

Pediatric Pain Letter

Abstracts and Commentaries on Pain in Infants, Children and Adolescents

Table of Contents

Commentary by Monique van Dijk	
Postoperative pain assessment in neonates and infants: State of the art	37
Abstracts	39
Recent Articles	41
Review Articles	46
Announcements	
Meetings	47
Positions	47

Commentary

Postoperative pain assessment in neonates and infants: State of the art

Since the introduction of the Children's Hospital of Eastern Ontario Pain Scale or CHEOPS (McGrath et al., 1985), approximately fifteen other postoperative pain instruments for preverbal infants have been published. Table 1 shows some characteristics of the different instruments. Some instruments were derived from existing ones or were originally designed for other purposes but were also tested for the postoperative situation. The instruments consist of either behavioural items only or a combination of behavioural and physiological items. Facial expression, cry and body movements, in combination, are used in 13 out of 16 instruments. Additional items may be consolability, sleep pattern and muscle tone. In some instruments, body movement is described by several items, distinguishing movements of legs, arms and trunk. In addition, instruments may differ in number of response

categories of the items, ranging from two to six. As a result, some instruments are easier to use than others but these may have the drawback of having to make an all-or-nothing choice. On the other hand, it may be desirable to detect subtle changes in behaviour which will be possible with more response categories.

Physiological items seem of limited value to assess postoperative pain (Buchholz, Karl, Pomietto & Lynn, 1998; Büttner & Finke, 2000; van Dijk et al., 2000). However, nurses and physicians indicate that they use these indicators in their observations and they may be valid in individual cases. The choice of a postoperative pain instrument may be determined by the severity of the intervention and physical condition of the child. For instance, in day surgery, a simple instrument may prove useful, whereas for ventilated infants after major surgery, this may be of limited use. The choice may further be influenced by the goal of pain assessment, either for clinical practice or pain research.

"Physiological items seem of limited value to assess postoperative pain..."

The problem of differentiating postoperative pain from fear and anger in toddlers should be addressed, because fear or anger may also increase scores on behavioural pain instruments. In these instances, an additional Visual Analogue Scale or another subjective tool may prove useful to differentiate between these emotions. Pain instruments are useful only if they assist in pain management. For that reason, cut-off scores are required to determine whether or not analgesic treatment is warranted. However, with the lack of a "gold standard" for pediatric pain, estimation of the sensitivity and specificity of different cut-off scores remains fallible. Therefore, postoperative pain instruments may be useful in guiding pain management, but factors such as developmental stage, temperament and personality and number of painful experiences of an infant should also be taken into account.

The development of new pain instruments should be

restricted to ones that incorporate pain indicators other than the existing ones. Preferably, existing postoperative pain instruments should be tested in different situations (day surgery versus major surgery) and different samples (different age groups, mentally handicapped). In that way, the choice and implementation of a pain instrument will be evidence-based.

Table 1 Characteristics of postoperative pain instruments for preverbal infants

	Item Type	Response Categories	Scoring Range	Age Groups
CHEOPS, 1985	F, C, B, A	variable	4 to 13	1 to 7 yr.
OPS, 1987	C, B, A, P	0 to 2	0 to 12	1.5 to 17 yr.
POPS, 1989	F, C, B, A	0 to 2	0 to 20 [†]	1 to 7 mo.
TPPPS, 1992	F, C, B	0 to 1	0 to 7	1 to 5 yr.
NAPI, 1994	F, C, B, A	variable	0 to 10	0 to 3 yr.
CRIES, 1995	F, C, A, P	0 to 2	0 to 10	neonates
LIDS, 1996	F, C, B, A	0 to 5	0 to 40	neonates
POPS, 1996	F, C, B, A	0 to 2	0 to 14 [‡]	0 to 3 yr.
RIPS, 1996	F, C, B, A	0 to 3	0 to 18	0 to 3 yr.
FLACC, 1997	F, C, B, A	0 to 2	0 to 10	2 mo. to 7 yr.
MIPS, 1998	F, C, B, A, P [†]	0 to 2	0 to 20 [†]	4 to 30 wk.
PIPP, 1999	F, A, P	0 to 3	0 to 21	premature neonates
PEPPS, 1999	F, C, B, A, P	variable	0 to 26	1 to 2 yr.
POCIS, 1999	F, C, B, A, P	0 to 1	0 to 7	1 to 4 yr.
CHIPPS, 1999	F, C, B, P [†]	0 to 2	0 to 10	0 to 5 yr.
COMFORT, 2000	F, C, B, A, P [†]	1 to 5	6 to 30	0 to 3 yr.

Legend:

- F - Facial
- C - Cry
- B - Body movements
- A - Additional items
- P - Physiological items

[†] Physiological items excluded after psychometric evaluation

[‡] High scores indicate comfort

Abbreviations:

CHEOPS, Children's Hospital of Eastern Ontario Pain Scale; OPS, Objective Pain Scale; POPS (1989), Postoperative Pain Score; TPPPS, Toddler-Preschooler Postoperative Pain Scale; NAPI, Nursing Assessment of Pain Intensity; CRIES, Crying, Requires increased oxygen administration, Increased vital signs, Expression, Sleeplessness; LIDS, Liverpool Infant Distress Score; POPS (1996), Postoperative Pain Score-restricted; RIPS, Riley Infant Pain Scale; FLACC, Face, Legs, Activity, Cry and Consolability; MIPS, Modified Infant Pain Scale; PIPP, Premature Infant Pain Profile; PEPPS, Preverbal, Early Verbal Pediatric Pain Scale; POCIS, Pain Observation Scale for Young Children; CHIPPS, Children's and Infants' Postoperative Pain Scale

Monique van Dijk, Ph.D.

