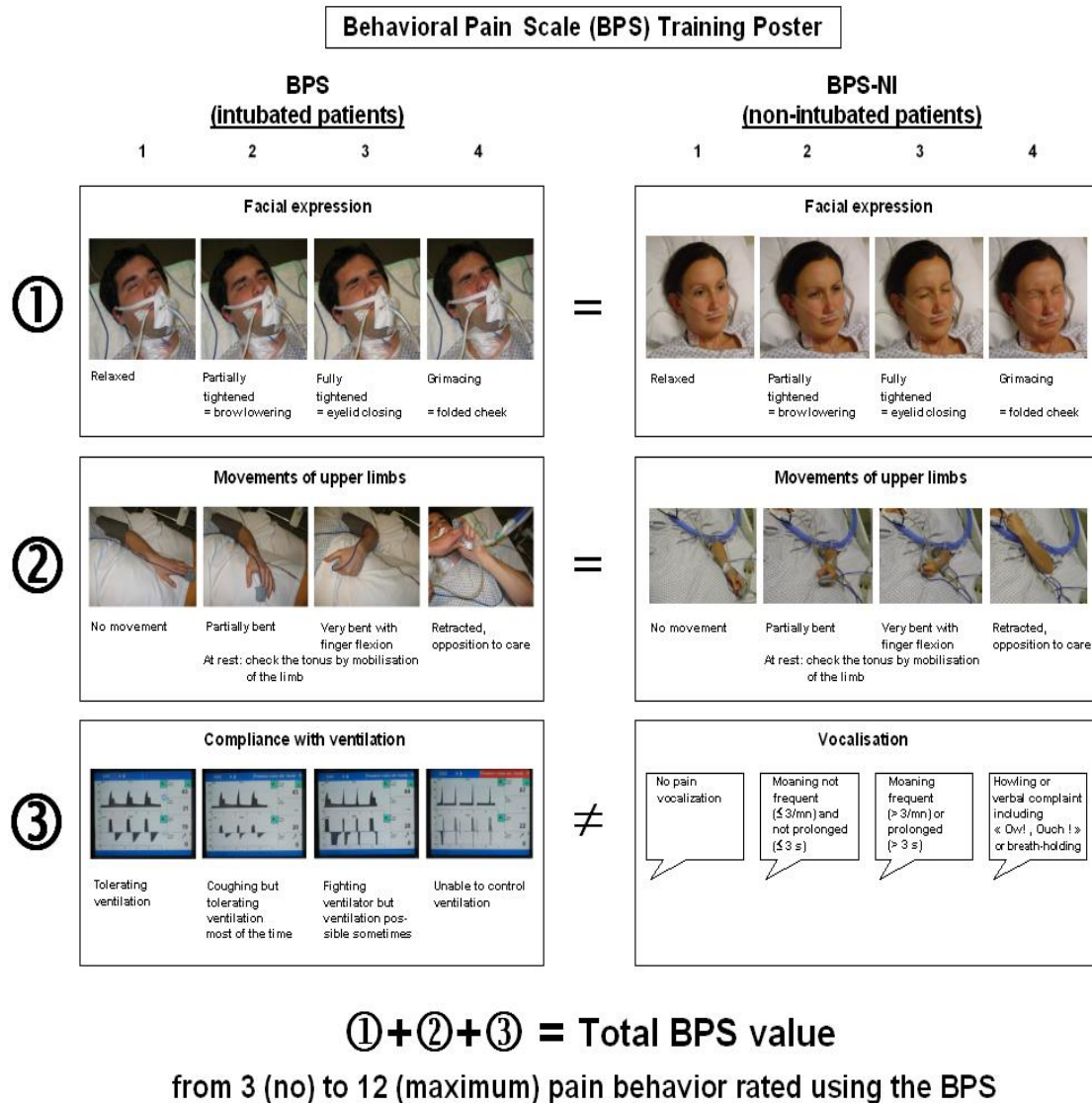
The nurse looks at the patient's face and body to note any visible reactions for an observation period of one minute. She gives a score for all items except for muscle tension. At the end of the one-minute period, the nurse holds the patient's arm in both hands – one at the elbow, and uses the other one to hold the patient's hand. Then, she performs a passive flexion and extension of the upper limb, and feels any resistance the patient may exhibit. If the movements are performed easily, the patient is found to be relaxed with no resistance (score 0). If the movements can still be performed but with more strength, then it is concluded that the patient is showing resistance to movements (score 1). Finally, if the nurse cannot complete the movements, strong resistance is felt (score 2). This can be observed in patients who are spastic.

