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Behavioral Observation: An Important and Valid Outcome Measures for Assessment of Acute Pain in Children: A Review

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ABSTRACT

Background - Pain is a very frequent phenomenon during childhood; it can be a symptom of an acute or chronic illness or may occur as a part of routine medical care like immunization. All types of pain lead to distress which is exhibited through behavior. Most of the people engage in these behaviors when in pain. For younger children or those with developmental delays often where communication is difficult, behavior is the only indicator of distress, as well as the degree of pain.[2] Those behaviours that indicate that an individual is experiencing pain are called pain behaviours. They include behaviors such as resting, guarding, grimacing, asking for help, taking medication, and other observable behaviors. Behavioral measures consist of an assessment of crying, facial expressions, body postures, and movements. Those children who cannot verbalize like newborns, infants, and younger children these measures are the only way to assess pain.
Objective- To identify and report that behavior is an important indicator of pain and behavioral observation used as outcome measures for the assessment of pain in children in the published journal articles.
Methods- The study started by exploring the literature on the topic from various sources. Titles and abstracts were screened .articles involving children (neonatal period to school age) e. using at least one appropriate behavioural outcome measure for pain assessment or assessment of behavioral distress. A descriptive summary of obtained information was prepared
Conclusions- As children cannot express and quantify their pain due to their yet developing cognitive verbal and ability (Oakes, 2011)[3] and other developmental factors. Therefore it's an important responsibility health care worker to assess a child's pain through behavioral assessment. Based on these assumptions the number of pain scales based on behavioral observations has been developed. Multidimensional pain scales should be utilized to determine the level of pain so that pain can be effectively managed. Behavioural observations are found to be the most widely used tool for assessment of the degree of pain among various researches

Keywords: Children, pain, pain assessment, pain scale, Self-report, Behavioral observation, Behavioural responses to pain and evidence-based practice

INTRODUCTION

Pain is the most common cause of distress. Such discomfort and distress reduce productivity thus; its damaging effect on society is enormous. Unfortunately, pain is a very frequent phenomenon during childhood. Pain can be a manifestation of diseases or it is sometimes induced as an element of routine medical care. Pain is a part of childhood as during a growing period they experience frequent bumps, bruises, and injuries

because they acquire coordination and adapt to their quickly developing body. Children are prone to various medical illnesses which makes them more prone to physical pain as well as immunization doesn't spare pain. The International Association for Study of Pain has defined pain as "an unpleasant sensory and emotional experience" associated with actual or potential tissue damage.[1]As pain leads to physiological, psychological changes, and the discomfort felt by an individual is expressed in the form of negative emotions so that person is aware of and adjust to tissue trauma. All types of pain lead to distress which is exhibited through behavior. Most of the people engage in these behaviors when in pain. (Turk 2011).[2]

Assessment is the most important aspect of facilitating effective for pain management.[3]Acute and chronic pain not properly assessed can result in inadequate pain management outcomes and can negatively affect the physical, emotional, and psychosocial well-being of patients.[4]When it comes to the assessment of a child it becomes very challenging as the children have yet in the process of developing communication and intellectual skills thus they can's verbalize their pain as similar to adults.[2,5,6] In such occasions, observation of physiological parameters and behavioural changes becomes an important element.[7] This review aims to *find out behavior is an important indicator of pain expression and it can be an important and valid outcome measures for assessment of acute pain in children.*

METHODS

The study started by exploring the literature on the topic from various sources and in various databases like Pub Med, Cochrane Library, MEDLINE, Science Direct, Clinical Key, Google Scholar, etc. published in English. Studies were searched using terms like Children, pain, pain assessment, pain scale, Self-report, Behavioral observation of pain, behavioural distress, pain assessment criteria's physiological measures, evidence-based practice. Each key term was combined with assessment of children.

For the review descriptive, quantitative, and qualitative articles mentioning behavioral assessment of pain, Studies that used a minimum of one appropriate behavioral outcome measure for pain assessment or assessment of behavioral distress for youngsters.