Department of Pediatric Surgery

Sophia Children's Hospital

Rotterdam, The Netherlands

References

- Barrier G, Attia J, Mayer MN, Amiel-Tison C, Shnider SM. Measurement of post-operative pain and narcotic administration in infants using a new clinical scoring system. *Intensive Care Medicine* 1989;15(suppl 1):S37-S39.
- Hannallah RS, Broadman LM, Belman AB, Abramowitz MD, Epstein BS. Comparison of caudal and ilioinguinal/iliohypogastric nerve blocks for control of post-orchiopey pain in pediatric ambulatory surgery. *Anesthesiology* 1987;66(6):832-834.
- Horgan M, Choonara I. Measuring pain in neonates: an objective score. *Paediatric Nursing* 1996;8(10):24-27.
- Joyce BA, Schade JG, Keck JF, Gerkenmeyer J, Raftery T, Moser S, Huster G. Reliability and validity of preverbal pain assessment tools. *Issues in Comprehensive Pediatric Nursing* 1994;17(3):121-135.
- McGrath PJ, Johnson G, Goodman JT, Schillinger J, Dunn J, Chapman J. CHEOPS: A behavioral scale for rating postoperative pain in children. In HL Fields, R Dubner, F Cervero (Eds.), *Advances in Pain Research and Therapy* 1985 (Vol.9, pp. 395-402), New York: Raven Press.
- McNair C, Ballantyne M, Dionne K, Stevens B. Post-operative pain assessment in the neonatal intensive care unit. Paper presented at the 8th International Pediatric Nursing Research Symposium, Clinical Care of the Child and Family, Montreal, 1999.
- Merkel SI, Voepel-Lewis T, Shayevitz JR, Malviya S. The FLACC: A behavioral scale for scoring postoperative pain in young children. *Pediatric Nursing* 1997;23(3):293-297.
- Schade JG, Joyce BA, Gerkenmeyer J, Keck JF. Comparison of three preverbal scales for postoperative pain assessment in a diverse pediatric sample. *Journal of Pain & Symptom Management* 1996;12(6):348-359.

Tarbell SE, Cohen TI, Marsh JL. The Toddler-Preschooler Postoperative Pain Scale: An observational scale for measuring postoperative pain in children aged 1-5. Preliminary report. *Pain* 1992;50(3):273-280.

Abstracts

Boelen-van der Loo WJC, Scheffer E, de Haan RJ, de Groot CJ. Clinimetric evaluation of the pain observation scale for young children in children aged between 1 and 4 year after ear, nose and throat surgery. *Journal of Developmental & Behavioral Pediatrics* 1999; 20(4): 222-227.

Previously abstracted in the Pediatric Pain Letter, Vol. 4, No. 1; p. 6. www.pediatric-pain.ca/pplet/v4n1c.PDF

Buchholz M, Karl HW, Pomietto M, Lynn A. Pain scores in infants: A modified infant pain scale versus visual analogue. *Journal of Pain & Symptom Management* 1998;15(2):117-124.

Objective. To present a simple tool, the Modified Infant Pain Scale (MIPS) to rapidly assess postoperative pain in infants and to document inter-rater reliability and criterion validity for the tool.

Design. Repeated measures study.

Setting. Tertiary care centre, USA.

Participants. Healthy term infants (n=40; 28 males; mean age=17 weeks, SD=7 weeks) with normal neurodevelopment undergoing elective surgery.

Main Outcome Measures. Experienced physicians and nurses used a partial MIPS, with sleep and vital sign data removed, to score videotaped infants after surgery to determine inter-rater reliability among professionals. A naïve observer underwent 2 hours of training in how to use MIPS to score videotapes of infants undergoing ICU procedures. Subsequently, infants in this study were observed and scored for pain by the naïve observer using both MIPS and partial MIPS and simultaneously by an experienced pediatric nurse using a 10 cm visual analogue scale for 5 minute periods at three times; with a parent before surgery, after surgery before any analgesics were given and after discharge from the postoperative recovery room. Infants were categorized as “comfortable” if they had a MIPS score > 20 (out of 26), a partial MIPS score > 12 (out of 18) or an inverse visual analogue score > 6 (out of 10).

Results. Infants had a broad range of MIPS scores. Inter-rater reliability between experienced physicians and nurses was good with a Pearson’s correlation of 0.85. Using

MIPS, a naïve observer showed 33% agreement and 88% agreement with experienced pediatric nurses at the start and end of a 2-hour training session, respectively. The partial MIPS and inverse visual analogue score categorized infants as “comfortable” or “uncomfortable” with a high degree of concordance, as did the MIPS and the inverse visual analogue score. The sensitivity of partial MIPS and MIPS was 1 at all time points except for partial MIPS used after discharge from the postoperative recovery room when it was 0.67. The specificity of the partial MIPS and MIPS varied with each of the three time points.

Conclusions. An inexperienced person trained in using MIPS can evaluate infants with postoperative pain as accurately as an experienced pediatric nurse using a visual analogue scale. Without the sleep and vital sign data, the partial MIPS can be scored very quickly and could be easily incorporated into an infant’s physical examination after surgery for use in a two-point clinical pain assessment. The authors recommend further studies, such as comparing the MIPS to the Neonatal Facial Coding System in term neonates or premature infants.

Büttner W, Finke W. Analysis of behavioural and physiological parameters for the assessment of postoperative analgesic demand in newborns, infants and young children: A comprehensive report on seven consecutive studies. *Paediatric Anaesthesia* 2000;10(3):303-318.

Objective. To determine if postoperative analgesic demand in children (≤ 5 years) can be assessed by observational methods alone and to determine reliable, valid indicators of postoperative pain.

Design. Seven sequential, prospective studies.

Setting. Four university clinics, Germany.

Participants. Children (n=584) undergoing non-emergency surgery categorized as newborns and infants (age range 0-12 months) or young children (age range 1-5 years).

Main Outcome Measures. Possible behavioural indicators of postoperative pain were selected from current literature. In Studies 1 and 2, young children were observed immediately postanesthesia to determine appropriate indicators and rated postsurgery using the selected indicators to evaluate internal consistency. Heart rate, blood pressure and respiratory rate measurements were also taken. In Studies 3 and 4, newborns and infants were observed immediately postanesthesia to determine appropriate indicators and rated postsurgery using those indicators to evaluate internal consistency. Again, heart rate, blood pressure and respiratory rate were measured.

