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PAIN ASSESSMENT AND MANAGEMENT IN CHILDREN

Sandhya P.*

M. S. Ramaiah Institute of Nursing Education and Research, MSR Nagar-Bengaluru, Karnataka, India-560056.

***Corresponding Author: Sandhya P.**
M. S. Ramaiah Institute of Nursing Education and Research, MSR Nagar-Bengaluru, Karnataka, India-560056.

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ABSTRACT

Childrens are the age group of birth to 18 years old. Research studies has said that children perceive more pain than adult. But because of negligence and not inadequate knowledge regarding pain assessment and management in children they are neglected and pushed into complication. So priliminarily pain need to be assessed using appropriate scale according to age and maturity and treatment need to be given. Pain is a existing whenever they say it does rather than whatever the experiencing person says.

INTRODUCTION

Pediatric patients are the most under treated and present to hospital for pain compared to adults, because of the wrong belief that they neither suffer pain nor they remember painful experiences.

DEFINITION

An unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage.

International Association for the Study of Pain (IASP)

SOURCES OF PAIN

Premature infants

- Neonatal intensive care unit procedures
- Ventilator
- Heel sticks
- Airway suctioning
- Repeated handling

Newborn period

- Diagnostic and therapeutic procedures, minor surgery
- Continuous pain
- Pain from thermal/chemical burns,
- Postsurgical
- Inflammatory pain

- Chronic or disease-related pain
- Diagnostic and therapeutic procedures(Repeated heel sticks, Indwelling catheters)
- Necrotizing enterocolitis
- Nerve injury
- Thrombophlebitis

Healthy infants

- ✓ Diagnostic and therapeutic procedures(Heel lances, Vaccination)
- ✓ Surgical incision
- ✓ Colic
- ✓ Pain due to eruption of teeth
- ✓ Disease condition: inflammatory process

Children

- Diagnostic and therapeutic procedures(Heel lances, Vaccination)
- Surgical incision
- Accidents: Muscle spasm/fracture
- Disease: Tissue inflammation

TYPES OF PAIN

Category	Sub-classification	Description
Pathophysiological	Nociceptive pain	This type of pain arises as the tissue injury activates specific pain receptors named **nociceptors,** which are sensitive and responds to noxious stimuli such as oxygen deprivation, tissue disruption or inflammation. It can be somatic or visceral pain based on the site of the activated receptors
	Neuropathic pain	This type of pain arises when the abnormal processing of sensory input recognized by the peripheral or central nervous system
Etiological	Non-malignant	It includes the pain due to chronic musculoskeletal pains, neuropathic pains, visceral pain (like distension of hollow viscera and colic pain) and chronic pain in some specific anemia. Rehabilitation care is there main treatment protocol.
	Malignant	This is the pain in potentially life-limiting diseases such as multiple sclerosis cancer, HIV/AIDS, end stage organ failure, amyotrophic lateral sclerosis, advanced chronic obstructive pulmonary disease, Parkinsonism and advanced congestive heart failure. These illnesses are indicating for similar pain treatment that emphases more on symptom control than function.
Based on duration	Acute	This is pain of recent onset and probable limited duration. It usually has an identifiable temporal and causal relationship to injury or disease. Most acute pain resolves as the body heals after injury.
	Chronic	It is the pain which lasts a long time mostly 6 months, which commonly persisting beyond the time of curing of an injury and may be without any clearly identifiable cause.
Based on location		Pain is classified by body Site (e.g. on head, on the back or neck) Anatomic function of the affected tissue (e.g. vascular, rheumatic, myo-fascial, skeletal, and neurological)

Development of Pain Systems During Fetal Period.