Articles, in which pain is assessed only through self-report o proxy reporting and adult pain assessment, were excluded.

BEHAVIOURAL EXPRESSION OF PAIN AND PAIN ASSESSMENT -

"Behaviour is a specific response of the certain organism to a specific stimulus or group of stimuli. It may occur be response during any usual or particular conditions."[8]

When an individual experiences pain certain bodily reaction occurs spontaneously. These observable behaviours includes crying, facial grimace, guarding the organ, changing body postures, muscular rigidity, whole or partial body movements.[9] Sometimes individuals may ask for a massage, medication, or any other therapy. Those behaviours that indicate that an individual is experiencing pain are called pain behaviours.

Behavioral expression, "an important indicator of pain among children"

Pain appraisal is considered as the foundation of pain management. Since pain is a subjective as well as a multidimensional experience. It is recommended that every time possible the existence and intensity of pain are measured by self-report.[10]It is seen that most of the time child's pain experiences are judged similar to that of an adult. But children react very differently than adults when in discomfort. They are not just a miniature of an adult As all types of pain lead to discomfort and it is depicted through behavior by a child.[11] For infants, young toddlers elderly, patients with dementia, unconscious patient, a person

with intellectual disability from whom self-report cannot be obtained, observation of behavior is a valid approach to pain assessment.[2,9,11,12]

These measures are more frequently used for small children or children with verbal or expressive inability who cannot verbalize the severity of pain and then behaviour is the only indicator of distress as well as the degree of pain.[9,13] According to McGrath, the behavior of children during invasive procedures is widely individual and dependent on the degree of perceived pain.[10] Behaviour measures can even complement and validate self-reported pain.

FACTORS GOVERNING PAIN BEHAVIOUR EXPRESSION-

Pain is considered as a Bio Psycho Social Phenomenon (Allison Twycross 2007) [13] Pain is significantly more complex than expected response to a sensory stimulus(Czarnecki et al.,2011).[14,2]An individual's response to a painful stimulus is influenced by the perception of pain and mediated by a number of factors. Developmental stage, emotional state, temperament, culture, previous experiences, type of procedure, coping skills, environment, and responses of caregivers and practitioners can be the factors influencing pain (Blount, Piira, Cohen, & Cheng, 2006; Czarnecki et al., 2011; Kuttner, 2004).[9,10,14]

Developmental Responses To Pain- Von Baeyer and Spagrud, 2003 stated that All along developmental period, orderly transformations happen in the expression and communication of pain.[15]before the preschool age fastest developmental changes occur in the expression of pain. Therefore special consideration for pain assessment was recommended during neonatal and infancy periods. [15]

The Cognitive Development and Emotional Behavior Development go hand in hand

Children's perception of pain appears to evolve through the stages of cognitive development as described by Piaget (O'Keeffe N 2001)[16].

Gender-Sensitivity, expression, and tolerance of pain among males and females are likely influenced by a variety of social and psychological processes.[17,18,19] Studies show that gender roles have been linked to pain response.[19,20]

Psychological factors –

- Fear-Perception and expression of pain are highly influenced by the fear of a child.[21,22] many a time it is not easy for children to discriminating among the sensory experience of pain and the affective response (i.e., distress or fear) to painful sensations (Turk 2010).[2,23]
- Previous experience- Fitzgerald and Bergs, state that previous experience with pain can affect behavior during future painful stimuli.[24,25] About 50% of 3- year-olds cry before an injection, suggesting that because of the previous experience they anticipate and fear the pain of their imminent injection .[26]
- Temperament- General nature of a child's behaviour style characteristic or mood of individual influences perception and reaction towards pain. [27]

