

Pediatric Pain Letter

Abstracts and Commentaries on Pain in Infants, Children and Adolescents

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Editorial

I recently attended the excellent Annual Meeting of the American Pain Society. There were relatively few lectures and symposia specifically directed towards "pediatric pain issues". However, I found many sessions of great interest and relevance, including research presentations that dealt with developmental models of pain (with implications for adult chronic pain) that were not identified as "pediatric" in any way. Although we, and other groups, organize meetings and disseminate information designated as "pediatric", like this *Letter*, it is important to remember that good science is good science, whatever the age of the subjects or discipline of the investigator. We can, and must, learn from others and we must share our observations with our "adult" colleagues.

The commentary in this issue is a good example. Although much of the research on measurement of pain in cognitively-impaired persons deals with children (i.e., less than 17 or 18 years of age), and is performed by scientists who spend most of their time working on pediatric problems, the same questions apply to many of these individuals when they are older and have relevance to the care of elderly or brain-injured patients who have lost cognitive or communication ability.

The topic of pain measurement in cognitively-impaired persons also has particular relevance in Canada,

in the wake of the Latimer murder trial (a Saskatchewan father was tried in the death of his daughter who suffered from severe cerebral palsy). Astonishingly, the vast majority of the lay media (newspapers, television) reported that Mr. Latimer had killed his disabled daughter because her pain was so severe and couldn't be treated. The ethical question at issue in the press was whether he had a right to end her life in the face of untreatable pain. No one asked publicly why her pain had been regarded as untreatable and why it hadn't been assessed and managed by the healthcare professionals involved in her care. This represents one more dramatic example of the difficulty parents have in persuading health professionals of their child's pain, particularly when the behaviour does not fit easily-recognizable norms in children with cognitive or expressive impairments.

Abstracts

Pain in children with severe cognitive and communication impairment

Collignon, P., Giusiano, B., Porsmoguer, E., Jimeno, M.T. & Combe, J.T. (1995). Difficultés du diagnostic de la douleur chez l'enfant polyhandicapé (*Difficulties in diagnosing the pain of children with multiple disabilities*). *Annales de Pédiatrie*, 42, 123-126.

Objective. To compile a preliminary description of the pain behaviour of three children with severe, multiple disabilities as part of a larger study to develop a pain assessment tool for this population.

Design. Case series.

Setting. Residential institution.

Participants. Two males aged 2.5 and 10 years and 1 female 5 years old, all with severe, multiple disabilities.

Main Outcome Measures. Descriptions of the baseline behaviour of each child (i.e., their lifestyle, social communicative ability, neuromotor diagnoses and psychotic tendencies) and of their behaviour during an incident in which it is presumed they experienced pain.

Results. Child 1 was observed 24 hours after surgery. He smiled and appeared relaxed and did not appear to show pain. He did not cry or grimace, but displayed a "giddiness". Examination of the surgical site caused the child's typical uncoordinated motor responses, but no pain expression and

no attempt to protect the painful area. Giddiness subsided over 5 days. Child 2, 29 months old, was observed prior to injection. During palpation of the abdomen, he displayed a tonic, spastic reaction of all four limbs. Examination of the face resulted in crying. Child 3, age 5, was observed during physiotherapy during which subluxation of the right hip was noted. Facial anxiety, fewer smiles and sadness were observed. Movement of the leg resulted in tears, screaming and crying, but no attempt was made by the child to protect the area or to stop the manipulation.

Conclusion. The response to pain of children with severe multiple disabilities is unique and varies with the child's individual abilities and limitations. Children may not exhibit clear signs of pain when expected and may display behaviours that observers believe do reflect pain when no source of pain is discernable.

Fanurik D., Koh, J.L., Harrison, R.D., Conrad, T.M. & Tomerlin, C. (1998). Pain assessment in children with cognitive impairment: An exploration of self-report skills. *Clinical Nursing Research*, 7, 103-124.

Objective. To examine the ability to use a numerical pain rating scale (NRS) with a sample cognitively impaired (CI) children with varying levels of mental retardation and unimpaired children.

Design. Cross-sectional.

Setting. Children's Hospital.

Participants. CI children (n= 47; aged 8-17 years) and unimpaired children (n=111; aged 4-14 years) scheduled for elective surgery.

Main Outcome Measures. A 3-step evaluation of the ability of CI and unimpaired children to understand magnitude and ordinal position and their ability to use a 0-5 NRS to rate their pain. A nurse specialist, blind to the evaluation, predicted whether each child would be capable of completing a 0-5 NRS.

Results. Twenty-one percent of the CI children (3 of 6 borderline, 7 of 20 mild mental retardation) displayed the ability to use the NRS, while 64% of unimpaired children and all unimpaired children above age 8 years completed the tasks. Of the 15 CI children who nurses predicted could use a NRS, 7 (47%) demonstrated the ability. Only 1 CI child (1%) who was predicted to be incapable of using a NRS demonstrated the ability. Seventy-seven percent of unimpaired children predicted to be capable of using a NRS, and 21% of those predicted to be incapable, actually demonstrated the ability to use it.

