Assessment of Pain in Children

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Objectives

- To understand and be able to utilize current validated scales for pain measurement in children
- Have the ability to discern specific pain measures that can be used for pre-verbal children and those with cognitive impairment

Frequent and routine pain assessment and documentation are essential for effective pain management. While self-report of pain using a 0-10 scale represents the gold standard of pain assessment in adults and older cognitively intact children, young children and those who are cognitively impaired frequently lack the cognitive and verbal skills necessary to use such scales. A number of physiologic, behavioral and self-report measures appropriate for use in children have been developed and their validity and reliability established in varied settings.[1-6] Yet, children in certain settings remain vulnerable to lack of pain assessment and inadequate treatment.[5] A clear understanding of several of these tools and selection of those appropriate to one's own practice will greatly facilitate the effective management of pain in children.

The goals of pain assessment are far greater than merely assigning a pain score or a numerical value to the severity of pain. A comprehensive assessment of pain must encompass the following goals:

- To detect the presence of pain
- To measure its severity
- To estimate the potential impact of pain on the individual
- To determine which measures should be used to alleviate pain
- To evaluate the effectiveness and side effects of these measures

Self-Report

Pain is a subjective experience. Self-report measures, therefore, most accurately reflect pain. Since limited verbal skills in children place them at a disadvantage in terms of communicating their pain, several pain assessment tools have been developed that facilitate self-report of pain in children.

Faces Pain scale: Several versions of this scale are now available.[1, 7, 8] Some of these have a smiling face while the others have a neutral face to represent "no pain".[1, 7] Recent data suggest that the versions with the smiling face may lead to overestimation of pain since children with no pain but with distress from other sources may be reluctant to choose the smiling face.[9] Most children 3 years old and above are able to use this scale effectively and accurately, and its validity and reliability have been confirmed by studies in children 3-18 years of age, in various settings and populations. Additionally, the Faces Scale was the most preferred scale by children and their parents when compared with 6 other tools.

Word Graphic Rating Scale: A 10 cm linear scale is used with the words "no pain" and "worst possible pain" written at each end of the line. The words "little pain", "medium pain" and large pain are written at fixed intervals along the line. The child is asked to draw a vertical line along this scale to indicate the extent of pain.

Numeric Scale: The numeric scale utilizes a horizontal line with the end points identified as 'no pain" and "worst pain". The divisions along the line are marked in numbers from 0 to 10. The use of any numeric scale requires that the child must understand the concept of order, proportionality (i.e. 4 is

more than 2) and number, skills that may not be present until 7 yrs of age. Other vertical variations of the numeric scale are the Pain Thermometer or the Pain Ladder. With both scales the higher numbers (like the higher rungs of a ladder) represent a greater degree of pain. Numeric scales have been shown to have a high degree of inter-rater reliability, validity and versatility.

Poker Chip Tool (PCT): This tool uses 4 red poker chips to quantify pain. (Some versions have a white chip to represent no pain).[6] The red chips represent pieces of hurt. One chip is a little bit of hurt while all four chips are the most hurt the child can have. The child is told to select the number of chips that indicate how much pain he/she is experiencing. The poker chip tool has been used with success in children aged 3 to 5 years and its validity has been established by high correlations in pain ratings assigned using the PCT and the Hurt Thermometer as well as the PCT and the Oucher tool. One study however, found that most children, nurses and parents preferred the Faces scale to the PCT.

Oucher: This scale consists of 2 vertical scales, a numerical scale from 0-100 and a photographic scale that consists of 6 pictures of the face of a child with expressions demonstrating increasing discomfort.[10] Children use the Oucher scale by selecting the number or photograph that most closely represents their pain intensity. Different ethnic versions of the Oucher are available (Caucasian, African American, Hispanic and Asian). To determine if the child has the cognitive ability to use this tool, the child is asked to seriate 6 geometric figures in ascending order of size. The Oucher has been extensively validated with a high degree of correlation between the numeric and photographic scales of the Oucher itself, and both Oucher scales and the Visual analog scales and the PCT.

Pain Descriptors: Other self report measures include the Pain Descriptors, a multidimensional tool developed by Savedra et al that includes a body outline, a word graphic rating scale and a pain descriptor list of 43 words.[11] This tool has been used in 8-17 year old children asked to mark the location of their pain on the body outline, rate the intensity by drawing a line on the Word Graphic Rating Scale and describe the pain by circling appropriate words that describe their pain. This tool offers a comprehensive assessment of pain but may be cumbersome to use in a busy clinical setting.

Other Self Report Measures: Studies associating color with the extent of pain have found red and black to be the colors most frequently associated with pain and yellow, blue, green and orange to be least frequently associated with pain. In addition to these measures, other ways to get children to self-report or quantify pain are Pain interviews, Questionnaires, Pain Diaries.