The Children's and Infants' Postoperative Pain Scale (CHIPPS) was developed from these earlier studies. In Study 5, children were simultaneously rated by experienced pediatric anesthetists and inexperienced nurses using CHIPPS to evaluate inter-rater reliability. In Study 6, a pediatric anesthetist used CHIPPS and the Toddler-Preschooler Postoperative Pain Scale (TPPPS) simultaneously to rate children postsurgery to evaluate CHIPPS's concurrent validity. In Study 7, CHIPPS was used to rate children in pain-free situations (e.g., kidney ultrasound) to assess construct validity. Observations from all studies were used to estimate CHIPPS's specificity and sensitivity.

Results. Studies 1 and 2 identified 5 indicators appropriate for young children (i.e., crying, facial expression, trunk posture, legs posture and motor restlessness); these indicators had good internal consistency (Cronbach's $\alpha=0.92$). Factorial analysis showed that heart rate, blood pressure and respiratory rate represented a different, independent dimension than the behavioural indicators. Studies 3 and 4 determined 9 indicators appropriate for newborns and infants (i.e., crying, facial expression, trunk posture, legs posture, motor restlessness, forehead, arms posture, fingers posture and toes posture). The 9 indicators had good internal consistency (Cronbach's $\alpha=0.96$). Decreasing the number of indicators for newborns and infants from 9 to 5 (the same 5 examined in Studies 1 and 2 for young children) did not alter internal consistency. Factorial analysis showed that heart rate, blood pressure and respiratory rate measured a different, independent dimension than the behavioural indicators. Study 5 showed CHIPPS had good inter-rater reliability (correlation coefficient $r=0.93$) that was unaffected by children's age. Study 6 yielded a moderate, significant correlation ($r=0.45$) between CHIPPS and TPPPS. Using a separate assessment of analgesic demand by experienced pediatric professionals as the criterion standard, the specificity of TPPPS and CHIPPS was 0.65 and 0.75, respectively. The sensitivity of both scales was 0.87. Study 7 indicated an erroneous analgesic demand in only 6.2% of observations, supporting CHIPPS's construct validity.

Conclusions. It is possible to detect postoperative analgesic demand in children up to 5 years old using only observational indicators. Physiological indicators were unreliable and unable to discriminate analgesic demand during the postoperative period. The CHIPPS scale is reliable, valid, simple, quickly assessed and applicable to newborns, infants and toddlers. However, the limited sensitivity values indicates that CHIPPS scores indicating analgesic demand may be induced by other factors affecting a child's comfort rather than only pain.

Krechel SW, Bildner J. CRIES: A new neonatal postoperative pain measurement score. Initial testing of validity and reliability. *Paediatric Anaesthesia* 1995;5(1):53-61.

Previously abstracted in the Pediatric Pain Letter, Vol. 3, No. 1; p. 2. www.pediatric-pain.ca/pplet/v3n1c.PDF

Schultz AA, Murphy E, Morton J, Stempel A, Messenger-Rioux C, Bennett K. Preverbal, early verbal pediatric pain scale (PEPPS): Development and early psychometric testing. *Journal of Pediatric Nursing* 1999;14(1):19-27.

Objective. To develop a postoperative pain scale, the Preverbal, Early Verbal Pediatric Pain Scale, for children less than 3 years of age and to investigate the scale's validity and reliability.

Design. Blinded cross-sectional study.

Setting. Tertiary care centre, USA.

Participants. A convenience sample of children ($n=40$; 35 males; mean age=16.2 months, range 12-24 months) undergoing urologic or abdominal surgery.

Main Outcome Measures. Pediatric nurses with 7-18 years of experience observed postoperative behaviours of young children and chose preliminary items for the scale by consensus. The items were evaluated by a panel of experts to ensure content validity and the scale was revised. All children in this study were videotaped throughout their stay in the postanesthesia care unit. For each child, 2-4 vignettes 2-3 minutes long were selected and rated by 4 nurses blinded to pain medication administration. Vignettes were chosen to include premedication (10 minutes before medication), postmedication (5-7 minutes after fentanyl, 7-10 minutes after morphine or 20 minutes after acetaminophen or belladonna/opium suppository) and nonmedication (all other times) behaviours. To assess inter-rater reliability, the nurses independently scored the same 26 behaviours. To assess intra-rater reliability, the nurses rated 14 vignettes again 2 months later. Internal consistency of the items on the scale was examined using Cronbach's alpha coefficient. To assess construct validity, premedication and postmedication scores were compared.

Results. Inter-rater reliability correlations were acceptable (range 0.90-0.96), as were intra-rater reliability correlations (range 0.96-0.98). Cronbach's alpha coefficient for the entire scale was 0.89. Inter-item correlations between 0.15 (for Sucking/Feeding and Heart Rate) and 0.88 (for Consolability and Cry) were observed. Premedication, postmedication and nonmedication scores

were significantly different ($p < 0.001$).

Conclusions. The Preverbal, Early Verbal Pediatric Pain Scale is a valid and reliable scale for immediate postoperative pain in toddlers. Further validation of this scale should include studies with a more balanced male-to-female ratio, a more ethnically diverse group of children and children undergoing other types of surgeries.

van Dijk M, de Boer JB, Koot HM, Tibboel D, Passchier J, Duivenvoorden HJ. **The reliability and validity of the COMFORT scale as a postoperative pain instrument in 0 to 3-year-old infants.** *Pain* 2000;84(2-3):367-377.

Previously abstracted in the Pediatric Pain Letter, Vol. 4, No. 2; p. 21. www.pediatric-pain.ca/pplet/v4n2c.PDF

Recent Articles

Borge AIH, Nordhagen R. **Recurrent pain symptoms in children and parents.** *Acta Paediatrica* 2000; 89(12): 1479-83.

Objective. To investigate the prevalence of recurrent localized pain in children and parents, focusing on similarities within family groups.

Design. Population-based, cross-sectional survey.

Setting. Three rural junior high schools, Norway.

Participants. Children ($n=229$; age ranges 13-15 years) and both their parents.