Conclusion. Some children with borderline to mild mental retardation are capable of providing self-report of pain

intensity on a 0-5 NRS. Nurses tend to overestimate the ability of CI and younger unimpaired children to rate their own pain using a NRS.

Giusiano, B., Jimeno, M.T., Collignon, P. & Chau, Y. (1995). Utilization of a neural network in the elaboration of an evaluation scale for pain in cerebral palsy. *Methods of Information in Medicine*, 34, 498-502.

Objective. To test an observational pain measure designed for individuals with severe mental and physical disabilities.

Design. Observational.

Setting. Residential institution.

Participants. Non-communicative individuals (n=100; mean age=16 years, range 2-33; 70% with psychotic problems or in a chronic vegetative state) with severe tetraplegia, triplegia, hemiplegia or paraplegia. Fifty were referred by nursing staff after an acute episode or orthopedic surgery and 50 were randomly selected from the remaining population.

Main Outcome Measures. A list of 22 possible pain behaviours was generated and 2 physicians and 3 nurses (examiners) rated the degree of change from baseline (0=none to 4=extreme) for each one during a physical exam. Each examiner also rated presence/absence of pain and his/her certainty of the presence or absence of pain (0-2).

Results. Two factors were extracted from the behaviour ratings using Multiple Correspondence Analysis: suffering and degree of voluntary motor function. A third factor, examiners' degree of certainty in pain/no pain ratings, was closely related to the factor reflecting degree of motor control. A neural network analysis produced significant combinations of behaviours for individuals at three levels of motor control: very dependent (expression, pain-easing posture, interest in surrounding, cry, increased tonus); quite dependent (protecting painful area, capacity to react to pain, interest in surroundings, cry, increased tonus); and not very dependent (increased involuntary movement, search for pain-easing position, protecting painful area, guarding painful area, cry).

Conclusions. A set of behaviours reflecting pain may be common to individuals with severe mental and physical disabilities, although this set appears to vary with the individuals' degree of voluntary motor function. Further research must clarify this relationship.

LaChapelle, D.L., Hadjistavropoulos, T. & Craig, K.D. (1999). Pain measurement in persons with intellectual disabilities. *The Clinical Journal of Pain*, 15, 13-23.

Objective. To examine self-reported pain intensity and non-

verbal, facial expressions of pain during a painful medical procedure in persons with intellectual disabilities.

Design. Observational.

Setting. Institution.

Participants. Forty adults with intellectual disability ranging from "severe" to "unspecified" mental retardation were recruited (29 male; mean age=49.6 years, SD=12.2; mean IQ=45.0, SD=15.1). Thirty-two university students (20 female; mean age=22.2 years, SD=6.6) were recruited as untrained observers.

Main Outcome Measures. Form L of the Peabody Picture Vocabulary Test-Revised (PPVT-R) was used to determine participants' level of intellectual functioning. A routine influenza vaccination was video-taped. The Colored Visual Analogue Scale for Pain (CAS) was administered before videotaping (baseline) and after injection. Observers viewed the videotaped injections and rated participants' pain on a 10cm visual analogue scale (VAS). Videotapes were also analysed objectively by trained coders using the Facial Action Coding System (FACS).

Results. Thirty-five percent of the participants were unable to provide self-report ratings of pain. There were no significant differences in self-reported pain ratings prior to and following injection, suggesting that even those participants capable of self-report were unable to rate their pain. FACS analyses revealed that within-subjects facial activity intensity changed in the expected direction across baseline, swabbing and injection ($p<0.05$), with the intensity at injection greater than either baseline ($p<0.01$) or swabbing ($p<0.05$). Observers rated participants' pain during the injection higher than during baseline or swabbing ($p<0.03$ and $p<0.002$). The best predictor of observers' pain ratings was the intensity of facial action ($p<0.005$). Stereotypes or biases did not affect the observers' ratings.

Conclusion. Intensity of facial action, as assessed by the FACS, is useful for assessing pain in individuals with cognitive disability. Observer ratings also appear to be useful in providing an objective measure of pain in those with cognitive disability. This is particularly important given the difficulty with self-report in this population.

McGrath, P.J., Rosmus, C., Camfield, C., Campbell, M.A. & Hennigar, A. (1998). Behaviors caregivers use to determine pain in non-verbal, cognitively impaired individuals. *Developmental Medicine & Child Neurology*, 40, 340-343.

Previously abstracted in *Pediatric Pain Letter*, Vol. 3, No. 1; p. 7.

Miller, A.C., Johann-Murphy, M. & Pit-ten Cate, I.M. (1997). Pain, anxiety and cooperativeness in children with cerebral palsy after rhizotomy: Changes throughout rehabilitation. *Journal of Pediatric Psychology*, 22, 689-705.

Objective. To assess, over time, children's behavioural distress, range of motion (ROM), tone and function and children's cooperativeness throughout the rehabilitation process following rhizotomy.