FETAL AGE (Weeks)	NEURAL DEVELOPMENT
7	Skin receptors and sensory nerves around the mouth
8–10	Cortex begins to form
13	Maturation of neurons in the dorsal horn of the spinal cord
15	Sub plate zone of the cortex formed (signaling station)
16	Non thalamic fibers reach the cortex; appearance of hormonal and circulatory stress responses
18	Thalamic fibers enter the cortex
19	First EEG signals recorded
20	Skin receptors and sensory nerves present throughout the fetus; amygdala, hippocampus, and subcortical areas developed and functional; thalamic fibers completely penetrate the cortex; responses to light, sound, touch, and taste recorded
32	Appearance of inhibitory mechanisms

CLINICAL FEATURES OF PAIN
Newborn babies (preterm)

Physical	Physiological	
Not violently oppose/ loudly cry Cringing, posture, sweating Facial frowning , grimaces Limb withdrawal	- Tachycardia, Sweating, - Elevation of blood pressure and intracranial pressure - Hypoxia, hypercarbia, increased in pulmonary artery pressure	**Stress related Biochemical and hormonal responses:** - Epinephrine/non-epinephrine, glucagon/aldosterone/corticosterone, - Hyperglycemia - Elevation serum lactate and pyruvate levels **Autonomic signs**: Nonspecific pain, fever, hypoxemia, and Cardiac/ Renal dysfunction

Infants

Typical responses	Autonomic signs	Other
Increase in ✓ Heart rate, respiratory rate, blood pressure, ✓ Intracranial pressure, **Decrease in** ✓ Transcutaneous oxygen saturation ✓ carbon dioxide levels, ✓ Peripheral blood flow	✓ Changes in skin color, ✓ vomiting, gagging, hiccupping, ✓ Dilated pupils, ✓ Palmar and forehead sweating.	✓ Facial expression, ✓ body movements, ✓ agitated/irritable/asleep, ✓ High-pitched cry and any other atypical functional behaviors ✓ Stiffness of the body ✓ Refuse eating

CHILDREN

- ✓ Crying
- ✓ Nonverbal expressions of pain (Facial expressions)
- ✓ Physical cues (Avoiding contact with other children, Decrease in physical activity, Comfort Position)
- ✓ Changes in appetite/sleep pattern
- ✓ Crankiness, irritability, or unruly behavior
- ✓ Short naps, grunting/breath-holding

TOOL FOR PAIN ASSESSMENT

- ◆ According to Character, location, quality, duration, frequency, and intensity of their pain
- ◆ Pain experienced by infants and children is not effectively identified or managed in many cases.
- ◆ Self-reporting of pain is the gold standard for assessment of the site, nature, and severity of pain and it is not precisely applicable in children below 3 years of age.
- ◆ Behavioral changes, the facial expression of the baby is considered the most reliable and consistent indicator.
- ◆

Stage	Age	Name of The Pain Assessment Scale
Neonate	Birth One Year	Neonatal Infant Pain Scale (NIPS)
	Neonatal postoperative pain	**CRIES** (Crying, Requires oxygen for saturation>95%, Increased vital signs, Expression, sleepless)
	Neonates and infants 3-6 months of age	Modified Pain Assessment Tool (MPAT)
Infants	2 months - 7 years	FLACC scale(The Face, Legs, Activity, Cry, Consolability scale)
	Birth - 4years	Children's Hospital of Eastern Ontario Pain Scale(CHEOPS)
Preschooler	4 yrs. and older children	Wong-Baker Faces Pain Rating scale Visual analogue scale(VAS)

1. **Neonatal Infant Pain Scale (NIPS):** Birth - One Year(full-term and pre-term infants)

- Non-verbal pain scales

	Parameter	Finding	score
1	Facial expression	Relaxed	0
		Grimace	1
2	Cry	No cry	0
		Whimper	1
		Vigorous crying	2
3	Breathing patterns	Relaxed	0
		Change in breathing	1
4	Arms	Restrained	0

Interpretation

0-2	Mild - No pain
3-4	Mild - Moderate pain
>4	Severe pain

2. **CRIES (**Crying, Requires oxygen for saturation>95%, Increased vital signs, Expression, sleepless)