Social factors

- Culture and expression of pain behaviour- Cultural differences may affect individuals responses to pain and distress during pain It may even influence the way it is expressed.[28.,29]Research indicates that in comparison to Northern Europeans, Southern Europeans are more likely to verbalize their distress (Pedro et al., 2009).[30] Moreover, cultural origin may further influence parents' anxieties during invasive procedures (Pfefferbaum, et. al.1990). Mothers in India give explanation-oriented and problem-focused responses to their children's emotions (Raval V.et al 2013)[31]. A study found that Indian children both from the old city and suburban areas were less likely to report anger, sadness, and pain expressed by then even direct verbal expression than children of the developed country.[32]

- Family and Caregiver's influence expression of pain behavior-Behavior of parents and healthcare professionals have also been associated with children's distress and coping during painful procedures.[33,34]Adults' instructions to use coping strategies, humor, and nonprocedural talk.[25] Blount,et al.1994 , Khan & Weisman, 2007 found that parental anxiety behaviours like giving apologies, empathetic comments, praise, and reassurance to the child are connected with expression more of a child's distress. Even adult distress promoting vocalizations may be antecedent to child distress verbal communication.[9,17,35]

PAIN ASSESSMENT SCALES BASED ON BEHAVIOURAL OBSERVATION

There are many pain scales for assessing pain in children. Self-report, behavioral, and physiological measures are the main methods that are currently used to measure pain intensity: According to Paesero Mc Caffery 2011 the hierarchy of assessment should be Self-report, Identify the cause of pain, and then History of pain, Observation of behaviour using pain behaviour assessment tool.[9] (Pasero& McCaffery, 2011,Herr Keela,2012) [6,9,,12,15,36,37,38]

Verbal children who can express pain can report the severity and characteristics of pain through self-report.[37] Physiological measures include assessment of heart rate, blood pressure, respiration, oxygen saturation, palmar sweating, and sometimes neuro-endocrine responses. It is not always possible to obtain a verbal report of pain and the degree of reporting depends on child's level of understanding. [29, 30,38]Thus behavioural observation can be used widely and as a valid measure for the assessment of pain.

Parents and caregivers are aware of a child's typical behavioral response to pain. Thus they can identify the presence of pain and can give an impression of severity.
Physiological, behavioural observation, or caregiver's report are used when child cannot verbalize or express or it can be used to supplement or validate the subjective report.(Fig 1)