Design. Repeated measures.

Setting. Clinical.

Participants. Consecutive sample of 30 children (mean age=4.5 years, SD=1.51) with spastic cerebral palsy admitted for inpatient rehabilitation following selective posterior rhizotomy (SPR). Length of stay ranged from 7 to 36 weeks (mean=15.1 weeks, SD=6.73).

Main Outcome Measures. Behavioural measures included the Observation Scale of Behavioural Distress (OSBD), Observer Ratings of Pain and Anxiety and the Infant Behavior Record of the Bayley scales of infant development. Muscle tone, range and function were assessed using the New York University Rhizotomy Evaluation Form (NYU-REF). Measures of behavioural distress and cooperativeness were taken at an average of 1 (T1), 5 (T2) and 13.2 (T3) weeks post-surgery. Physical assessments were made for three muscle groups at T1 and T2, and 4 muscle groups at T3.

Results. Ratings of children's pain and anxiety decreased throughout the rehabilitation process as demonstrated by OSBD scores ($p < 0.05$) and Observer ratings ($p < 0.001$). Children's physical assessments also improved over time ($p < 0.05$) and were not associated with either pain responses or cooperativeness. Children's ability to cooperate improved over time ($p < 0.001$). Cognitive impairment, parental involvement and children's pain behaviours accounted for 77% of the variance in task-focussed cooperativeness and 56% of the variance in emotion-focussed cooperativeness.

Conclusions. The hypothesis that children's pain and anxiety would decrease during the course of rehabilitation was supported. Coping strategies are believed to be important, however, parental involvement and pain behaviours are important predictors of children's cooperativeness. The clinical implications of this study include the promotion of cognitive and behavioural coping strategies for pain management and parental involvement during therapy.

Oberlander, T.F., Gilbert, C.A, Chambers, C.T., O'Donnell, M.E. & Craig, K.D. (1999). Biobehavioral responses to acute pain in adolescents with a significant neurological impairment. *The Clinical Journal of Pain*, 15, 201-209.

Objective. To gain a better understanding of acute pain responses in children with significant neurological impairment (SNI).

Design. Within-subject cross-over design.

Setting. Tertiary care facility.

Participants. Eight adolescents with SNI (5 boys; mean age=15 years) with spastic quadraparesis due to perinatal asphyxia or posttraumatic encephalopathy.

Main Outcome Measures. Participants were videotaped and their heart rate was monitored during both mock (no skin penetration) and real vaccinations. For each participant facial actions were coded using the Facial Action Coding System (FACS) and the Child Facial Action Coding System (CFCS) across 5 segments of videotape (baseline, start of skin contact, injection, post-contact and recovery) by coders blinded to study conditions. Pain was rated using a visual analogue scale (VAS) by a blinded coder who was not familiar with the FACS or CFCS.

Results. There were no significant changes in mean heart rate from baseline during the mock or real vaccination conditions. There were no significant differences in FACS or CFCS scores across the mock or real vaccination video segments, however, VAS ratings did show significant differences ($p = 0.023$). Post-hoc tests showed that VAS ratings for the "injection" phase were significantly higher than all phases except the "start of skin contact" phase.

Conclusions. Both behavioural and physiological responses observed were quite weak, thus providing further evidence for the complexities associated with assessing pain responses in individuals with severe cognitive impairment. Although there are several limitations to the study (a ceiling effect associated with heart rate, small sample size, range of pain response) the data warrant further investigation into how neurological impairment influences the pain response.

Commentary

Children who have pain and severe neurological impairments (e.g., cerebral palsy and neurodevelopmental disorders) are at risk of unrecognized and un-managed pain (Collignon et al., 1995; Giusiano et al., 1995; McGrath, 1998). They have problems specific to their condition (e.g., spasticity and contractures in cerebral palsy), plus those

associated with efforts to treat the condition (e.g., surgical treatment of contractures and dislocated joints), plus difficulty in communicating their experience to their caregivers. These difficulties are compounded by a widespread and pernicious belief that intellectually impaired children are insensitive to pain. The accumulating evidence indicates that, despite occasional evidence of insensitivity or indifference to pain in exceptional people in the diverse population addressed here, the vast majority retain a capacity for considerable pain and suffering and deserve the careful attention and care available to those who do not suffer cognitive and communication impairment.

The studies abstracted here show that most children with severe (as distinct from mild and moderate) intellectual impairment cannot use graded self-report scales. For example, Fanurik et al. (1998) found that children with severe cognitive impairments could not use a 0-5 numerical rating scale because they were unable to understand concepts of magnitude and ordinal position. LaChapelle et al. (1999) demonstrated the difficulty of accessing self-report in adults with severe cognitive impairments using a coloured visual analogue scale, although there was no association between severity of impairment and ability to use self-report scales. Thus, clinicians should attempt to obtain self-reports and to use this information if possible in the context of nonverbal behaviour and other available information.