Main Outcome Measures. A questionnaire concerning localized pain was distributed to children and both parents. Participants indicated if they experienced stomachache, pain in arms or legs, headache, backache or neck or shoulder pains in the previous two months. They indicated how frequently these pains occurred and if they were distressed due to the pain. Participants also indicated whether they suffered from a chronic illness or handicap and rated their general health.

Results. Forty-four percent of children reported pain in at least one area, compared to 60% of mothers and 51% of fathers. Both parents reported the neck and shoulders as the most frequent site of pain (40% of mothers, 27% of fathers). The arms/legs and head were the most frequent sites (22% and 18%, respectively) of pain for boys. The most frequent sites of pain for girls were the head and back (23% and 18%, respectively). Logistic regression analysis found no significant associations between complaints of

pain in parents and their children.

Conclusions. Children's pain did not associate with parental pain. This does not support the hypothesis of recurrent pain clusters in families.

Debillon T, Zupan V, Ravault N, Magny J-F, Dehan M. **Development and initial validation of the EDIN scale, a new tool for assessing prolonged pain in preterm infants.** *Archives of Disease in Childhood* 2001; 85: F36-F41.

Objective. To develop and validate a scale, the EDIN (Échelle Douleur Inconfort Nouveau-Né) for clinically assessing prolonged pain in premature infants.

Design. Prospective cohort study.

Setting. Five hospitals, France.

Participants. Preterm infants ($n=76$; mean gestational age=31.5 weeks, range 26-36 weeks; mean birth weight=1667 g, range 750-2980 g) admitted to a neonatal ICU ($n=40$) or a conventional neonatal unit ($n=36$).

Main Outcome Measures. All preterm infants born over one year were observed to identify useful indicators of prolonged pain, which were evaluated by a panel of experts to establish content validity. Based on the expert panel, the EDIN scale was developed (0-15, 15=extreme pain). To assess inter-rater reliability and internal consistency, two nurses scored the same 36 infants admitted to the conventional neonatal unit. To assess construct validity, the infants in this study were scored using the EDIN scale before and 8 hours after receiving fentanyl (IV infusion, 1 mcg/kg/hr). As well, the infants were scored on the day of admission to the neonatal ICU (assumed to be a day with pain) and the day before discharge (assumed to be a day with no pain). Using the infants in the conventional neonatal unit, the homogeneity of the items included in the EDIN scale was assessed by deleting each item and using Cronbach's alpha coefficient to determine internal consistency.

Results. Five behavioural indicators of prolonged pain (facial activity, body movements, quality of sleep, sociability and consolability) were included in the EDIN scale. Inter-rater reliability was acceptable for the entire EDIN scale ($\kappa=0.69$) and for each of the five behavioural indicators of prolonged pain (range of kappa values 0.59-0.74). Infants in the neonatal ICU had significantly lower mean EDIN scores after administration of fentanyl ($p < 0.0001$) and infants in the conventional neonatal unit had significantly lower mean EDIN scores on the day before discharge compared with the day of admission ($p=0.0009$), supporting the construct validity of the EDIN scale. The EDIN scale had high internal

consistency ($\alpha=0.92$ for all five indicators) with alpha values of 0.86-0.94 obtained when individual scale items were removed.

Conclusions. The EDIN scale appears to discriminate between prolonged pain and no prolonged pain for preterm infants. The authors recommend further studies to more fully evaluate the construct validity of the EDIN scale and to investigate the impact of factors (i.e., infant behavioural state, illness severity, gestational age at birth and pain experience) on the response of infants to prolonged pain.

Frank F, Stricker T, Stallmach T, Braegger CP. *Helicobacter pylori* infection in recurrent abdominal pain. *Journal of Pediatric Gastroenterology & Nutrition* 2000;31(4):424-427.

Objective. To examine the prevalence of *Helicobacter pylori* bacteria in children with recurrent abdominal pain and to measure changes in recurrent abdominal pain symptoms following antimicrobial treatment for *H. pylori*.

Design. Consecutive case trial.

Setting. Children's hospital, Switzerland.

Participants. Seventy-three children (35 males) diagnosed with recurrent abdominal pain who received diagnostic upper endoscopy took part in this study. A diagnosis of recurrent abdominal pain was given if the child had experienced abdominal pain recurring over a period of at least 3 months.

Intervention. Some children with histological evidence of *H. pylori* infection received a 10-day course of omeprazole (10-20 mg twice daily), amoxicillin (25 mg/kg twice daily) and clarithromycin (7.5 mg/kg twice daily).

Main Outcome Measures. Fifty-two children were tested for the presence of *H. pylori* antibodies using a validated assay (serological test). Duodenal and antral biopsies were taken during endoscopy and examined histologically for the presence of *H. pylori* (histological test). Some children with histologic evidence of *H. pylori* infection received antimicrobial treatment. Four to six weeks after the termination of treatment, a clinical evaluation was performed along with a ^{13}C -urea breath test used to detect the presence of *H. pylori*.

Results. Biopsies taken from each child indicated 29 children were infected with *H. pylori* (13 males; mean age=10.8 years, range 3-15 years) and 44 children were uninfected (16 males; mean age=9.2 years, range 2-15 years). There was a significantly higher rate of infection among non-Swiss (83%) than Swiss children (17%). The serological test for *H. pylori* was positive for 82% of patients with histological evidence of infection and for 40% of patients without histological evidence of infection. Of the

infected children, 22 of 29 received antimicrobial treatment. Three of these children were lost to follow-up. All of the remaining 19 children had negative ^{13}C -urea breath tests following treatment (i.e., negative for *H. pylori* infection). Recurrent abdominal pain symptoms improved markedly or resolved completely in 15 of these 19 children after 4-6 weeks.

Conclusions. Diagnostic endoscopy was found to be superior to serological tests in detecting *H. pylori* infection in children. As some symptoms of recurrent abdominal pain may be attributable to *H. pylori* infection, when treating recurrent abdominal pain in children, consideration should be given to whether *H. pylori* is a factor, particularly in countries with increased prevalence of this type of infection.