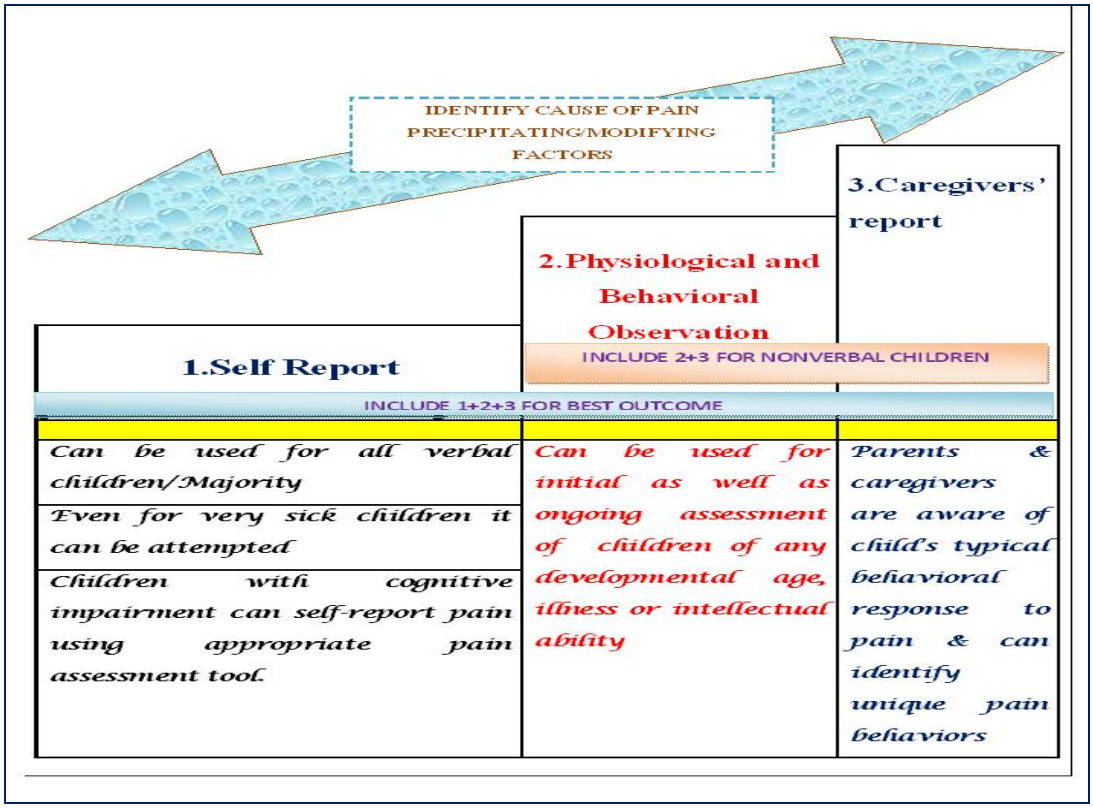

Fig 1: Pain Assessment Hierarchy In A Child

BEHAVIOURS INDICATING PAIN- Generally, the pain will cause some change in normal behavior. Since parents know their children and occur. These behaviours will further change with the severity of pain. Thus, it is important to observe and interpret the child's behaviour.[15]

- *Facial expression*- These are typical behavioural clues indicating pain. They provide cues to distress or discomfort experienced. Changes in facial expression during pain may include[29,39,40]
  - Clenched teeth
  - Opened mouth
  - Wrinkled forehead
  - Quivered Chin
  - Biting lips
  - Opened mouth
  - Scowling
  - Closing eyes firmly
  - Widely opened eyes
- **Vocalizations and verbal expression-** Vocalization and verbal expression of pain depend on the developmental characteristics, language development, verbal ability, consciousness, and also the cultural factors some of the vocalization expressions may include[40]
  - Crying
  - Moaning
  - Gasping
  - Groaning
  - Grunting
  - Screaming
- **Body Movements-** Pain causes certain body movements as a sign of discomfort or as a protective mechanism.[38],[41] The expressions of vocalization may include
  - Restlessness
  - Protective body movement
  - swaying
  - Muscle tension
  - resisting caregiver with limbs
  - Immobility
  - Pacing
  - Rhythmic movement
- **Social Interaction–** Researches[42] shows pain changes emotions which may affect socialization some of the change during pain is
  - Silence
  - Withdrawal
  - Reduced attention span
  - Focus on pain relief measures

- Seeking help

Types of observational or behavioral measures of pain.

Pain assessment tools are usually in the following forms

Behavior checklists. - Behavior checklist lists behaviors which are to be marked as either present or absent .[15]

Behavior rating scales. -Behavior rating scales incorporate a rating of the intensity, frequency, or duration of each behavior (McGrath et al., 1985; Ambuel et al., 1992; Gauvain- Piquard et al., 1999). [15,28]

Global rating scales. -These provide a rating of the observer's overall observation of a child's pain. Identification of typical pain-related behavior can be done by an observer who is familiar with the usual behavior of a child (von Baeyer and Spagrud, 2003). [15]

Global behaviorally anchored rating scales.- These scales give examples of behavior for various levels of pain e.g., 0 to 5, and for some or all of these levels, it provides that are likely (but are not required) to be seen at that level. Instead of patient reporting the observer selects and weighs the behaviors and based on this judgment rates it.[15]

OBSERVATIONAL MEASUREMENT OF PAIN BASED ON BEHAVIORAL RESPONSES AT DIFFERENT DEVELOPMENTAL AGE

At birth emotional behavior appear simple and undifferentiated, with age it becomes less diffuse, less haphazard, and more differentiated (Hurlock E2007).[15,43] Pre-speech forms of expression, crying facial gestures, body movement, and cooing sound are the ways how the babies express.

