# Postoperative Pain Assessment in Ambulatory Pediatric Patients by Parents

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**Abstract**

**Objectives :** This study aimed to assess 1) agreement and correlation of postoperative pain scores rated by nurses and parents 2) the difference between the pain scores (CHEOPS and FLACC) as rated by nurses and parents 3) effects of parental education on pain rating 4) the ease with which parents could score CHEOPS and FLACC.

**Methods :** Sixty-nine children, age 1-12 years (median 3.7, IQR 2-6.85 years) underwent herniorrhaphy and hydrocoelectomy under general anesthesia and 69 parents, age 20-65 years (median 32, IQR 37.5-38.5 years) were enrolled in the study. Parents were trained how to score pain using CHEOPS and FLACC by using a videotape of children's pain behaviors. One of 2 nurses who were tested for inter-rater reliability (ICC>0.9) rated the postoperative pain of a child in the recovery room at the same time with his parent by using CHEOPS and FLACC.

**Results :** Agreement (ICC) and Correlation Coefficient (r) between nurses and parents were 0.934-0.979 and 0.898-0.969 respectively ($p<0.001$). ICC and r were not influenced by parental education. Pain scores rated by parents using either CHEOPS or FLACC showed no difference between the scoring systems ($p=0.544$, 0.166).

**Conclusion :** Thai parents could be easily trained how to use pain scales. Parental rating was not different from nurse rating. The agreement and correlation between parents and nurses were very high. The ease of using CHEOPS was not different from FLACC.

**Key word :** Pain Assessment, Parents, Pediatric Ambulatory

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Postoperative pain relief in children has traditionally been neglected[1-4]. The effective provision of analgesia requires a valid assessment of pain at frequent intervals. The selection of an appropriate tool depends on the age group. Behavioral measures can be used in all age groups especially 1-5 year. Physiological measures should be combined in measuring pain in infants. Additionally, patients older than 5 years should be assessed by self-rating measures and behavioral measures[5]. Several behavioral measures have been validated for use in children and may be used clinically to guide the provision of analgesia or in research studies to quantify pain. The Children's Hospital of Eastern Ontario Pain Scale (CHEOPS, Table 1)[6] and FLACC (Table 2)[7] are behavioral measures that have been validated in Thai children (in-patient)[8]. Longer details and categories of CHEOPS did not affect clinical utility than FLACC[3].

Most surgery in children is performed on an ambulatory basis. There is currently a problem with the objective and valid assessment of pain after discharge. Many analgesic techniques, especially regional blocks are associated with excellent analgesia of variable duration and the child may be discharged pain-free but become distressed after the block has worn off at home where the provision of analgesia becomes a parental responsibility.

The purposes of this study were to assess 1) the correlation and agreement of pain rating by parents and nurses 2) the difference in pain scores rated by parents and nurses 3) the effect of parental education in pain rating 4) parents' opinion regarding ease of using CHEOPS and FLACC.

## METHOD

This descriptive study was approved by the Institutional Ethics Committee. Parents and their

**Table 1. The Children's Hospital of Eastern Ontario Pain Scale.**

| Item | Behavioral | Score | Definition |
|---|---|---|---|
| Cry | No cry | 1 | Child is not crying |
| | Moaning | 2 | Child is moaning or quietly vocalizing; silent cry |
| | Crying | 2 | Child is crying, but the cry is gentle or whimpering |
| | Scream | 3 | Child is in a full-lunged cry; sobbing: may be scored with complaint or without complaint |
| Facial | Composed | 1 | Neutral face expression |
| | Grimace | 2 | Score only if definite negative facial expression |
| | Smiling | 0 | Score only if definite positive facial expression |
| Child verbal | None | 1 | Child not talking |
| | Other complaints | 1 | Child complains, but not about pain; e.g., "I want to see mommy" or "I am thirsty" |
| | Pain complaints | 2 | Child complains about pain |
| | Both complaints | 2 | Child complains about pain and about other things: e.g., "It hurts; I want mommy" |
| | Positive | 0 | Child makes any positive statement or talks about other things without complaint |
| Torso | Neutral | 1 | Body (not limbs) is at rest; torso is inactive |
| | Shifting | 2 | Body is in motion in a shifting or serpentine fashion |
| | Tense | 2 | Body is arched or rigid |
| | Shivering | 2 | Body is shuddering or shaking involuntarily |
| | Upright | 2 | Child is in vertical or upright position |
| | Restrained | 2 | Body is restrained |
| Touch | Not touching | 1 | Child is not touching or grabbing at wound |
| | Reach | 2 | Child is reaching for but not touching wound |
| | Touch | 2 | Child is gently touching wound or wound area |
| | Grab | 2 | Child is grabbing vigorously at wound |
| | Restrained | 2 | Child's arm are restrained |
| Legs | Neutral | 1 | Legs may be in any position but are relaxed; includes gently swimming or serpentine-like movements |
| | Squirming/kicking | 2 | Definitive uneasy or restless movements in the legs and/or striking out with foot or feet |
| | Drawn up/tense | 2 | Legs tensed and/or pulled up tightly to body and kept there |
| | Standing | 2 | Standing, crouching, or kneeling |
| | Restrained | 2 | Child's legs are being held down |