Observational pain measures developed for children without disabilities have also been evaluated. Koh & Fanurik (1997) found that the Children's Hospital of Eastern Ontario Pain Scale was difficult to score reliably when rating behavioural indicators with cognitively impaired children because of idiosyncratic behaviours (e.g., facial grimacing, moaning) and physical limitation (e.g., movement of extremity limited by casts or paralysis). These idiosyncratic behaviour variations (e.g., facial paralysis) may also influence fine-grained observational measures such as the Facial Action Coding System. Other observational measures, such as the Nursing Assessment of Pain Intensity, the Riley Infant Pain Scale and the Post Operative Pain Scale, have been shown to be unreliable measures of pain in a sub-sample of children with cerebral palsy (Schade et al., 1996). However, Miller et al. (1997) suggested that global ratings of distress could be validly used as they correlated significantly with scores on the Observational Scale of Behavioural Distress recorded from videotape.

Research groups in the Netherlands, Canada and the United Kingdom are currently undertaking projects identifying the behaviours, healthcare situations and activities of daily living that are associated with pain in

people with severe cognitive and communication impairment, as seen by their caregivers and healthcare providers. Advances in this field are addressed in detail in a forthcoming chapter (Hadjistavropoulos et al., in press).

Recently, two observational pain measures have been developed specifically for children with severe disabilities. One is the Non-Communicating Children's Pain Checklist (McGrath et al., 1998) which was developed, based on parents' reports, for children with cerebral palsy, neurodevelopmental disorders, severe intellectual disabilities and other pervasive developmental disorders. Preliminary results support its reliability and its ability to differentiate pain from response to non-noxious stimuli (Camfield et al., 1998).

A second measure is Giusiano's Evaluation Scale of Pain in Cerebral Palsy (Giusiano et al., 1995) which consists of 22 items that were developed from physicians' perception of behaviours that indicate pain during a physical examination. Examples include crying during manipulation, decreased interest in the surroundings and pain-easing posture. The authors concluded that the behaviours observed during a physical examination are dependent on the child's ability to move voluntarily (e.g., guarding reaction to palpation of the painful zone); more severely impaired children showed more involuntary movement (e.g., painful expression during manipulation).

Global measures should be distinguished from molecular measures. Global ratings by observers who know the child may be more flexible, taking account of idiosyncratic behaviour that is not listed on a checklist, but be biased by various characteristics of the observer and situation. On the other hand, molecular pain measures such as facial action coding systems may select behaviours that are reliable and valid pain indicators for most people, but not for a particular individual. A promising possibility is to tailor a pain scale for each individual by getting that individual's parents to identify the specific behaviours observed at various levels of pain intensity. Behaviourally anchored global rating scales may represent an acceptable compromise, retaining some of the positive features of both simple, unanchored global ratings and formal, complex behaviour coding schemes.

Future research should focus on validating molecular and global measures during medical interventions as well as on exploring ways to obtain self-reports of pain from children with severe cognitive and physical impairments. We are investigating multidimensional measurement of pain in children with cerebral palsy, an effort which is also underway in several other centres.

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Recent Articles

Beyer, J.E., Simmons, L.E., Woods, G.M. & Woods, P.M. (1999). A chronology of pain and comfort in children with sickle cell disease. *Archives of Pediatric & Adolescent Medicine*, 153, 913-920.

Objective. To examine the patterns of children's and caregivers' descriptions of pain and the comfort measures used to relieve the pain of sickle cell disease (SCD).

Design. Qualitative and quantitative survey.

Setting. Children's hospital with a regional SCD service.

Participants. African American children and adolescents with SCD (n=21; 6-15 years old) and 21 family caregivers

(20 mothers and 1 aunt) referred by the hospital's inpatient hematology/oncology unit. All were English-speaking and born in the United States. Exclusion criteria were mental or developmental delay of the parent or child or life-threatening complications at the time of the interview.

Main Outcome Measures. Observation and ethnographic interviews were conducted once during and once after a vaso-occlusive episode (VOE). Interviews lasted between 30 and 120 minutes per family and were audio-taped and transcribed to disk. Pain measures were obtained using several clinically validated tools. Multiple, simultaneous, methodological triangulation was used to integrate the qualitative and quantitative findings.

Results. Children's pain and comfort was found to follow an 8-phase chronology: 1) baseline, child's usual condition; 2) "pre-pain state" involved no vaso-occlusive pain but child showed prodromal signs and symptoms (e.g., yellowing of eyes or fatigue); 3) pain start point; 4) pain acceleration; 5) peak pain experience; 6) pain decrease start point; 7) steady pain decline; and 8) pain resolution. Emergency department visits usually occurred during phase 5 and in phase 8 the pain had decreased enough that the child could be discharged. The number and variety of comfort measures varied with pain intensity.

Conclusion. The results provide a chronology of children's and adolescents' pain and comfort experiences during a VOE. Further larger, quantitative and longitudinal studies are required to improve understanding of the pain characteristics and comfort measures used during each phase.