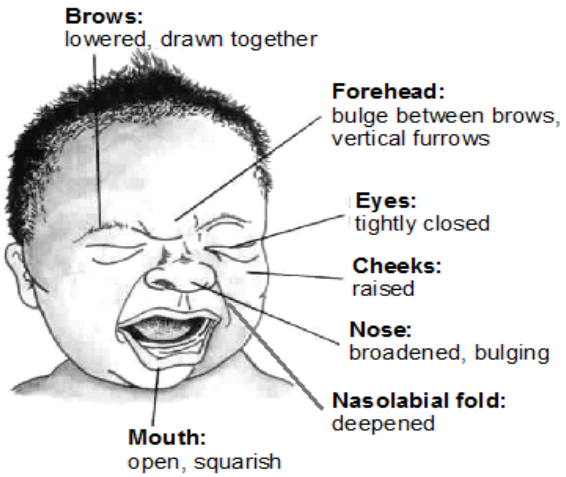
Neonatal postoperative pain measurement score.

Parameters	0	1	2
Crying	No	High pitched but consolable	Inconsolable
Requires oxygen for saturation>95%	No	FiO2<30%	FiO2>30%
Increased vital signs	No	Heart Rate or Blood Pressure <20%	Heart Rate or Blood Pressure >20%
Expression	No	Grimace	Grimace and grunt
Sleepless	No	Wakes often	Constantly awake
Interpretation			

Score <4	Initiate non pharmacologic measures
Score >4	Initiate pharmacologic and non-pharmacologic measures

3. Modified Pain Assessment Tool (MPAT)

- Assessing pain in neonates and infants 3-6 months of age and all patients admitted to Neonatal Intensive Care (NICU).



Facial expression of physical distress and pain in the infant

Modified Pain Assessment Tool (MPAT)			
Parameters	**0**	**1**	**2**
Posture/tone	Relaxed Normal Some flexion	Extended Digits wide spread Trunk rigid Limbs abducted Shoulders raised off bed	Flexed / tense Fist clenched Trunk guarded Limbs drawn to midline Head / shoulders resist posturing
Cry	No	Yes Consolable Can be settled	Yes When disturbed Does not settle after handling Loud Whimpering Whining
Sleep pattern	Relaxed	Easily woken	Agitated/ Withdrawn Wake with startle Restless Squirming No clear sleep/ wake pattern Eye aversion/ “shut out”
Expression	Relaxed Normal	Frown Shallow furrows Eyes lightly closed	Grimace Deep furrows Eyes tightly closed

			Pupils dilated
Color	Pink, well perfused	Ocassionally mottled or pale	Pale/ dusky/ flushed Palmar sweating
Respirations	Normal baseline rate	Tachypnea At rest	Apnea At rest/ with handling
Heart rate	Normal baseline rate	Tachycardia At rest	Fluctuating Spontaneous/At rest
Oxygen saturation	Normal	Fleeting desaturation	Desaturation with/without handling
Blood pressure	Normal	Fluctuating with handling	Hypo-/hypertension at rest
Nurse perception	No pain perceived by me	I think the baby has pain only with handling	I think the baby is in pain

Interpretation of pain

- Total score -20 (the higher the score, the higher the level of pain).

MPAT Score	Intervention
<5	Nursing Comfort Measures
>5	Paracetamol/Clonidine/Other Non-Opioid Analgesia with Nursing Comfort Measures
>10	Opioids with Non-Opioid Analgesia/Analgesia Dose Adjustment with Nursing Comfort Measures

5. FLACC scale(The Face, Legs, Activity, Cry, Consolability scale)

✓ The ages of 2 months and 7 years or individuals that are unable to communicate their pain

Criteria	Score 0	Score 1	Score 2
1. Face	No particular expression or smile	Occasional grimace or frown, withdrawn, uninterested	Frequent to constant quivering chin, clenched jaw
2. Legs	Normal position or relaxed	Uneasy, restless, tense	Kicking, or legs drawn up
3. Activity	Lying quietly, normal position, moves easily	Squirming, shifting, back and forth, tense	Arched, rigid or jerking
4. Cry	No cry (awake or asleep)	Moans or whimpers; occasional complaint	Crying steadily, screams or sobs, frequent complaints
5. Consolability	Content, relaxed	Reassured by occasional touching, hugging or being talked to, distractible	Difficult to console or comfort

INTERPRETATION

0	Relaxed and comfortable
1–3	Mild discomfort
4–6	Moderate pain
7–10	Severe discomfort or pain or both

6. **Children's Hospital of Eastern Ontario Pain Scale (CHEOPS):** Mitchell (1999)

- Behavioral scale for evaluating postoperative pain in young children. (0-4 years).

