

THE INCIDENCE AND TYPES OF PAIN IN ICU

In published studies 70-80% of patients remembered having moderate to severe pain in ICU. Even more (80-90%) remembered pain or discomfort relating to endotracheal tube position and tolerance. Recall of pain is high during the immediate period after ICU discharge, but studies show that many patients remember pain for many months or longer. These can be traumatic and distressing memories. Recalling pain is associated with greater risk of post-traumatic stress following critical illness and lower quality of life.

TYPES OF PAIN IN THE ICU

It is useful to consider the types of pain an individual patient may be experiencing under several headings, as this may influence the **choice of treatment** (for example choice of drug) and the **timing of treatment** (for example intermittent bolus versus continuous infusion).

Pre-existing pain

Patients may have **pre-existing conditions** associated with significant pain. These include arthritis, back pain, chronic pancreatitis, or chronic pain syndromes. These patients may already take analgesics that require continuation or alter the sensitivity to typical analgesic doses in intensive care.

Pain at rest

ICU patients often experience pain and physical discomfort at rest **related to their acute illness**. These could include surgery, fractures, bruising, burns, acute pancreatitis or other inflammatory conditions. In addition, pain may relate to **interventions required during ICU care** such as chest drains, endotracheal tubes, intravenous catheters, and nasogastric or rectal tubes. In addition, **pain related to prolonged immobility** such as joint and muscle stiffness may contribute.

Procedural Pain

Essential procedures such as **removal of chest drains** and **wound care** are frequent causes of pain in ICU patients. Other causes of pain include endotracheal suctioning, physiotherapy, and mobilisation. Insufficient treatment of procedural pain is a major problem, and patients often receive inadequate analgesia prior to procedures. It is estimated that **less than 25%** of patients receive adequate analgesia for procedures in ICU.

WHAT FACTORS EXACERBATE PAIN AND DISCOMFORT IN AN ICU PATIENT?

The perception or experience of pain is influenced by many factors other than the injury or process directly causing damage to tissues. These factors are especially relevant to patients who are managed in more awake states. Trends to use less sedation in ICU increase the importance of an awareness of these factors and the attempts to reduce their contribution to pain and discomfort.

- **Fear-** many patients experience fear in ICU as a result of being in a strange environment this can be associated with feelings of helplessness or lack of control.
- **Memory-** Patients often have difficulty remembering or understanding the circumstances that led to their admission to ICU. This may contribute to acute pain or memories of pain.
- **Anxiety-** Many patients have feelings of uncertainty and anxiety about their situation, what is happening at home, and how their family are coping.
- **Noise-** Background noise such as alarms, phones ringing, admissions and discharges are a constant irritation to patients in ICU and disrupts rest and sleep.

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- **Sleep-** *In ICU normal sleep patterns are disturbed. This may increase stress and fatigue, and may contribute to the experience of pain.*
- **Communication-** *An inability to communicate while on mechanical ventilation can lead to frustration and anger and can intensify the patient's perception of pain and discomfort.*
- **Sensory-** *Feelings such as thirst, hunger, feeling too hot or too cold perhaps feeling nauseous or itchy are all uncomfortable sensations for the ICU patient and can equally exacerbate a patient's perception of pain.*

ADVERSE EFFECTS OF PAIN

The adverse effects of pain on the individual can be **physiological** and **psychological**:

Physiological- *Pain induces the stress response which can result in increased circulatory catecholamines. This causes vasoconstriction which may reduce tissue perfusion, worsen organ function, and increase stress on the heart. Pain can also increase metabolic rate causing lipolysis, hyperglycaemia and breakdown of muscle to supply a substrate of protein. These factors may increase muscle breakdown, impair wound healing and increase the risk of wound infection. The physiological response to pain can also alter immune cell function (for example reducing the number of cytotoxic T cells and neutrophil phagocytic activity) which could increase the risk of infection.*

Psychological- *Studies have shown that patients who remember a worse experience of pain during their ICU stay are at greater risk of psychological problems after their discharge from ICU. These include traumatic memories and post-traumatic stress disorders. These patients also describe poorer quality of life. Patients who suffer significant pain during their ICU stay may also be at greater risk of chronic pain.*

Key point: Inadequately treated acute pain in ICU patients is associated with greater physiological stress during ICU care. It is also associated with long term unpleasant memories of pain, and important complications such as post-traumatic stress and chronic pain syndromes.

ASSESSMENT OF PAIN

The International Association for the Study of Pain (2010) made the following important statement

"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".