Boelen-van der Loo, W.J.C., Scheffer, E., de Haan, R.J. & de Groot, C.J. (1999). Clinimetric evaluation of the Pain Observation Scale for Young Children in children aged between 1 and 4 years after ear, nose, and throat surgery. *Developmental & Behavioural Pediatrics*, 20, 222-227.

Objective. To develop and assess the reliability, validity and responsiveness of a pain observation scale in children aged 1 to 4 years undergoing adenotonsillectomy (ATE), adenotomy (AT) and ventilation tube insertion (VTI).

Design. Scale development and validation.

Setting. Day surgery centre of a general hospital in the Netherlands.

Participants. Three-hundred and eleven children (187 boys; median age=2 years, range 1-4) who underwent either ATE (n=114), AT (n=109) or VTI (n=88). Eleven children in the VTI group received 250 mg paracetamol suppositories immediately after surgery. For 3 children, pain scores were

included only for the several hours before they began bleeding after ATE.

Main Outcome Measures. Post-operative pain was assessed using one physiological (respiratory rate) and eight behavioural items (facial expression, crying, movement of torso, legs/toes and arms/fingers, state of arousal, verbal response and touching the painful spot) derived from the Children's Hospital of Eastern Ontario Pain Scale (CHEOPS) and the Neonatal Infant Pain Scale (NIPS). The presence or absence of each item was recorded 10 minutes after surgery (T0) and then every 60 minutes (T1-T5) until the child was discharged (6 assessments for ATE; 3 assessments for AT; 2 assessments for VTI). Observation and scoring time was less than 2 minutes for each assessment. Total score was calculated by summing all item scores.

Results. At T0 and T1 inter-observer agreement for individual item scores (kappa coefficient) ranged from 0.73 to 0.97 for all but "verbal response" and "touch painful spot" (range 0.43-0.73). For total score the intra-class correlation coefficient was 0.96 at T0 and T1. Homogeneity (Cronbach's alpha coefficient) was 0.91 at T0 and increased to 0.94 when the "verbal" and "touch" items were removed. Construct validity was supported by principal components analysis which showed that 1 factor (as measured by 7 items) contributed ~59% of the scale's explained score variance while only 12% could be attributed to a second factor ("verbal" and "touch" items). The 7 items from the first factor formed the Pain Observation Scale for Young Children (POCIS). Significant differences in total POCIS scores were found for: ATE, AT and VTI at T0 and T1 ($p < 0.0001$); AT and ATE at T2 ($p < 0.0001$); ATE between T0 and T5 and AT between T0 and T2 ($p < 0.0001$); and VTI within-patient change scores between T0 and T1 ($p < 0.0001$). Removing the 11 children who received paracetamol from the analyses did not affect the results.

Conclusion. In agreement with previous studies, the results indicate that post-operative pain from ATE is greater than that for AT or VTI. For children aged 1 to 4 years undergoing ear, nose or throat surgery the POCIS is a reliable, valid and responsive pain measure that is easy to administer due to the dichotomous coding of only 7 items. Further study is needed to validate its use in measuring longer lasting pain under different conditions.

Chambers, C., Giesbrecht, K., Craig, K., Bennett, S. & Huntsman, E. (1999). A comparison of faces scales for the measurement of pediatric pain: Children's and parents' ratings. *Pain*, 83, 25-35.

Objective. To examine: 1) how smiling rather than neutral

"no pain" faces influence children's self-reported ratings of clinical pain using face scales; 2) child-parent agreement between reports of the child's pain using these various face scales; and 3) the reasons for children's and parents' scale preferences.

Design. Between-measures comparison.

Setting. Endocrine and diabetic units of a children's hospital.

Participants. Children ($n=75$; 39 female; mean age=8.73 years, range 5-12) scheduled for venipuncture either in a central lab or metabolic investigation unit and their parents (62 mothers; mean age=38.24 years, range 25-56; middle social class).

Main Outcome Measures. Standardized scores (0-10) on five pain faces scales (Bieri et al., 1990; Kuttner & Lepage, 1989; LeBaron & Zeltzer, 1984; Maunuksela et al., 1987; Wong & Baker, 1988) following venipuncture. The participants' preferences for the various face scales and reasons why were recorded.

Results. Spearman correlations between ratings with all 5 scales for children and parents ranged from 0.78 to 0.93. Children had significantly higher pain ratings when using scales with smiling "no pain" faces (Maunuksela et al., 1987; Wong & Baker, 1988), compared to scales with neutral "no pain" faces (Bieri et al., 1990; Kuttner & Lepage, 1989; LeBaron & Zeltzer, 1984) ($p < 0.05$) and girls reported significantly higher pain on all scales ($p=0.05$). The level of agreement (kappa coefficient) between child and parent reports of pain was low (range 0.21- 0.36), with parents overestimating their children's pain on all five scales ($p < 0.05$). Of all the scales the Wong & Baker (1998) scale was most preferred (64.4% of children and 40.3% of parents) followed by Bieri et al. (1990) (25% of parents). The least preferred was the LeBaron & Zeltzer (1984) scale (2.7% of children and 4.2% of parents). The most commonly reported reasons for scale preference were: "happy or cartoon-like" (52.1% of children and 27.8% of parents); "realistic/life-like" (23.6% of parents); "simple and easy to use" (15.3% of parents); "descriptive/expressive" (13.9% of parents).