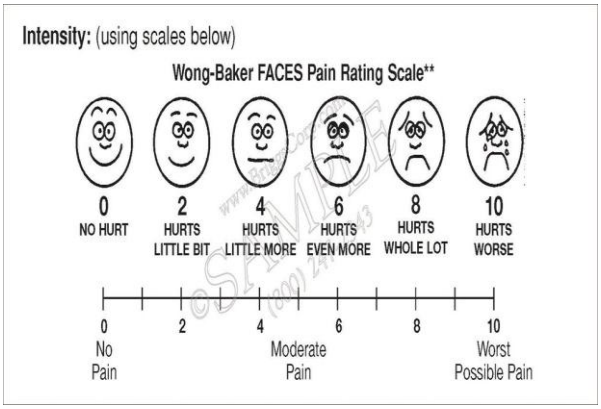
	0	1	2	3
1. Crying	-	High pitched	Inconsolable	-
2. Requires oxygen for saturation >95%	-	<30%	>30%	-
3. Increased vital signs	-	Heart rate and blood presure less than or equal to preoperative state	Heart rate and bloodpressure increase <20% of preoperative state	Heart rate and bloodpressure increase >20% of preoperative state
4. Expression	None	Grimace	Grimace/grunt	-
5. Sleepless	-	Wakes at frequent interval	Constantly awake	-
6. Legs	Neutral	Continous move kicking	Streched	-

Interpretation

Minimum score	4
Maximum score	13

7. Visual analogue scale(VAS)/ Wong-Baker Faces Pain Rating scale

- 8 yrs and older children. Evaluate Fear in patients with painful medical conditions.



❖ PAIN MANAGEMENT

Prevention: The best approach to management of pain is prevention

- Limit potentially painful procedures and administer appropriate analgesics when pain is anticipated or prior to procedures.
- Avoiding sampling and painful procedures during sleep cycles
- Moistening tapes before removal

Non-pharmacological Interventions

- Positioning and restraining the infant in a relatively flexed/comfortable posture.
- Stimulation of nerve fibres transmitting tactile and thermal sensations.
- Allow self-soothing maneuvers (thumb sucking, pacifiers, clinging to blanket, rocking)
- **Distraction** (Bubbles, music, video games, television, the telephone, conversation, school, and play.
- **Repositioning**
- Positioning the neonate, appropriate to their gestational maturation, supporting limbs/ trunk and taking care with any attached lines or equipment's (i.e. supine or side lying).
- Use of Rolls/ nests to give position
- **Mummification:** Neonates can be wrapped in a cloth or blanket, with their arms and legs tucked in, to make them feel secure.
- **Kangaroo Care Mother :-** Nursing of the neonate on the bare skin of their mother or father, upright at a 40-60 degree angle
- Breast feeding
- Ice pack /Sponge
- Feeding of sweet compounds such as sucrose, glucose
- Minimal handling of sick babies
- Not sticking adhesive tapes onto hair
- **Modification of procedure techniques** used for diagnostic and therapeutic procedures.
- Infants show significantly fewer signs of pain during heel puncture with the use of mechanical lancets as opposed to manual lancets
- Venous puncture for blood sampling is reportedly less painful than heel puncture
- **Facilitated tucking**: Holding a neonate so that their limbs are in close proximity to the trunk in side lying with flexed position.
- **Containment holding**: Use two hands to hold the baby and make them feel secure. Decreasing environmental sensors (noise/ light)
- **Tactile soothing** : Gentle touch/ Talking to neonate
- Change the diaper regularly
- **Clustering, developmental or cue based care**: Grouping care to minimize the number of times a neonate is handled.
- Minimize handling neonates of neonates especially with cold hands
- **Relaxation techniques-** Controlled breathing and progressive muscle relaxation are used for preschool-aged and older children.
- **Individual psychotherapy** (Cognitive, behavioral, and psychologic)
- **Family education and/or psychotherapy** : Help parents cope with their own and their child's distress; and develop a plan for the child's optimal self-management of symptoms and independent functioning.
- **Music, art, dance, and aromatherapy**
- **Integrative team approach:** Develop a communication plan among the different therapists, so all therapists are giving the same messages to the child and parent .
- **Hypnotherapy**: Focus on an imaginative experience that is comforting, safe, fun. This intervention is best for children of school age or older.
- **Biofeedback** (Controlled breathing, relaxation, or hypnotic techniques with a mechanical device that provides visual or auditory "feedback" to the child when the desired action is approximated)
- **Yoga**: A series of asanas (body poses) that are oriented for the specific medical condition or symptoms. pranayama may be learned for added benefit.
- **Massage therapy**: pain in children with juvenile rheumatoid arthritis/cancer/fibromyalgia using deep tissue massage is helpful with myofascial pain.
- **Physical therapy:** children with chronic musculoskeletal pain
- **Acupuncture:** Chronic nausea/fatigue/chronic pain (migraines, chronic daily headaches, abdominal pain, myofascial pain, sickle cell crisis pain, and sore throat pain).