### **Observation of patient during turning**

Even during the turning procedure, the nurse can still assess the patient's pain. While she is turning the patient on one side, she looks at the patient's face to note any reactions such as frowning or grimacing. These reactions may be brief or can last longer. The nurse also looks out for body movements. For instance, she looks for protective movements like the patient trying to reach or touching the pain site (e.g. surgical incision, injury site). In the mechanically ventilated patient, she pays attention to alarms and if they stop spontaneously or require that she intervenes (e.g. reassurance, administering medication). According to muscle tension, the nurse can feel if the patient is resisting to the movement or not. A score 2 is given when the patient is resisting against the movement and attempts to get on his/her back.

## 8.2 Appendix 2

### Behavioural pain scale (BPS)



**FIGURE 4 BEHAVIOURAL PAIN SCALE (BPS) AND BPS-NI (NON-INTUBATED PATIENTS)**

Chanques et al., Intensive Care Med 2009; 35:2060-2067<sup>42</sup>

## References

1. [https://journals.lww.com/pain/Abstract/9000/The\\_revised\\_International\\_Association\\_for\\_the.98346.aspx](https://journals.lww.com/pain/Abstract/9000/The_revised_International_Association_for_the.98346.aspx) (July 15, 2020).
2. Kotfis et al. Methods of pain assessment in adult intensive care unit patients – polish version of the CPOT (critical care pain observation tool) and BPS (behavioral pain scale). *Anaesthesiology intensive therapy* 2017, vol 49, no 1, 66-72.
3. Desbiens NA, Wu AW. Pain and suffering in seriously ill hospitalized patients. *J Am Geriatr Soc.* 2000; 48(5 Suppl): S183–S186.
4. Li DT, Puntillo K. A pilot study on coexisting symptoms in intensive care patients. *Appl Nurs Res.* 2006; 19(4): 216–219.
5. Chanques G, Sebbane M, Barbotte E, et al. A prospective study of pain at rest: incidence and characteristics of an unrecognized symptom in surgical and trauma versus medical intensive care unit patients. *Anesthesiology.* 2007; 107(5): 858–860.
6. Puntillo KA, Wild LR, Morris AB, et al. Practices and predictors of analgesic interventions for adults undergoing painful procedures. *Am J Crit Care.* 2002; 11(5): 415–29.
7. Siffleet Jo, Young J, Nikoletti S, et al. Patients’ self-report of procedural pain in the intensive care unit. *J Clin Nurs.* 2007; 16(11): 2142–2148.
8. Anand KJ, Craig KD. New perspectives on the definition of pain. *Pain.* 1996; 67(1): 3–6.
9. Puntillo KA, Arai S, Cohen NH, et al. Pain experiences of intensive care unit patients. *Heart Lung.* 1990; 19(5 Pt 1): 526–533.
10. Chanques G, Pohlman A, Kress JP, et al. Psychometric comparison of three behavioural scales for the assessment of pain in critically ill patients unable to self-report. *Crit Care.* 2014; 18(5): R160.
11. Stanik-Hutt JA, Soeken KL, Belcher AE, et al. Pain experiences of traumatically injured patients in a critical care setting. *Am J Crit Care.* 2001; 10(4): 252–259.
12. Stotts NA, Puntillo K, Bonham Morris A, et al. Wound care pain in hospitalized adult patients. *Heart Lung.* 2004; 33(5): 321–332.
13. Novoa CM, Figueroa-Ramos MI, Puntillo KA, et al. Pain related to tracheal suctioning in awake acutely and critically ill adults: a descriptive study. *Intensive Crit Care Nurs.* 2008; 24(1): 20–27.
14. Vincent JL, Shehabi Y, Walsh TS, et al. Comfort and patient-centred care without excessive sedation: the eCASH concept. *Intensive Care Med.* 2016; 42(6): 962–971.
15. Jones J, Hoggart B, Withey J, et al. What the patients say: A study of reactions to an intensive care unit. *Intensive Care Med.* 1979; 5(2): 89–92.
16. Gélinas C. Management of pain in cardiac surgery ICU patients: have we improved over time? *Intensive Crit Care Nurs.* 2007; 23(5): 298–303.
17. Granja C, Gomes E, Amaro A, et al. JMIP Study Group. Understanding posttraumatic stress disorder-related symptoms after critical care: the early illness amnesia hypothesis. *Crit Care Med.* 2008; 36(10): 2801–2809.
18. Schelling G, Richter M, Roozendaal B, et al. Exposure to high stress in the intensive care unit may have negative effects on health-related quality-of-life outcomes after cardiac surgery. *Crit Care Med.* 2003; 31(7): 1971–1980.