This is especially relevant to patients in ICUs because factors such as endotracheal intubation, altered conscious level, sedation, and delirium all reduce normal verbal communication.

The most reliable method for detecting and rating pain is **self-reporting by the patient themselves**, using visual or numeric rating scales. When this is not possible, as is often the case in mechanically ventilated ICU patients, other methods need to be used to assess pain.

QUIZ - RECOGNISING PAIN IN ICU PATIENTS

QUESTION 1

Are physiological variables such as tachycardia, hypertension, tachypnoea, sweating and pupillary size reliable indicators that the patient is experiencing pain?



True



False

Correct. Physiological variables are not reliable indicators of pain as they may change as a result of many factors during critical illness that are unrelated to pain. This means that although they may be quite sensitive indicators (many patients in pain will have hypertension, tachycardia, sweating or large pupils), they are not specific (many factors other than pain cause these in ICU). Importantly, many patients experiencing pain will not have these signs. Alterations in physiological variables should be used as a sign or a cue to carry out further pain assessments.

QUESTION 2

Are patient behaviours such as grimacing, increased muscle tone, and resistance to ventilation reliable indicators of pain?



True



False

Correct. These are behaviours that are strongly associated with the presence of pain and discomfort. These clinical signs are the basis of **Behavioural Pain Scales**, that enable an assessment of pain among patients who cannot verbalise or communicate normally. This approach requires the patient to be observable and to have intact motor responses.

QUESTION 3

A Behavioural Pain Scale is considered the best pain assessment tool.

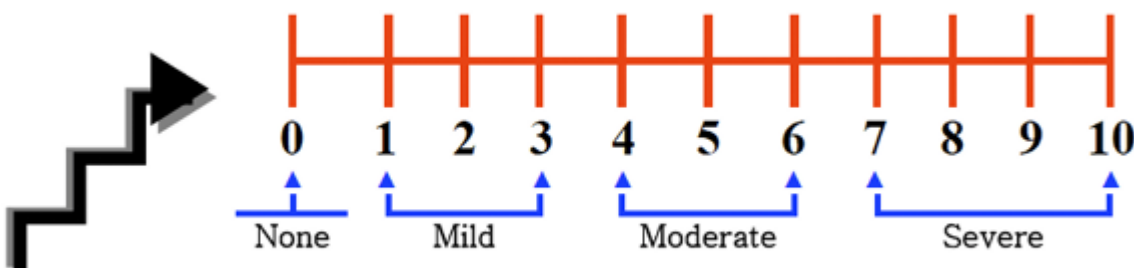


True



False

Correct. The 'gold standard' is patients self-report of pain. In ideal circumstances a clinician should encourage the patient to rate his/her own level of pain. The visual horizontal numeric system (0 to 10) has been proven to be the most valid numeric rating system tool for awake patients who can score their own level of pain.



Key point: The best way to assess pain is a self-rating scale by the patients themselves. In patients unable to communicate normally or self-rate their pain, observing and rating behaviours associated with the presence of pain are the most reliable objective methods of assessment.

THE BEHAVIOURAL PAIN SCALE (BPS)

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

The Behavioural Pain Scale is based on a total of 3 behaviours.

- 1) Facial Expression
- 2) Movement
- 3) Compliance with mechanical ventilation

The range of score for the BPS is 3 (no pain) to 12 (severe pain). Patients who score 6 or more are likely to be in significant pain.

The BPS has been shown to be **reliable** (good agreement between different individuals), **valid** (different scores correlate with different pain levels), and have **discrimination** (can detect differences in clinically important degrees of pain). Research studies have shown that regular use of the BPS in ICUs can improve pain management and may improve clinical outcomes.

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BEHAVIOURAL PAIN SCALE - SCENARIO

A patient appears to be grimacing and biting on the ET tube with arms fully flexed and fists clenched. He is difficult to ventilate and not synchronising his breathing efforts resulting in frequent alarms and poor oxygenation. Use the Behavioural Pain Scale to score the patient's pain.

The correct answer is 10.

SCENARIO QUESTION

What action would you take?



Administer a bolus dose of sedative and increase the infusion rate.



Administer a bolus dose of analgesia and consider increasing the infusion rate.

Correct.