Hunter M, McDowell L, Hennessy R, Cassey J. An evaluation of the Faces Pain Scale with young children. *Journal of Pain & Symptom Management* 2000; 20(2): 122-129.

Objective. To examine the psychometric characteristics of the Faces Pain Scale and to evaluate its usefulness with young children.

Design. Observational, comparative study.

Setting. Kindergarten and primary schools, Australia.

Participants. Normal, healthy boys and girls (n=135) were grouped according to age; group 1 children (n=45; 23 males; mean age=4.2 years) between 3.5 and 4.5 years, group 2 children (n=45; 19 males; mean age=4.9 years) between 4.5 and 5.5 years and group 3 children (n=45; 20 males; mean age=6.2 years) between 5.5 and 6.5 years.

Main Outcome Measures. The Faces Pain Scale was presented in four different ways. Thirty children from each group (balanced for gender) completed each of the first 3 presentations. Fifteen additional children from each group (balanced for gender) completed the fourth presentation on two separate occasions, 1 week apart. In presentation 1, the 7 Faces cards were laid out randomly and the child was requested to order the cards from least pain to most pain. In presentation 2, all possible pairs of cards were presented consecutively and the child selected the card from each pair that expressed more pain. In presentation 3, the experimenter placed no wooden blocks on Face 1 (no pain) and 6 blocks on Face 7 (most pain). The child was asked to decide the number of blocks needed to best represent the amount of pain expressed on random presentation of Faces 2 through 6. In presentation 4, the children were shown all 7 cards and asked to choose the card that best expressed the amount of pain associated with nine painful experiences common to children. Also

recorded was which of these nine events were previously experienced by the child.

Results. For presentation 1, no statistically significant differences were found between the three groups. For all three groups, Face 5 was the most difficult to correctly position, with group 2 performing more poorly than groups 1 and 3 ($p=0.02$). The only significant gender difference found was in positional error for Face 6, with boys performing worse than girls ($p=0.04$). For presentation 2, group 1 children made a higher percentage of errors than the other 2 groups. For presentation 3, group 1 children deviated more from a linear series of wooden blocks than did children in groups 2 and 3 ($p=0.001$). For presentation 4, test-retest correlations ranged from 0.21-1.0 (mean=0.56) for group 1, from 0.06-0.80 (mean=0.58) for group 2, and from 0.09-1.0 (mean=0.57) for group 3. Imagined pain experiences showed greater variability and lower correlations than the situations that had been experienced.

Conclusions. Although very young children used and understood the Faces Pain Scale, developmental maturity affected a child's capacity to estimate pain, with overall accuracy being poorer in the youngest children. Few significant differences were noted between girls and boys in their interpretations of the facial expressions of pain. Only moderate test-retest correlation was observed after a one-week period, raising concerns regarding reliability. The difficulties encountered in placing the Faces in order of perceived pain and in rank ordering on the basis of paired comparisons imply that the Faces Pain Scale does not qualify as an interval scale in this age group. This scale seems to be best reserved for school-aged children.

Kleiber C, Craft-Rosenberg M, Harper DC. Parents as distraction coaches during IV insertion: A randomized study. *Journal of Pain & Symptom Management* 2001; 22(4): 851-861.

Objective. To examine whether a brief teaching intervention for parents describing distraction techniques results in parents using the distraction techniques while their child undergoes an IV insertion and to assess the efficacy of the distraction.

Design. Single-blind, randomized study.

Setting. Tertiary care hospital, USA.

Participants. Forty-four children (11 males; age range 4-7 years) undergoing IV insertion during treatment or evaluation for a non-life-threatening condition and a parent. Children were randomly assigned to a control ($n=22$) or an experimental ($n=22$) group with groups evenly matched for past experiences with medical procedures.

Main Outcome Measures. Parents in the experimental group watched a 7-minute video describing various distraction techniques. Children were invited to view the tape as well and were involved in choosing the desired distraction tool to be used during their IV insertion. Researchers videotaped parents and children during the IV insertion. Parental use of distraction was measured by observing videotape intervals of parental behaviour for the presence or absence of parental distraction. Child distress was measured by coding videotape intervals using the Observational Scale of Behavioral Distress-Revised. Child distress from a parental perspective was measured using the Perception of Procedures Questionnaire-Revised. Children reported their pain using the Oucher Scale after the IV was secured.

Results. Parents in the experimental group used significantly more distraction techniques throughout the procedure (78.40%) than did parents in the control group (38.95%). All parents used more distraction prior to needle stick than during the remainder of the procedure. Child distress did not differ between groups or phases of the procedure. However, children in the experimental group showed a decrease in distress (mean child distress score fell from 2.51 ± 1.67 to 1.89 ± 1.22) as the procedure progressed, while children in the control group showed an increase in distress (mean child distress score rose from 1.70 ± 1.79 to 2.13 ± 2.77). Parental perception of child distress did not differ between groups or phases of the procedure. Children in the two groups did not differ in self-reported pain.

Conclusions. Parents who had some instruction on a distraction technique used more distraction but it did not have the expected effects of lessening the child's distress and reported pain. This study suggests that parental distraction early in a procedure may calm a child during the invasive part of an IV insertion. Further studies with larger, more diverse samples are warranted.

Miller AC, Johann-Murphy M, Zhelezniak V. Impact of the therapist-child dyad on children's pain and coping during medical procedures. *Developmental Medicine & Child Neurology* 2001;43(2):118-123.

Objective. To compare children's pain and coping behaviours over time as they progressed through a rehabilitation program; to investigate the influence of the physical therapist on level of distress and ability to cope during episodes of painful stretching; and to investigate the relationship between child variables and distress and coping.

Design. Observational, longitudinal, repeated measures

study.

Setting. Rehabilitation institute, USA.

Participants. A consecutive sample of 30 children (19 males; mean age=4.5 years, SD=1.51 years) diagnosed with spastic cystic fibrosis who were admitted for in-patient rehabilitation immediately following selective posterior rhizotomy (SPR). The length of admission for rehabilitation ranged from 7 to 36 weeks (mean=15.1 weeks).