**Table 2. FLACC Scale (Face, Legs, Activity, Cry, Cousolability).**

| Categories | Scoring 0 | 1 | 2 |
|---|---|---|---|
| Face | No particular expression or smile | Occasional grimace or frown, withdrawn, disinterested | Frequent to constant quivering chin, clenched jaw |
| Legs | Normal position or relaxed | Uneasy, restless, tense | Kicking, or legs drawn up |
| Activity | Lying quietly, normal position, move easily | Squirming, shifting back and forth, tense | Arched, rigid or jerking |
| Cry | No cry awake or asleep | Moans or whimpers; occasional complaint | Crying steadily, screams or sobs, frequent complaints |
| Consolability | Content, relaxed | Reassured by occasional touching, hugging or being talked to, distractable | Difficult to console or comfort |

**Table 3. Demographic data of children.**

| | | |
|---|---|---|
| Age: year, median (IQR) | 3.7 (2-6.85) | |
| Procedure | n | % |
| Herniorrhaphy | 48 | 69.6 |
| Hydrocoelectomy | 21 | 30.4 |

IQR = Interquartile range.

**Table 4. Demographic data of parents.**

| | | |
|---|---|---|
| Age: year, median (IQR) | 32 (27.5-38.5) | |
| Educational level | n | % |
| Primary level ($P_{1-6}$) | 30 | 41.6 |
| Secondary level ($M_{1-6}$) | 19 | 29.2 |
| Tertiary level (>$M_6$) | 20 | 29.2 |

IQR = Interquartile range.

children aged 1-5 years who underwent herniorrhaphy and hydrocelectomy on an ambulatory basis were enrolled in this study. Parents of children who had developmental delay or cerebral palsy were excluded. Informed consent was obtained from all parents.

Parents were trained how to use CHEOPS and FLACC to rate pain from 10 behaviors on a videotape. They were allowed to stay with their children in the postanesthetic care unit (PACU) after the child wake up. A parent and a research nurse used CHEOPS and FLACC to rate the child's pain every 15 minutes. They were blind to each other's score. Two research nurses were trained in pain rating and tested for inter-rater reliability with excellent intraclass correlation (>0.9). Parental age and educational level were recorded. Ease of using CHEOPS and FLACC by parents were assessed by a visual analogue scale (0=easiest, 10=most difficult).

Sample size was calculated based on a correlation of 0.5-0.9, $\alpha$=0.05, power=0.9 by using Cohen's formula (1998)[9]. The minimum sample required was 45. Descriptive variables were analyzed by using descriptive statistics. Dependent parametric data were analysed by using a paired *t*-test and dependent non-parametric data were analyzed by using the Wilcoxon signed ranks test. Correlation and agreement were analyzed by using Spearman correlation and Intraclass correlation respectively. A P-value less than 0.05 was considered significant.

## RESULTS

Sixty-nine parents of 69 children aged 1-12 years (mean $\pm$ SD = 4.47 $\pm$ 2.98 years), who underwent ambulatory surgery (Table 3) were enrolled in the study. Parents' age and educational level are illustrated in Table 4. Agreement and correlation of pain scores rated by research nurses and parents with both a low level ($\leq$primary level 6) and high level of education (>6 yrs primary education) (Table 5). Pain scores rated by research nurses were not different from parents (Table 6). The visual analogue scores of the ease of rating CHEOPS were 3.43 $\pm$ 1.75 which were not different from FLACC 3.38 $\pm$ 1.70 (p=0.815).

## DISCUSSION

Thai parent of all education background could easily be trained to use the translated pain scales. The parents' rating was not different from the

**Table 5. Agreement and correlation of pain scales rated by parents with respect to nurses.**

| | CHEOPS | | FLACC | | |
|---|---|---|---|---|---|
| | ICC | r | ICC | r | n |
| Total parents | 0.977 | 0.945* | 0.949 | 0.938* | 69 |
| Parents with education $\leq P_6$ | 0.975 | 0.970* | 0.969 | 0.898* | 30 |
| Parents with education $>P_6$ | 0.979 | 0.940* | 0.934 | 0.949* | 39 |

CHEOPS = The Children's Hospital of Eastern Ontario Pain Scale, ICC = inter-rater reliability, r = Spearman correlation, FLACC = FLACC Scale (Face, Legs, Activity, Cry, Cousolability)
* $p<0.001$

**Table 6. CHEOPS and FLACC rated by nurses and parents.**

| Pain scale | Nurses' rating (median, IQR) | Parents' rating (median, IQR) | P-value |
|---|---|---|---|
| CHEOPS | 5 (5-8.5) | 5 (5-8.5) | 0.544 |
| FLACC | 0 (0-3) | 0 (0-3.5) | 0.166 |
| n | 69 | 69 | |

Wilcoxon signed ranks test.
CHEOPS = The Children's Hospital of Eastern Ontario Pain Scale,
FLACC = FLACC Scale (Face, Legs, Activity, Cry, Cousolability),
IQR = Interquatile range.

nurses' ratings and yielded excellent agreement and correlation. Moreover, their ability to use CHEOPS which was more detailed than FLACC was not different.