Newborn

Behavioural response- Generalized body movement, facial grimacing, chin quivering, refusal to feed

Verbal Response- Crying

Infants (1–12 months)

Behavioural response-Generalized body movement, facial grimacing, chin quivering, refusal to feed, Disturbed sleep, irritability, reflex withdrawal to stimulus, localized movement

Verbal Response- Crying

Pain assessment tools based on behavioural observation for Neonates and Infants

For Preterm and Full-term Neonates

Premature Infant Pain Profile (PIPP). To assess pain among preterm to full-term infants, the indicators include Gestational age, behavioral state before the painful stimulus, change in heart rate during stimulus, change in oxygen saturation, brow bulge, eye squeeze nasolabial furrow[44]

Neonatal Facial Coding System (NFCS)- For Preterm to full-term infants. It includes an assessment of brow bulge, eye squeeze, nasolabial furrow, open lips, stretched mouth (horizontal or vertical), lip purse, tout tongue, and chin quiver[45]

Échelle Douleur Inconfort Nouveau-Né, neonatal pain and discomfort scale(EDIN scale)-It includes an assessment of Facial activity, body movement, Quality of Sleep, Quality of contact with caregivers, consolability[46]

Neonatal Infant Pain Scale (NIPS) –The key assessment areas are Face, cry, breathing pattern, arms, legs, and state of arousal.[47]

For Infants

Crying Requires Increased Vital Signs Expression Sleeplessness (CRIES) –Recommended for assessment of pain among infants below 6 months by observation of crying, oxygenation, vital signs, facial expression, and sleeplessness.[48]

Maximally Discriminate Facial Movement Coding System (MAX)- To assess pain among infants . Assessment of Brow, eye, and mouth movement are included in this scale [49]

Developmental stage-

During the toddler and preschool years, the expression of pain becomes shaped increasingly by the child's growing understanding of emotions and the ability to anticipate outcomes and feelings. As they are in the p*reoperational stage* the perception of pain is like a physical event that disappears like magic[16,43]

Toddlers(1–3 years)

Behavioural response- Disturbed sleep, aggressive behavior, localized withdrawal [50,51]

Verbal Response- Crying, screaming, unable to describe the intensity of pain

Preschoolers(3–6 years)

Behavioural response- Low frustration level, active physical resistance, strikes out when hurt

Verbal Response- Able to identify the location, intensity, and characteristics of pain

A school ager is in the concrete operational stage that can identify the location of the pain as they are aware of the fact and know about internal organs in the body.

School-age(7–9 years)

Behavioural response- Resists passively, holds body rigidly, emotional withdrawal, plea bargains for relief of pain, Facial Grimace

Verbal Response- Able to identify the location, intensity, and characteristics of pain

School-age(10–12 years)

Behavioural response-Facial Grimace may regress with stress and anxiety, pretend not to hurt to project bravery, perform poorly in school

Verbal Response-Able to describe the location, intensity, and characteristics in detail, including psychic pain

Adolescents (13–18 years)

Adolescents in the formal operational stage have the experience similar to the adults, but may not have developed coping mechanisms.

Behavioural response- Controls behavior to be socially acceptable, may perform poorly in school, irritable, unable to concentrate

Verbal Response-Able to give a more complete description of pain and its meaning [28, 50,51]

Pain assessment tools based on behavioural observation (Infants and older children)

Children's Hospital of Eastern Ontario Pain Scale (CHEOPS) **-**Used for children between 1to7 years of age. It includes observation of the child's cry, facial expressions, child verbal response, torso, touch, legs[52]

Modified Behavioural Pain Scale (MBPS)- is an amendment of the Children's Hospital of Eastern Ontario Pain Scale). It is composed of three behaviours: facial expression, cry and body movements. Each of the behaviours included is assessed and scored and the scores added to generate a pain intensity score from 0 to 10. [53]

The Faces Legs Activity Cry Consolability Scale(FLACC) **–**Widely used tool among 1to7 years of age. Face, legs, activity, cry, and Consolability are assessed to find out pain experienced by the child.[54,55]