Behavioral Measures of Pain

Specific distress behaviors have been associated with pain and are very helpful in quantifying pain in children unable to provide self-report. Since it may be difficult to distinguish between pain behaviors and behaviors resulting from other types of distress such as hunger or anxiety, behavioral measurement must be used in conjunction with the child's self-report whenever feasible. When self-report is not possible, interpretation of pain behaviors requires careful consideration of the context of behaviors. While several behavioral scales are available, those used commonly in practice are discussed below.

CHEOPS: This behavioral scale is based on observations of 6 aspects of behavior: cry, facial expression, verbal expression, movement of torso, touching of wound and movement of legs.[2] A score ranging from 0-2 or 1-3 is assigned to each activity and the total score ranges from 4-13. Inter-rater reliability of this scale has been established by comparison of scores assigned by 2 different raters in the PACU. In addition, its validity was established by comparisons with VAS scores and by appropriate decrease in CHEOPS scores after administration of fentanyl for acute postoperative pain.[2]

However, studies have found that the CHEOPS may not provide valid indicators of pain intensity after discharge from the PACU. Additionally, CHEOPS scores were inconsistent with self

report scores in a convenience sample of 3-7 year olds.[12] Lastly, this scoring system has been perceived as being cumbersome (28 separate behaviors across the 6 categories) and time consuming.

Objective Pain Scale (OPS): This scale incorporates 4 pain behaviors (crying, movement, agitation and verbalization) and BP change, a physiological measure of pain. Each of these categories are scored from 0-2. Testing of this scale has not been done in preverbal and very young children. Comparison of OPS scores with Visual Analog Scores in children 13-18 yrs. of age demonstrated excellent correlation between these scales in children experiencing intense pain (score≥6), but a lesser degree of agreement in children having mild to moderate pain. While less cumbersome than the CHEOPS, the use of OPS is also not preferred by nursing staff in a busy clinical setting.

Toddler-Preschool Postoperative Pain Scale (TPPPS): The TPPPS consists of 7 items among 3 behavior categories -- Vocal Pain Expression, Facial Pain Expression and Bodily Pain Expression.[4] The 7 items are scored as a 1 if the pain behavior is present during a 5 minute observation period or as a 0 if not present. Scores therefore range from 0-7. Its reliability and validity have been demonstrated in children 1-5 years of age.[4, 13] One study reported significant differences in TPPS scores in children following painful and non-painful procedures and appropriate decreases in scores following analgesic administration.[13]

FLACC: The FLACC assessment tool was developed in an attempt to provide a simple consistent method of pain assessment in non verbal or preverbal children.[3] This tool incorporates 5 categories of behavior that have been used in other behavioral scales. The acronym FLACC (Face, Legs, Activity, Cry and Consolability) facilitates recall of the categories, each of which is scored from 0-2 with total scores ranging 0-10 similar to other clinical assessment tools. Inter-rater reliability of the FLACC among 2 observers was established in 30 children in the PACU (r=0.94). Validity was established by demonstrating an appropriate decrease in FLACC scores after analgesic administration. Also, a high degree of agreement was found between FLACC scores, the PACU nurses global rating of pain, and with OPS scores. The reliability and validity of this tool has been established in diverse settings and in different patient populations.[13-16]

Pain Assessment in the Child with Cognitive Impairment

Children with CI are subject to more frequent painful experiences than their intact counterparts. Yet, difficulty with pain assessment and lack of clinician knowledge regarding specific pain assessment tools in this population have been identified as significant barriers to effective pain management. [17] The majority of work in pain assessment for the cognitively impaired consists of observation of the frequency of occurrence of core sets of pain behaviors over varied observation periods.[18-22] More recently specific tools for assessment of pain in this population have been developed and tested.[14, 16, 23]

The Pain Indicator for Communicatively Impaired Children: Stallard et al identified six core pain cues reported by caregivers of children with CI as signs of definite or severe pain in their child.[20] These cues include: crying, screaming or yelling, screwed up or distressed looking face, body appears stiff or tense, difficult to comfort or console and flinches if moved or touched. Each of these cues is scored on a 4-point Likert scale based on the frequency of occurrence of the behavior over the observation period. Caregivers of 49 children with severe CI and a chronic serious illness were instructed to complete this scale at home for 1-hour observation periods. They were also instructed to record whether they believed their child was in pain during these periods and rate its severity from 1-5. Caregivers reported no significant relationship between crying and the presence of pain but found that a “screwed up” or distressed looking face had the strongest relationship with the presence of pain. In fact, when facial expression was used alone, it correctly identified 71% of children in pain and 93% of those not in pain with an overall correct classification rate of 87%. While this study was subject to the

bias of the same observer using the PICIC and the global rating of pain, it provides a simple method of assessing pain in children with CI in the home setting. Further testing of this tool is required in the hospital setting and using shorter observation periods to determine its clinical utility.