The results of this study are different from previous studies. Manne, et al (1992) assessed the correlation of pain rating by parents and nurses while the children receieved an injection. The correlation coefficient was low (0.42, $p<0.001$) as nurses rated pain from the child's behavior during the procedure whereas the parental rating of the child's pain was strongly influenced by their pre-procedural expectations of how much pain the child would experience and on their own anxiety[10]. Wilson and Doyle (1996) assessed the correlation of postoperative pain assessment in children by parents and nurses, using the Objective Pain Score, the Four point numerical score and VAS. They found a high degree of correlation both in PACU (0.77, 0.70 and 0.69, $p<0.01$) and 1 hour after discharge from PACU (0.81, 0.80 and 0.73, $p<0.01$). Pain scores from all scales rated by parents were higher than nurses[11].

The degree of agreement between parents and research nurses in this study was very high because our tools were behavioral measures, not global assessment. Parents were well trained in rating by research nurses. Therefore, good correlation was yielded from parents of all educational levels. In addition, the kindness and close monitoring of the child by a research nurse during the study might have reassured the parents about their child's care and probably reduced their anxiety. Consequently, parents rated children's pain from what they had seen with less bias or anxiety.

In summary, Thai parents could be easily trained to use pain scales. Pain scores rated from parents were not different from nurses. There was high correlation and agreement between parents' and nurses' pain rating. The level of parental education did not affect the correlation or agreement with the nurses' rating. Therefore, pain assessment in pediatric day-case patients by parents after discharge from hospital, using valid assessment tools should be applicable and reliable.

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# การประเมินความปวดหลังผ่าตัดในผู้ป่วยเด็กโดยผู้ปกครอง

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**วัตถุประสงค์** : เพื่อประเมิน 1) agreement และ correlation ของระดับคะแนนความปวดหลังผ่าตัดในเด็กที่ให้โดยพยาบาลและผู้ปกครอง 2) ความแตกต่างระหว่างระดับคะแนนความปวดที่ให้โดยพยาบาลและผู้ปกครองโดยใช้สเกล 2 ชนิดที่มีความยาวต่างกัน คือ CHEOPS และ FLACC 3) อิทธิพลของการศึกษาของผู้ปกครองต่อการให้คะแนนความปวดเมื่อเทียบกับการให้คะแนนของพยาบาล 4) เปรียบเทียบความง่ายในการใช้ CHEOPS และ FLACC ของผู้ปกครอง

**วิธีการ** : ศึกษาในเด็กจำนวน 69 ราย อายุ 1-12 ปี (median 3.7 ปี, Interquatile range, IQR 2-6.85 ปี) ที่มารับการผ่าตัด herniorrhaphy และ hydrocelectomy โดยได้รับการดมยาสลบ และศึกษาในผู้ปกครองจำนวน 69 ราย อายุ 20-65 ปี (median 32 ปี, IQR 37.5-38.5 ปี) ผู้ปกครองได้รับการฝึกให้คะแนนระดับความปวดจากภาพวีดิทัศน์แสดงพฤติกรรมของเด็กที่เจ็บปวดหลังผ่าตัด โดยให้สเกล CHEOPS และ FLACC หลังจากนั้นผู้ปกตรองจะให้คะแนนความปวดของเด็กพร้อมกับพยาบาลผู้ช่วยวิจัย 1 ใน 2 คน ซึ่งได้รับการทดสอบ inter-reliability (Intraclass correlation หรือ ICC> 0.9) แล้ว

**ผลการศึกษา** : ค่า agreement (ICC) และ correlation coefficient (r) ระหว่างผู้ปกครองและพยาบาล คะแนนที่ผู้ปกครองให้ไม่แตกต่างจากพยาบาล ไม่ว่าจะใช้สเกล CHEOPS (p=0.544) หรือ FLACC (p=0.166) คะแนนความง่ายที่ผู้ปกครองประเมิน CHEOPS ไม่ต่างจาก FLACC (p=0.815)

**สรุป** : ผู้ปกครองไทยสามารถรับการฝึกให้ใช้เครื่องวัดระดับความปวดเพื่อประเมินเด็กหลังผ่าตัดได้ง่าย ระดับคะแนนที่ผู้ปกครองให้ไม่ต่างจากพยาบาล ค่า agreement และ correlation ระหว่างคะแนนของผู้ปกครองและพยาบาลสูงมาก นอกจากนี้ผู้ปกครองยังพบว่าการใช้ CHEOPS ซึ่งมีรายละเอียด มีความง่ายไม่ต่างจาก FLACC

**คำสำคัญ** : การประเมินความปวด, ผู้ปกครอง, ผู้ป่วยนอกเด็ก

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