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THE CRITICAL CARE PAIN OBSERVATION TOOL OR CPOT

Facial Expression	No muscular tension observed	Relaxed, neutral	0
	Presence of frowning, brow lowering, orbit tightening and levator contraction	Tense	1
	All of the above facial movements plus eyelid tightly closed	Grimacing	2
Body Movements	Does not move at all (does not necessarily mean absence of pain)	Absence of movements	0
	Slow, cautious movements, touching or rubbing the pain site, seeking attention through movements	Protection	1
	Pulling tube, attempting to sit up, moving limbs/thrashing, not following commands, striking at staff, trying to climb out of bed	Restlessness	2
Muscle tension	No resistance to passive movements	Relaxed	0
Evaluation by passive flexion and extension of upper extremities	Resistance to passive movements	Tense, rigid	1
	Strong resistance to passive movements, inability to complete them	Very tense or rigid	2
Compliance with the ventilator (intubated patients)	Alarms not activated, easy ventilation	Tolerating ventilator or movement	0
	Alarms stop spontaneously	Coughing but tolerating	1
	Asynchrony: blocking ventilation, alarms frequently activated	Fighting ventilator	2
Vocalisation (extubated patients)	Talking in normal tone or no sound	Talking in normal tone or no sound	0
	Sighing, moaning	Sighing, moaning	1
	Crying out, sobbing	Crying out, sobbing	2

The Critical Care Observation Tool is another scale based on behavioural reactions. It has been shown to have a similar performance to the BPS in ICU patients.

The CPOT requires running through a series of steps:

Step 1:

Observe the patient for at least one minute to obtain a baseline value of the CPOT.

Step 2:

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The patient should be observed during nociceptive procedures (endotracheal suctioning, position changes, wound dressings) to detect any change in the patient's behaviour to pain.

Step 3:

The patient should be evaluated before and at the peak effect of an analgesic agent to assess if the treatment was effective in relieving pain.

Step 4:

To rate the CPOT, the patient should be given the highest score observed during the observation period.

Step 5:

The patient should be given a score for each behaviour included in the CPOT and muscle tension should be evaluated last, especially when the patient is at rest because the stimulation of touch (passive flexion and extension of the arm) may lead to behavioural reactions.

TREATMENT OF PAIN IN ICU PATIENTS

When considering how to treat pain in an ICU patient the following steps should be taken. It is also important to **anticipate** pain and treat it **pre-emptively**, especially for procedural pain such as drain removal or wound care.

STEP ONE: Assess the **severity** of pain

- For patients able to rate their own pain use a self-reported pain scale and determine the site of pain and the factors worsening it
- For patients unable to communicate or self-rate their pain use a Behavioural Pain Scale

STEP TWO: Consider the **cause** of the pain

- Is the pain present at rest? Is it related to surgery, burns, or other injuries? Is it related to endotracheal intubation or other indwelling tubes or catheters?
- Is it related to a pre-existing condition, for example arthritis, backpain, a chronic pain syndrome or other chronic disease?
- Is it procedural pain, for example tracheal suctioning or physiotherapy

STEP THREE: **First line** management

- IV opioids are the first line therapy for acute pain in the ICU setting
- Pain at rest may require *continuous infusions* of opioids, although intermittent dosing or skin patch delivered dosing may be suitable for some patients
- Procedural pain requires *bolus dosing*, preferably **before** the procedure is undertaken
- For some patients, especially following surgery, regional analgesia using epidural or peripheral nerve block may be indicated.

STEP THREE: **Second line** management

- Patients with pre-existing chronic pain syndromes or regular analgesia may require these medications in addition to first line acute pain management. These agents may include gabapentin, carbamazepine and other agents. When these agents are used the potential

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for interaction with other drugs and/or accumulation due to organ failures should be considered

- Patients with chronic analgesic addiction may require regular replacement, for example oral methadone
- The use of paracetamol (acetaminophen), non-steroidal anti-inflammatory drugs (NSAIDs), ketamine, and other agents may all be appropriate depending on organ function and the risk of side effects. These agents may decrease the requirement for opioids.

STEP FOUR: Complementary and adjunctive therapies

- Therapies that reduce anxiety and stress may improve the experience of pain in ICU patients. These may include relaxation therapies or environmental interventions, for example to reduce noise and facilitate sleep. These are unlikely to be sufficient in isolation.

SUMMARY

Pain is extremely common in ICU patients, and is often unrecognised or poorly treated. Many patients remember pain after ICU discharge, and this is associated with several important long term problems including chronic pain and post-traumatic stress.

Causes of pain can be usefully classified as:

- Pre-existing: present before the illness resulting in ICU admission
 - Pain at rest: related to the acute illness or ongoing treatment
 - Procedural pain: related to specific procedures or treatments
- Ideally, a patient self-reported scale should be used to assess pain.

When communication is not possible scales based on the patient's behaviour should be used.

Opiate drugs by infusion or bolus are the first line treatment of pain in the ICU.