Main Outcome Measures. The Child-Adult Medical Procedures Interaction Scale-Revised (CAMPIS-R) was used by 2 raters to independently score the behaviours of the children and physical therapists videotaped during physical therapy sessions at three points in time; 1 week postsurgery, 5 weeks postsurgery and week of discharge or 4 months postsurgery, whichever came first.

Results. The CAMPIS-R child distress scores decreased over time, with the greatest decrease occurring early in the rehabilitation process. The CAMPIS-R child coping scores increased over time, with the greatest increase occurring later in rehabilitation. There was a significant relationship between overall changes in distress scores and overall changes in coping scores ($p<0.05$). The physical therapists' distress-promoting scores decreased over time (greatest decrease early in rehabilitation), while coping-promoting behaviours increased over time (greatest increase later in rehabilitation). A positive relationship was observed between coping-promoting behaviours in physical therapists and coping behaviours in children ($p<0.001$). While nonprocedural talk and commands to use a coping strategy promoted coping in children, reassurance inhibited coping. A positive relationship existed between distress-promoting behaviours in physical therapists and distress behaviours in children ($p<0.001$). Distress in children was decreased by checking child's status, praise, and empathy while distress was increased by criticism and reassurance. No significant relationships were found between children's CAMPIS-R distress indices and children's characteristics (age, gender, ethnicity, cognitive impairment). Older children and children with higher Verbal and Performance IQ scores exhibited more coping behaviours ($p<0.05$).

Conclusions. Reduction in distress and increased coping behaviours were exhibited by children exposed to a repeated painful medical procedure over time, although changes in coping behaviour took longer to occur. Simple behaviours (e.g., distraction with nonprocedural talk) by adults during a painful procedure on a child may help the child cope better and be less distressed.

Suraseranivongse S, Santawat U, Kraiprasit K, Petcharatana S, Prakkamodom S, Muntraporn N.

Cross-validation of a composite pain scale for preschool children within 24 hours of surgery. *British Journal of Anaesthesia* 2001;87(3):400-405.

Objective. To cross-validate pain measures for Thai children with postoperative pain, to assess the discriminative abilities of these measures for two periods (immediately postsurgery in a postanesthesia care unit and later in a ward) and two age groups (≤ 3 years and >3 years) and to assess the clinical practicality of the measures.

Design. Comparative observational study.

Setting. Two tertiary care centres, Thailand.

Participants. Thai children ($n=167$; mean age=2.9 years, age range 1-5.5 years) undergoing general anesthesia and surgery.

Main Outcome Measures. Four pain measures, CHEOPS (Children's Hospital of Eastern Ontario Pain Scale), FLACC (Face, Legs, Activity, Cry, Consolability), OPS (Objective Pain Scale) and TPPPS (Toddler-Preschool Postoperative Pain Scale) were translated into Thai. Each item on each scale was assessed by an expert panel to establish content validity. Children were videotaped before surgery, after surgery before analgesics were given in the postanesthesia care unit and on the ward. Any decision to treat pain was made according to common clinical practice by a blinded professional. To assess inter-rater reliability, 4 nurses independently scored 30 random behaviours for each pain measure. To assess intra-rater reliability, the nurses scored the same 30 behaviours for each measure 14 days later. To assess construct validity, the infants' scores for all measures before surgery were compared with the scores after surgery before administration of analgesics. Concurrent validity was tested for all pain measures at the same point in time using the agreement (kappa value) between the pain score and the clinical decision to treat pain. To assess discriminative capabilities of the measures, the agreement between the decision to treat pain and the pain score was examined on the basis of time and age group. To determine clinical practicality, 30 nurses ranked them according to feasibility, usability, ability to assess pain and general satisfaction.

Results. An expert panel accepted all items of the measures except for two items from CHEOPS and one from TPPPS. Inter-rater reliability was acceptable for all measures (range 0.92-0.95). Intra-rater reliability was acceptable for all measures (range 0.87-0.99). For all measures, pain scores before surgery were significantly lower (all $p<0.001$) than scores after surgery before analgesia. All measures demonstrated a moderate to good

association with each other in the postanesthesia care unit ($r=0.621-0.769$, $p<0.0001$) and good association with each other in the ward ($r=0.757-0.827$, $p<0.0001$), regardless of age group. The CHEOPS yielded the highest agreement with the clinical decision to treat pain. The CHEOPS and FLACC were rated as generally satisfactory by 63.4% and 66.7% of nurses, respectively.

Conclusions. Pain measurement tools developed for one group of children may not be valid or reliable when used for children of another culture since the pain response is affected by cultural differences. The CHEOPS is a valid, reliable and practical tool recommended for assessing immediate postoperative pain in Thai children aged 1-5 years.

Tucker CL, Slifer KJ, Dahlquist LM. Reliability and validity of the Brief Behavioral Distress Scale: A measure of children's distress during invasive medical procedures. *Journal of Pediatric Psychology* 2001;26(8): 513-523.

Objective. To evaluate the reliability and validity of the Brief Behavioral Distress Scale.

Design. Prospective, observational study.

Setting. Tertiary care pediatric hospital, USA.

Participants. Consecutive sample of 40 children (28 males; mean age=6.0 years, range 2-10 years) diagnosed with a chronic illness and receiving invasive medical procedures.

Main Outcome Measures. The procedures were videotaped and coded using both the Brief Behavioral Distress Scale and the Observation Scale of Behavioral Distress. For the Brief Behavioral Distress Scale, observers recorded the occurrence or nonoccurrence of noninterfering distress behaviours, potentially interfering distress behaviours, interfering distress behaviours and active coping responses without verbal delay during 12 possible discrete steps. For the Observation Scale of Behavioral Distress, observers coded for the absence or presence of 11 child distress behaviours during 15 second continuous intervals. A total distress score was obtained for both the Brief Behavioral Distress Scale and the Observation Scale of Behavioral Distress. In addition, children provided self-report rating of pain using either the Oucher Scale or the Coloured Analogue Scale, parents provided ratings of child fear and pain using visual analogue scales and nurses provided ratings of child distress and cooperation using visual analogue scales. Heart rate was measured before, during and after the procedure.