Conclusion. Subtle variations in face pain scales, such as smiling "no pain" faces, affect child and parent ratings of pain in clinical settings.

Fanurik, D., Koh, J., Schmitz, M., Harrison, D. & Conrad, T. (1999). Children with cognitive impairment: Parent report of pain and coping. *Developmental & Behavioural Pediatrics*, 20(4), 228-234.

Objective. To obtain pain-relevant information in children with cognitive impairment by examining: 1) parents'

perceptions of their child's pain expression, pain coping strategies and pain treatment; and 2) the relationship between the level of child cognitive impairment and parental responses.

Design. Survey.

Setting. Ambulatory surgery centre.

Participants. Children (n=145; 59 female; mean age=9.8 years, range 4-20) with borderline to profound cognitive impairment, and their parents, were recruited on the day of surgery. The majority of children had either cerebral palsy and/or seizure disorder and a large proportion had either autism, Down syndrome, a genetic disorder, a neurodegenerative disease, brain trauma, or multiple central nervous system symptoms.

Main Outcome Measures. Three open ended questions asking parents for information about their children's pain experience, expression, treatment and two forced-response questions asking parents to classify the coping behaviours of their children before and during a medical procedure involving a needle-stick.

Results. Parental report of pain expression and coping behaviour was related to the level of the child's cognitive impairment. Sixty-six percent of children with mild to moderate cognitive impairment were able to directly report that they were experiencing pain and exhibited procedural coping strategies similar to those observed in children without cognitive impairments. Parents of 90% of the more severely impaired children reported the ability to use only indirect behaviours to determine the presence of pain. Almost two thirds of parents responded that their children experienced pain differently than did children without cognitive impairment, with the majority of parents describing a higher pain tolerance and a lower sensitivity to pain. Parents frequently reported the general difficulties of assessing and treating pain, as well as underestimating or under-treating pain. Approximately one third of parents felt that their children's pain was treated differently than that of children who did not have intellectual deficits, although the level of impairment did not seem related to parent's perceptions.

Conclusion. Further research involving direct observation of children with cognitive impairment in clinical pain situations is recommended to learn more about pain in this special pediatric population.

Gilbert, C.A., Lilley, C.M., Craig, K.D., McGrath, P.J., Court, C.A., Bennett, S.M. & Montgomery, C.J. (1999). Postoperative pain expression in preschool children: Validation of the Child Facial Coding System. *The Clinical Journal of Pain*, 15, 192-200.

Objective. To determine if the Child Facial Coding System (CFCS) can be used to assess postoperative pain in children; use the structure, consistency and dynamics of the facial display to examine the construct validity of the measure; and use associations with global pain ratings to evaluate concurrent validity.

Design. Validation study.

Setting. Post anesthesia care unit (PACU) in a tertiary care children's hospital.

Participants. One-hundred English-speaking children (58.6% male; mean age=41.8 months, range 13-74) undergoing a variety of surgical procedures (50% myringotomies; 27% tonsillectomies and/or adenoidectomies; 8% cyst removals; 4% inguinal hernia repairs; 10% other miscellaneous procedures) for which general anesthesia (GA) was required and their parents. Children with developmental disabilities, those undergoing major surgery or facial procedures and those receiving major conductive blocks were excluded. Mean length of procedure was 15 minutes and mean length of stay in the recovery room was 48 minutes. All children received GA and 45% had local anesthetic injected into the wound.

Procedure. Before surgery parents completed a demographic and medical history questionnaire and after discharge a research assistant conducted a chart review. All children were videotaped upon arrival in the PACU until their discharge to the day surgery unit (mean length of time=35 minutes, range 2-62). Editing involved randomly selecting 20 second blocks from each successive 2 minute time period (mean number of blocks=18).

Main Outcome Measures. Parents provided a history of their child's past medical experiences and rated their reaction to each one on a 7-point Likert scale. Three research assistants trained in the use of the CFCS (reliability: kappa coefficient range 0.75-0.86) coded the edited videotapes for intensity (0-2) of 10 facial actions (brow lower, eye squeeze, squint, nose wrinkler, nasolabial furrow, cheek raiser, upper lip raiser, lip corner puller, horizontal and vertical mouth stretch) and presence or absence for 3 (flared nostril, open lip and blink). Pain was rated for each 20 second block of videotape on a 10-point visual analog scale (VAS) by an independent observer.

Results. Percentage of total time coded in which each facial action was present ranged from 2.8-40.8%. Principal component analysis yielded one factor accounting for 55% of the variance in facial actions. Twenty-five of 30 correlations between facial action summary scores and VAS ratings of pain were significant ($p < 0.1$). Facial action summary scores were lowest just after admittance to the PACU and just before discharge.