- **Transcutaneous electrical nerve stimulation** (TENS) is quite safe and can be tried for many forms of localized pain.

❖ **Pharmacological Interventions**

Indication Based on Pain Intensity

• Stage 1 – Non-opioid +/- adjuvant agent for mild pain

• Stage 2 – Opioid +/- non-opioid +/- adjuvant agent. For moderate to severe pain or pain uncontrolled after Step 1.

Classification of drugs	Indication	Examples
Non-Opioids	• Mild to moderate pain • Severe pain	- Acetaminophen - Ibuprofen - Choline magnesium trisalicylate (Trilisate) - Naproxen
Non-Steroidal Anti-Inflammatory Drugs (NSAIDs)	Mild and moderate pain	- Diclofenac - Aspirin - Ibuprofen - Indomethacin
Opioids	Severe Pain Postoperative Pain Sickle Cell Disease Pain Cancer Pain	- Morphine - Methadone - Fentanyl - Meperidine
Adjuvants	Non-malignant pain	✓ Oral sucrose and glucose ✓ Topical and local anesthetics ✓ Anti-depressants (amitriptyline) ✓ Anticonvulsants ✓ Steroids ✓ Bisphosphonates and radiation therapy ✓ Neuroleptics ✓ Benzodiazepines ✓ Serotonin Reuptake Inhibitors (fluoxetine)

❖ **Adjuvants**

Oral sucrose and glucose

- Used for procedural pain
- oral dose of 0.1 to 1 mL of 24% sucrose (or 0.2–0.5 mL/kg) 2 minutes before a painful procedure
- preterm and term neonates found that the administration of 20% to 30%

Sucrose solution	**Preterm infants** **<28 wks** : 0.2 ml **28–32 wks**: 0.2–2 ml **>32 wks** : 2 ml **Term infants:** 1.5–2 ml over 2 min Administer orally via pacifier/gloved finger\

Adjuvants	Examples
Topical And Local Anesthetics	✓ Lidocaine 2.5%
Anti-Depressants	✓ Amitriptyline, Duloxetine And Venlafaxine
Anticonvulsants	✓ Carbamazepine And Valproic Acid
Steroids	✓ Prednisolone
Benzodiazepines	✓ Midazolam
Serotonin Reuptake Inhibitors	✓ Fluoxetine

Consequences of untreated pain

Infant

✓ Increased Pain Sensitivity
✓ Decreased Immune System Functioning
✓ Increased Avoidance Behavior
✓ Social Hypervigilance

Older children

✓ Anxiety
✓ Depression
✓ Irritability And Exhaustion
✓ Disturbance With Eating And Sleeping
✓ Act In “Babyish” Ways
✓ Future Pain Worse

CONCLUSION

This article helps us to gain knowledge regarding pain assessment and treatment in children using different scales and management.

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