Results. Inter-rater reliabilities were high on the four behavioural categories of the Brief Behavioral Distress Scale (kappa coefficients = 0.68-0.87). Brief Behavioral

Distress Scale total distress scores were significantly correlated with 6 of the 7 concurrent validity measures; Observation Scale of Behavioral Distress (correlation = 0.721), parent rating of child pain (correlation = 0.658), nurse ratings of child distress and cooperation (correlation = 0.816 and 0.866, respectively), child self-report (correlation = 0.579) and heart rate (correlation = 0.663). A robust association was found between Brief Behavioral Distress Scale and Observation Scale of Behavioral Distress total distress scores ($p<0.0001$). In addition, the Brief Behavioral Distress Scale showed stronger associations than did the Observation Scale of Behavioral Distress for the nurse ratings of child distress and cooperation.

Conclusions. Results provided preliminary support for the reliability and validity of the Brief Behavioral Distress Scale. This scale uses an essential demands approach for measuring child distress and may be an alternative to more complex continuous interval coding systems.

van Dijk M, de Boer JB, Koot HM, Duivenvoorden HJ, Passchier J, Bouwmeester N, Tibboel D. The association between physiological and behavioral pain measures in 0- to 3-year-old infants after major surgery. *Journal of Pain & Symptom Management* 2001; 22(1):600-609.

Objective. To examine the association between behavioural and physiological pain measures and to identify factors that may predict this association.

Design. Observational study as part of a randomized, double-blind clinical trial.

Setting. Pediatric surgical intensive care unit, Netherlands.

Participants. Children ($n=204$; 119 males) undergoing major abdominal or thoracic surgery were categorized into 4 groups; neonates ($n=66$; >35 weeks gestation; weight >1500 g), young infants ($n=67$; age range 1-6 months), infants ($n=31$; age range 7-12 months) and toddlers ($n=40$; age range 1-3 years).

Main Outcome Measures. Behavioural and physiological pain measures were simultaneously assessed before and after surgery and every 3 hours for 24 hours postoperatively. For the behavioural measure, children were assessed for pain using the 6 behavioural items of the COMFORT scale. For the physiological measures, heart rate and mean arterial pressure were measured via an indwelling arterial line and heart rate variability and mean arterial pressure variability calculated. Children were assessed immediately postsurgery using the Surgical Stress Scale by the anesthesiologist and surgeon. The

presence or absence of Systemic Inflammatory Response Syndrome/sepsis and cardiorespiratory insufficiency was also recorded. Pain was additionally rated using a 10 cm visual analogue scale. Any time a child's visual analogue score ≥ 4 , morphine was given.

Results. Individual within-subject correlations varied widely (-0.81-0.98). However, mean within-subject correlations between the behavioural and each physiological measure were significant ($p < 0.001$): 0.37 for COMFORT-heart rate variability, 0.44 for COMFORT-heart rate, 0.48 for COMFORT-mean arterial pressure and 0.49 for COMFORT-mean arterial pressure variability. Within-subject correlations between the physiological measures were low to moderate (0.04 for heart rate-heart rate variability to 0.45 for heart rate variability-mean arterial pressure variability). Bivariate regression analysis showed that: age and average COMFORT score contributed to the COMFORT-heart rate correlation; age, Systemic Inflammatory Response Syndrome/sepsis, morphine dosage and average COMFORT score contributed to the COMFORT-mean arterial pressure correlation; and morphine dosage and average COMFORT score contributed to the COMFORT-mean arterial pressure variability correlation. Multiple regression analysis showed that behavioural-physiological correlations tended to be lower in neonates than the other children.

Conclusions. Children exhibited large interindividual differences in the level of behavioural-physiological association. Since average COMFORT scores predicted COMFORT-heart rate and COMFORT-mean arterial pressure correlations, it appears behavioural-physiological correlations seem to increase with increasing pain. Behavioural-physiological correlations are not significantly affected by gender, physical condition, surgical stress or cardiorespiratory insufficiency. The authors conclude that physiological measures such as heart rate and blood pressure can be useful for postoperative pain assessment in the ICU where patients are closely monitored and the pain levels experienced are relatively high.

Review Articles

The *Pediatric Pain Letter* briefly notes the following recent review articles:

Compas BE, Boyer MC. Coping and attention: Implications for child health and pediatric conditions. *Journal of Developmental & Behavioral Pediatrics* 2001;22(5):323-333.

In this excellent review, Compas and Boyer elucidate a two-process model of response to stress distinguishing between voluntary or controlled responses and involuntary or automatic responses. Examples are drawn from the research on recurrent abdominal pain in children.

Kristjansdottir G. Familial aggregation and pain theory relating to recurrent pain experiences in children. *Acta Paediatrica* 2000;89(12):1403-1405.

Kristjansdottir, a nurse researcher from Iceland, provides a nice commentary on the issues of familial transmission of pain.

Oberlander TF. Pain assessment and management in infants and young children with developmental disabilities. *Infants & Young Children* 2001;14(2):33-47.

This article provides an overview of pain in children with severe developmental disabilities. It discusses the possibility that altered pain sensation may accompany some developmental disorders and presents a detailed review of pain management strategies. Only a brief overview of pain assessment is given. The article provides an introduction to the complexity of pain assessment and management in this group. However, further information concerning the epidemiology and assessment would have added to its clinical relevance.

Rapoff MA. Psychosocial aspects of pediatric rheumatic diseases. *Current Opinion in Rheumatology* 2001;13(5):405-409.

This is a brief review of current issues. It highlights the lack of research on pain and other psychosocial aspects of pediatric rheumatic diseases.

Announcements

Meetings

May 23-25, 2002: *Canadian Pain Society 2002 Annual Conference, Hotel Fort Garry, Winnipeg, Manitoba, Canada.* The conference theme is "Back to the Future: Emerging Ideas on Pain Mechanism and Treatment". For more information, contact the Canadian Pain Society, 50 Driveway, Ottawa, ON K2P 1E2, Attention: Sherry Franklin, tel: 613-234-0812, fax: 613-234-9894, web-site: www.canadianpainsociety.ca/winnipeg/.