The Non-Communicating Children's Pain Checklist – Postoperative Version (NCCPC-PV): Breau et al tested the reliability of this checklist of pain behaviors (27 behaviors across 6 categories including vocal, facial, social, body and limbs, activity, and physiologic signs) in 25 children with severe CI.[24] Each of these behaviors is scored on a 0-3 point scale based on the frequency of observation of that behavior over a 10-minute observation period. The scores of all items are summed to provide a total pain score. This study demonstrated good interrater reliability in 4 of the 6 behavior categories and good correlations between NCCPC-PV scores and VAS scores when the same individual assigned both scores. However, no significant correlations were found between NCCPC-PV scores assigned by primary caregivers or a researcher and VAS scores assigned by a bedside nurse who had not used the checklist to assess pain suggesting a bias when the same individual used both scoring methods. While this checklist provides a comprehensive pain assessment method for children with CI undergoing surgery, it may be cumbersome for frequent pain assessment in the clinical setting.

The Paediatric Pain Profile (PPP): A set of 20 pain behaviors including facial expressions, body movement, tone, social reactions, mood and consolability are scored on a 4-point ordinal scale (0-3) based on frequency of occurrence over 5-minute observation periods.[22] Initial evaluation of this tool has demonstrated good reliability and validity in children with severe CI in the home as well as postoperative hospital settings. However, studies regarding its feasibility and ease of incorporation into clinical practice are needed.

The University of Wisconsin Pain Scale for Preverbal and Nonverbal Children: This scale is comprised of 5 behavior categories (Vocal/cry, facial, behavioral, body movement/posture, sleep) with 4 descriptors for each.[23] The overall rating using this tool is not a sum of scores of individual behaviors but a score assigned on a 0-5 scale based on the clinicians' judgment relative to assessment of individual categories. This scale has been tested in 59 preverbal children and 15 children who were nonverbal due to CI. While these investigators reported good validity and reliability in their overall sample, the reliability and validity of this tool for children with CI was not reported. Furthermore, while the scoring style of this tool allows for flexibility, it limits its precision.

FLACC: The FLACC tool was found to have reasonable inter-rater reliability and validity in children with varying degrees of CI.[14] However, while measures of agreement between observers were found to be acceptable in the Face, Cry and Consolability categories, there was low agreement in the Legs and Activity categories. The FLACC tool was therefore, revised to include behaviors specific to children with CI.[16] The categories were left unchanged but descriptors were added to incorporate specific behaviors that were most consistently associated with pain in individuals with CI. Most of the revisions focused on the Legs and Activity categories. Additionally, the revised FLACC permits parents/caregivers to record divergent or idiosyncratic pain behaviors in each patient. The inter-rater reliability of the revised FLACC was supported by excellent intraclass correlation coefficients and acceptable measures of exact agreement between observers for each category as well as total FLACC scores. Test-retest reliability was supported by excellent ICC for repeated FLACC scores of observers viewing videotaped segments of children following surgery. Moderate to high correlations between observers' FLACC scores, parents' global pain ratings, Nursing Assessment of Pain Intensity (NAPI) scores assigned by nurses and child ratings when available supported the criterion validity of the revised FLACC. Lastly, significant and appropriate decreases in scores following analgesic administration supported its construct validity. Another recent study has demonstrated that of the FLACC, NAPI and NCCPC-PV, the FLACC was the most preferred in terms of pragmatic qualities by clinicians at three institutions.[25]

The Individualized Numeric Rating Scale (INRS): This tool was specifically designed to incorporate parents' knowledge of their cognitively impaired child's pain expression.[26] Parents are asked to score severity of pain behaviors (based on previous painful experiences) on a 0-10 scale using the categories of the FLACC tool. This individualized tool, then becomes part of the patient's permanent medical record for use in that and subsequent hospitalizations. Pain descriptors are added to each patient's INRS based on observations by nurses.

Summary

Ongoing research related to pain assessment techniques has provided valid and reliable measures that permit assessment of pain in children unable to report their pain. While these tools and techniques undergo further refinement and testing, the existing tools should be incorporated into clinical practice so that pain in these individuals may be identified and appropriately treated. It remains challenging to discern pain behaviors from other forms of distress behaviors. Therefore, behavioral measures of pain should be used in conjunction with self-report whenever feasible and with careful consideration of the context of distress behaviors.

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