Conclusion. The results confirm the construct and

concurrent validity of the CFCS and indicate that it is a valid measurement tool for persistent pain in children. A constellation of facial actions most likely to represent persistent postoperative pain was identified (open lips, lowered brows, deepened nasolabial furrow, mouth stretched wide horizontally and vertically, eyes squeezed shut or squinted and raised cheeks). **NB** - There were inconsistencies in the reported intravenous opioid use.

Litman, R.S. (1999). Conscious sedation with remifentanyl and midazolam during brief painful procedures in children. *Archives of Pediatric & Adolescent Medicine*, 153, 1085-1088.

Objective. To determine the effectiveness of remifentanyl, in combination with midazolam, in providing conscious sedation and analgesia during brief, yet painful procedures in children.

Design. Prospective, observational.

Setting. University hospital.

Participants. Children (n=20; 11 boys; mean age=7.4 years, SD=3.5) requiring sedation or general anesthesia for brief, but painful, medical procedures (e.g., bone marrow aspiration and/or biopsy, renal biopsy, closed fracture reduction) and who were eligible to receive remifentanyl hydrochloride and midazolam hydrochloride. Exclusion criteria were obesity and/or disease or anomalies associated with impaired breathing.

Intervention. Pre-medication for children consisted of intravenous midazolam hydrochloride (0.05mg/kg), intravenous ondansetron hydrochloride (2mg) and oxygen (3L/min) via nasal cannula or "blow-by" technique (10L/min). A bolus of remifentanyl hydrochloride (1µg/kg) was then infused over one minute, followed by an infusion at 0.1 µg · kg⁻¹ · min⁻¹ which was titrated at 5-minute intervals to levels of sedation and analgesia.

Main Outcome Measures. Following infusion, children were assessed for level of consciousness, comfort and respiratory depression. Outcome measures of interest were successful remifentanyl infusion, amount of time to discharge and adverse events (e.g., hypoxemia, hypotension, bradycardia, lack of adequate analgesia or emesis).

Results. Infusion was successful for 17 of the children, of which 4 developed hypoxemia which was quickly corrected and 10 others developed apnea and were given verbal prompts to breath. For 3 children the technique had to be aborted for reasons of child anxiety or unresponsiveness. Mean time for children to reach discharge status was 9.5 minutes (SD=4.3 minutes).

Conclusions. Although the use of remifentanyl and midazolam for brief, painful procedures yields a rapid

discharge time, the combination can cause respiratory complications, particularly in children younger than 5 years. The authors caution against the use of this combination for children and suggest use of a propofol-based technique instead.

Powers, K.S. & Rubenstein, J.S. (1999). Family presence during invasive procedures in the pediatric intensive care unit: A prospective study. *Archives of Pediatric & Adolescent Medicine*, 153, 955-958.

Objective. To examine whether the presence of one or both parents during their child's invasive procedures in a pediatric ICU reduces parent anxiety, helps the parent and child and/or is harmful to medical staff.

Design. Prospective study.

Setting. Pediatric intensive care unit (ICU).

Participants. Children were enrolled in either the study group (n=16; aged 3 months-18 years) or the control group (n=7; aged 22 months-12 years). All children underwent at least one invasive procedure (e.g., intubation, central line placement, chest tube placement). For the study group, parents were invited to attend the procedure. Parents of children in the control group were not invited to attend the procedure, however, the procedure was described to them in detail.

Main Outcome Measures. Parents in both the study and control groups were asked to fill out a survey within 24 hours of their child's procedure. The survey assessed parental ratings of their own anxiety about their child's condition (condition-related anxiety) and their own anxiety about the procedure their child underwent (procedure-related anxiety). For the parents present during the procedure, additional questions assessed how their presence affected themselves and their children, how helpful the medical staff were throughout the procedure and whether or not they would attend an invasive procedure again. Nurses involved in the procedures for the study group completed surveys that assessed how they felt parental presence affected the child, the parents, their own performance and the physician's performance.

Results. Parental presence significantly reduced parental procedure-related anxiety (p<0.005) but not condition-related anxiety. Eighty-one percent of parents in the study group felt their presence was helpful to themselves and the medical staff; 88% felt that their presence was helpful to their child; and 94% reported they would attend an invasive procedure again. Ninety-four percent of nurses felt parental presence was helpful to the child and 72% believed that allowing parents to attend invasive procedures is appropriate.

Conclusion. Given that parental presence reduces procedure-related anxiety, thus proving helpful for the child, further evaluation of policy change allowing parents to be present during invasive pediatric ICU procedures is warranted.

Review Articles

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

Breau, L.M., McGrath, P.J. & Ju, L.I. (1999). Review of primary fibromyalgia and chronic fatigue syndrome. *Developmental & Behavioural Pediatrics*, 20, 278-288.