June 21-25, 2002: *Canadian Anesthesiologists' Society 58th Annual Meeting, Victoria, British Columbia, Canada.* For more information, contact the CAS Meeting Co-ordinator, 1 Eglinton Avenue East, Suite 208, Toronto, ON M4P 3A1, tel: 416-480-0602, fax: 416-480-0320, web-site: www.cas.ca/calendar/.

August 17-22, 2002: *The 10th Triennial World Congress on Pain, San Diego Convention Center, San Diego, California, USA.* More information may be found at the following web-site: www.iasp-pain.org.

International Forum on Pediatric Pain

The Context of Pediatric Pain: Biology, Family, Society, Culture

September 19 - 22, 2002

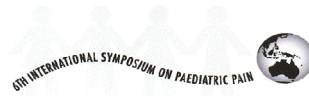


White Point Beach, Nova Scotia, Canada

Speakers include: Jeff Mogil, Canada: Genetics of pain and analgesia; Sunny Anand, USA: Early pain experience (the animal data); Ruth Grunau, Canada: Early pain experience (the human data); Carl von Baeyer, Canada: Cognitive and social development; Gustaf Ljungman, Sweden: Effects of chronic illness; Christine Chambers, Canada: Family issues; Ken Craig, Canada: Social influences, culture, ethnicity; Ada Jacob, Detroit, USA: Health centre policies and accreditation; David Joranson, Madison, USA: Governmental policies.

PLEASE CONTACT: Conventional Wisdom Event Planning
6496 Liverpool Street, Halifax, NS, B3L 1Y4, CANADA
Email: info@conventionalwisdom.ca
Tel: 902.453.4664 Fax: 902.423.5232
<http://www.pediatric-pain.ca/ifpp>

6th International Symposium on Paediatric Pain



ISPP 2003

Pain in Childhood:
The Big Questions

Sponsored by the Special Interest Group on Pain in Childhood, International Association for the Study of Pain

**THE SYDNEY CONVENTION & EXHIBITION CENTRE
SYDNEY, AUSTRALIA • 15-19 JUNE 2003**

The Symposium will reflect an evidence based approach to defining shared knowledge and common goals, as well as educating and challenging researchers on what clinicians need to know in caring for children in pain.

CALL FOR WORKSHOPS DEADLINE: 1 May 2002

CALL FOR POSTERS DEADLINE: 15 December 2002

Contact Conference Secretariat: DC Conferences Pty Ltd
PO Box 571 Crows Nest 1585 NSW Australia
Phone 02 9954 4400 • Fax 02 9954 0666
Email ISPP2003@dcconferences.com.au
Website www.dconferences.com.au/ISPP2003.html

Positions

The Pediatric Chronic Pain Management Program, Department of Anesthesia at the Hospital for Sick Children, Toronto is advertising for a Fellow commencing July 2002. Applications are invited from Board eligible (CA-3 completed or fellowship qualification outside of North America) candidates. It would be expected that applicants would have some prior experience of management of pain in children. Individuals trained in anesthesia or other pain allied specialties will be considered. For further information, please contact Stephen Brown, Director Chronic Pain or Hana Zita hana.zita@sickkids.on.ca (tel: 416-813-7240, fax: 416-813-7543).

*Short announcements on pediatric pain events
will be published free of charge.*

We need your help

Your participation in abstracting and writing commentaries for the *Pediatric Pain Letter* is welcomed. Please send submissions according to the specifications outlined in our Author's Kit which can be obtained from Kelly Morris, Managing Editor, *Pediatric Pain Letter*, Pain Research Lab, IWK Health Centre, 5850 University Avenue, Halifax, Nova Scotia, Canada, B3J 3G9, email kamorris@is.dal.ca (requests can be made in writing or by email). Abstracts and commentaries on any aspect of pain in infants, children and/or adolescents are appropriate. We will attempt to use abstracts and commentaries but the editors reserve the right to edit or reject contributions.

Assistants for this issue: Lynn Breau, Sheldon Choo, Alyson Currie, Bruce Dick, Sandy Reyno and Trudi Walsh.

Subscriptions

One-year subscription is \$25 CDN in Canada, \$35 CDN or \$25 US in other countries. Payment can be made by cheque (payable to Dalhousie University - *Pediatric Pain Letter*), Visa, or MasterCard. Subscribe by sending payment and mailing address to the Managing Editor.

Copyright © 2001 - P. J. McGrath & G. A. Finley / ISSN 1205-9692

Note: Over the next few issues we will be modifying the format in an effort to improve the usefulness of the *Pediatric Pain Letter*. Your comments are appreciated.

Editorial Board

Editors and Publishers

Patrick J. McGrath Ph.D.
G. Allen Finley M.D. FRCPC
Dalhousie University & the IWK Health Centre
Halifax, Nova Scotia, Canada

Editorial Board Members

H. Abu-Saad, Maastricht, The Netherlands
C. Berde, Boston, USA
D. Champion, Sydney, Australia
K. Craig, Vancouver, Canada
J. Eland, Iowa City, USA
C. Eccleston, Bath, UK
M. Fitzgerald, London, UK
G. Frager, Halifax, Canada
S. Hertel, Copenhagen, Denmark
C. Johnston, Montreal, Canada
N. Morton, Glasgow, Scotland
G. Olsson, Stockholm, Sweden
J. Ritchie, Montreal, Canada
N. Schechter, Hartford, USA
A. Unruh, Halifax, Canada
C. von Baeyer, Saskatoon, Canada

Editorial Staff

Managing Editor:
Kelly Morris, kamorris@is.dal.ca
IWK Health Centre
Pain Research Lab
5850 University Avenue
Halifax, NS
B3J 3G9
Canada
tel: 902-470-7702
fax: 902-470-7709
web-site: www.pediatric-pain.ca/pplet/