Pain Observational Scale for young children (POCIS) **–** It was developed to assess pain among infants and toddlers. It includes measurement "Facial expression, cry, breathing, torso, arms and fingers, legs and toes, and states of arousal are included".[56]

Toddler-Preschooler Postoperative Pain Scale (TPPPS)-Includes Vocal pain expression, facial pain expression, bodily pain expression. It is developed for children between 1–5 years[57]

Amiel TisonScale- *A* clinical neurologic and behavioral scoring system usable from age 0 to 3 years. "It is composed of 10 items to measure the postoperative pain levels that are sleep during the preceding hour, the facial expression of pain, quality of cry, spontaneous motor activity, Spontaneous excitability, flexion of fingers and toes,

sucking, global evaluation of tone, Consolability, and sociability in an immediate postoperative setting with 10 items.[58.]

Child Facial Coding System (CFCS)- it includes facial actions: brow lower, squint, eye squeeze, blink, flared nostril, nose wrinkle, nasolabial furrow, cheek raiser, open lips, upper lip raise, lip corner puller, vertical mouth stretch, and horizontal mouth stretch are included in this scale to assess pain among 1to 6 years[59]

COMFORT Scale can be used for all children below 18 years of age. The indicators for pain assessment included are Calmness/agitation, respiratory response, physical movement, blood pressure, heart rate, muscle tone, and facial tension[60.50.]

The Observational Scale of behavioral Distress (OSBD)includes eleven behaviors related to pain and/or anxiety which can be used for toddlers preschoolers and school-agers.[61]

Brief Behavioral Distress Scale –This scale can be used for children between 1to7 years of age. It includes observation of *Noninterfering Distress Behaviors*. crying, whining, groaning, moaning, negative vocalizations that are not above conversational level, or seeking physical comfort from another person or object. *Potentially Interfering Distress Behaviors*. such as screaming, yelling, shouting, negative vocalizations that are above conversational level, obvious tensing of muscles, facial contortions, jaw clenching, tooth grinding or gritting, tightly clenched fists (not in response to being told to "make a fist"), or flinching and *Interfering Distress Behavior* such as escape or avoidance (i.e., getting up from the seat, leaving the room, leaning or pulling away from the caregiver, resisting or moving out of position, hiding, or blocking the procedure site), disruptions of medical materials, or physical aggression[62]

SOME POINTS TO BE REMEMBERED -The observational pain scales may indicate pain and it may even include negative emotions like anxiety fear anger or the efforts to cope with fear and pain. Most of the behaviours like crying restlessness clinging to parents thrashing limbs, restlessness may overlap in conditions leading to pain or other distress states unpleasantness, and fear. *We should be careful while selecting a tool to assess pain or pain-related distress*.[15]

Pain behavior in relation to duration of pain - A strong painful stimulus elicits an immediate, instinctual behavioral response including withdrawal, vocalization, and grimacing. Over the course, this overt response to pain attenuates rapidly and may be replaced by more covert responses like rigidity, silence, and guarding the affected body part. Thus, in long-term pain, an absence of visible signs of pain is common (von Baeyer and Spagrud, 2003).[15]

Implications for Practice

Prioritize pain assessment and management – Pain assessment and control should be a priority while caring but the pain is often under-assessed and unrelieved. Pain is difficult to assess as it is complex and subjective, and assessment is influenced by many factors. An addition of pain measurement tool can be very useful because it removes the subjectivity of assessment. A systematic approach for pain assessment can be adopted by this. Pain Behavior should be assessed: [63]

- Along with vital signs and giving the same importance.
- Using Standardized pain assessment methods.
- Pain assessment must be performed after each potentially painful clinical intervention and to evaluate the efficacy of behavioral, environmental, and pharmacological agents.[4]
- The Severity of pain (intensity, 0-10 scale), pain-related symptoms; and timing (occasional, intermittent, constant).