19. Chapman CR, Tuckett RP, Song CW. Pain and stress in a systems perspective: reciprocal neural, endocrine, and immune interactions. *Pain*. 2008; 9(2): 122–145.
20. Ak.a O, Melischek M, Scheck T, et al. Postoperative pain and subcutaneous oxygen tension. *Lancet*. 1999; 354(9172): 41–42.
21. Beilin B, Shavit Y, Hart J, et al. Effects of anesthesia based on large versus small doses of fentanyl on natural killer cell cytotoxicity in the perioperative period. *Anesth Analg*. 1996; 82(3): 492–497.
22. Pollock RE, Lotzová E, Stanford SD. Mechanism of surgical stress impairment of human perioperative natural killer cell cytotoxicity. *Arch Surg*. 1991; 126(3): 338–342.
23. Peterson PK, Chao CC, Molitor T, et al. Stress and pathogenesis of infectious disease. *Rev Infect Dis*. 1991; 13(4): 710–720.
24. Devlin et al. The pain, agitation/sedation, delirium, immobility, and sleep disruption guidelines of the critical care medicine (PADIS SCCM). *Critic care med* 2018; 46(9):825-873.
25. Puntillo KA. Pain assessment and management for intensive care unit patients. *ICU management & practice 4-2016*, vol 16, 233-236.
26. Carrothers KM, Barr J, Spurlock B, et al. American College of Critical Care Medicine. Clinical practice guidelines for the management of pain, agitation, and delirium in adult patients in the intensive care unit. *Crit Care Med*. 2013; 41(1): 263–306.
27. Baron R, Binder A, Biniek R, et al. DAS-Taskforce 2015. Evidence and consensus based guideline for the management of delirium, analgesia, and sedation in intensive care medicine. Revision 2015 (DAS-Guideline 2015) - short version. *Ger Med Sci*. 2015; 13: Doc19.
28. Chanques G, Viel E, Constantin JM, et al. The measurement of pain in intensive care unit: comparison of 5 self-report intensity scales. *Pain*. 2010; 151(3): 711–721.
29. Ministry of health. Pain Scale Template (Ruler) Ver. 2018
30. Marmo L, Fowler S. Pain assessment tool in the critically ill post-open heart surgery patient population. *Pain Manag Nurs*. 2010; 11(3): 134–140.
31. Young J, Siffleet Jo, Nikoletti S, et al. Use of a Behavioural Pain Scale to assess pain in ventilated, unconscious and/or sedated patients. *Intensive Crit Care Nurs*. 2006; 22(1): 32–39.
32. Aissaoui Y, Zeggwagh AA, Zekraoui A, et al. Validation of a behavioral pain scale in critically ill, sedated, and mechanically ventilated patients. *Anesth Analg*. 2005; 101(5): 1470–1476.
33. Ahlers SJ, van Gulik L, van der Veen AM, et al. Comparison of different pain scoring systems in critically ill patients in a general ICU. *Crit Care*. 2008; 12(1): R15.
34. Ahlers SJ, van der Veen AM, van Dijk M, et al. The use of the Behavioral Pain Scale to assess pain in conscious sedated patients. *Anesth Analg*. 2010; 110(1): 127–133.
35. Gélinas C, Fillion L, Puntillo KA, et al. Validation of the critical-care pain observation tool in adult patients. *Am J Crit Care*. 2006; 15(4): 420–427.

36. Gélinas C, Puntillo KA, Joffe AM, et al. A validated approach to evaluating psychometric properties of pain assessment tools for use in nonverbal critically ill adults. *Semin Respir Crit Care Med*. 2013; 34(2): 153–168.
37. Payen JF, Chanques G, Mantz J, et al. Current practices in sedation and analgesia for mechanically ventilated critically ill patients: a prospective multicenter patient-based study. *Anesthesiology*. 2007; 106(4): 687–95.
38. Severgnini P, Pelosi P, Contino E, et al. Accuracy of Critical Care Pain Observation Tool and Behavioral Pain Scale to assess pain in critically ill conscious and unconscious patients: prospective, observational study. *J Intensive Care*. 2016; 4: 68.
39. Payen JF, Bru O, Bosson JL, et al. Assessing pain in critically ill sedated patients by using a behavioral pain scale. *Crit Care Med*. 2001; 29(12): 2258–2263.
40. Desbiens NA, Mueller-Rizner N. How well do surrogates assess the pain of seriously ill patients? *Crit Care Med* 2000; 28:1347–1352
41. Gélinas C. CPOTHandout.pdf. Retrieved from <http://kpnursing.org/professionaldevelopment/CPOTHandout.pdf>
42. Chanques G, Payen JF, Mercier G, et al. Assessing pain non-intubated critically ill patients unable to self report: an adaptation of the Behavioral Pain Scale. *Intensive Care Medicine*. 2009. 35:2060.