Creating awareness among health care workers- Health care workers have a moral, ethical, humanitarian, and professional

responsibility to provide an adequate standard of pain assessment and documentation. It is therefore vital that doctors, nurses and all others involved in the carr of a child is educated in the process of pain assessment. [64]

Multimodal assessment methods - Pain assessment instruments should be sensitive and specific for children belonging to different ages and/or with acute, recurrent, or continuous pain. [6, 15]Pain assessment should be comprehensive and multidimensional, including contextual, behavioral, and physiological indicators.

Developmental consideration while assessment for a child in pain is the utmost important-Consideration of child's age, motor, verbal, cognitive psychological development is an important aspect while assessment of pain to acquire an appropriate response

Behavioral changes in pain among children should be recognized - Behaviour of a child is the most important means of communication. Screening all children at risk for pain at least once a day and also by asking the person or family/care provider about the presence of pain, ache, or discomfort will improve the identification and management of pain. In situations where the individual is non-verbal, use behavioral indicators to identify the presence of pain should be used to assess pain.[4]

Special consideration for special children -For Children with communication difficulty, sick child, Children with cognitive impairment specialized scales of pain behaviour assessment should be used to plan an appropriate strategy.

History should be part of pain assessment – History is an integral part of pain assessment. Child's past behaviour, behavioral changes during illness, injury procedures .medical history are key indicators of child's status. These should be part of a routine assessment.

Reassessment and ongoing assessment of pain behavior - Reassessment of pain should be a routine variable considered for effective pain management. Pain should be reassessed on a regular basis according to the type and intensity of pain and the treatment plan.

In-service education-Knowledge of Indicators of pain and anticipation of pain- Manworren 2000, Twycross 2004 found that knowledge deficits were apparent in many areas including pain assessment, pharmacological, and Non-pharmacological management.[65] Incorporating clinical scenario simulation, teaching rounds improve knowledge in practice.

Evidence-based assessment tools for pain behaviour - There is a need for the development and validation as well as utilization of evidence-based assessment tools for accurate identification of pain among children.

Development and utilization of behavioral assessment tools based on cultural and ethnic differences – Pain assessment tools with an emphasis on racial and ethnic differences would be very helpful to measures pain effectively.

Documentation of pain behavior-Timely and accurate documentation of pain assessed is if an indefinite value to plan and provide effective pain management. Documentation also is important as a means of monitoring the quality of pain management within the institution (Wells N 2008).[7]

Communicating findings of pain assessment– Assessment without communication will futile thus validation of findings of the pain assessment by parents or other caregivers and communicating findings with other team members is an important step for planning the pain-relieving measure.[2, 6]

Family education – Parents are more aware of behavior of a child and spend more time with them thus, parents can be trained effectively in a variety of methods to promote child coping (Cohen et al., 2002;

Sweet, & McGrath, 1998).Kennedy Kutner 2004 found that painful episode in children changes parents behavior which in turn affects a child's pain anxiety, fear, and coping strategy. Thus family-centered care should be emphasized.[2,7,]

Policies, Protocols, and Standard - The most critical aspect of pain assessment is that it is done on a regular basis (e.g., once a shift, every 2 hours) using a standard format. The assessment parameters should be explicitly mentioned in the policies and procedures. To meet the patients' needs, pain should be assessment treatment, reassessment after each intervention, and modification of care plan should be clearly stated. The time frame for reassessment also should be directed by hospital or unit policies and procedures (Wells N 2008).[5,7]

CONCLUSION

Evaluation of pain in the pediatric patient is more complex than in the adult patient. To accurately assess pain in children, we must tailor assessment strategies to the child's developmental level, personality style, and to the situation. Consider factors modifying pain perceptions and pain expression. Based on Developmental age utilize behavioral indicators of pain: global rating scales, indirect measures, and behavioral observation scale. *Multidimensional pain assessment should be used for children, and Pain assessment in patient populations who are unable to give self-report may include behavioral indicators using standardized measures and physiological indicators whenever appropriate*.

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