Kocis, K.C. (1999). Chest pain in pediatrics. *Pediatric Clinics of North America*, 46(2), 189-203.

A good review of a common but poorly understood pain in pediatrics.

Lloyd-Thomas, A.R. (1999). Modern concepts of paediatric analgesia. *Pharmacology & Therapeutics*, 83(1), 1-20.

A broad review of advances in pediatric analgesia by an experienced anesthesiologist. A good review.

Rasquin-Weber, A., Hyman, P.E., Cucchiara, S., Fleisher, D.R., Hyams, J.S., Milla, P.J. & Staiano, A. (1999). Childhood functional gastrointestinal disorders. *Gut*, 45(Suppl 2), 1160-1168.

This is an attempt to refine the general classification of recurrent abdominal pain into different subtypes. It is an important step that now should be followed up by careful research to ascertain its value.

Book Review

World Health Organization (1998). *Cancer Pain Relief and Palliative Care in Children*. Geneva: WHO, 76 pp. ISBN 92-4-154512-7. (Price: \$16.20 US, to order visit <http://www.who.int/dsa/justpub/justpub.htm>)

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Pain Research & Management, Vol. 4, No. 4; p. 200.

This book is the result of a consensus conference held in Gargonza, Italy, in 1993, and its release has been greeted with enthusiasm by those working in this field. The experts convened for the meeting included internationally-recognized specialists in pediatrics, psychology, oncology, anesthesiology, nursing, neurology, pastoral care and palliative care, and represented Canada, France, India, Italy, Japan, Kenya, the United States and the World Health Organization.

This is a companion volume to the WHO's *Cancer Pain Relief*. It fills a much-needed gap in information on the care of children with cancer, although the principles are equally applicable to children with AIDS and other painful terminal and non-terminal diseases. It is a small but clearly written book, intended for inexpensive and widespread distribution.

The book begins with introductory sections that delineate the extent of the problem of children's cancer pain. About two-thirds of children in developed countries can be cured of cancer and therefore suffer specific types of pain related to treatment. Unfortunately, children in developing countries have a much lower cure rate from cancer, due to the scarcity of treatment resources, and thus may undergo a quite different, but even greater, pain experience in the absence of adequate care. Pain places a severe burden on the parents, siblings and healthcare workers, in addition to the suffering felt by the child. The book continues with a plea for better understanding of the principles of comprehensive and palliative care. Note is made of the fact that good palliative care is not necessarily expensive — it can and should be implemented in a community-based setting which uses the resources available.

The various types of pain suffered by children with cancer are described, although the listing is brief and does not include much detail. A short chapter on pain assessment follows, which emphasizes the importance of pain measurement and of using the parents' expertise to help in evaluation. Some suggestions of different measurement

techniques are provided, although further reading would be advisable for those with serious interest in the subject.

In the section on non-drug pain relief therapy there is clear and concise description of the need and techniques for cognitive and behavioural approaches to pain management. Education and family support are emphasized and the use of imagery, hypnosis and relaxation is described. Under physical methods, touch, heat, cold, topical anaesthesia and transcutaneous electrical nerve stimulation (TENS) are mentioned.

There is an extensive section on use of analgesic drugs for pediatric cancer pain, starting with a modification of the WHO analgesic ladder to include the item "for the child", which emphasizes the importance of individualized treatment. Specific drug approaches are recommended and good use is made of tables. Several case examples provide useful illustrations of real-life situations. Side-effects, adjuvant drugs and dependence and tolerance are covered in their respective sections. A longer section details the approaches to procedure pain, and includes recommended pharmacological and non-pharmacological approaches.

Subsequent sections of the book discuss the important, and often overlooked, topics of spiritual care, ethical concerns, professional and public education and legislative, policy and organizational issues. Cited references and suggestions for further reading are also provided.

Although the coverage of many of the topics is necessarily brief, this should be considered an essential book in the collection of any health professional or hospital department treating children with life-threatening chronic disease. In particular, it is to be hoped that it will be translated into many languages and widely distributed. It is small, concise and inexpensive, but it is complete enough to be of value to nurses, physicians and other professionals and to students in these disciplines. It should also be required reading for government and hospital administrators and policy makers.

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Announcements

Meetings

May 11-13, 2000: *Canadian Pain Society 2000 Annual Conference; Pain 2000: Mind, Medicine and Mechanisms, Banff Park Lodge, Banff, Alberta, Canada.* Much progress has been made in reducing the needless suffering of pain. The focus of the annual scientific meeting of the Canadian Pain Society in Banff is to ensure that this quest is carried into the new millennium. Keynote speakers include Dr. John Loeser (Seattle, WA) and Dr. Barry Sessle (Toronto, ON) with plenary speaker Dr. Carl von Baeyer (Saskatoon, SK). For more information, contact Marge Olsen, Local Arrangements Committee, University of Calgary, 3330 Hospital Drive NW, Calgary, Alberta, Canada, T2N 4N1, tel (403) 220-4251, fax (403) 270-2330, e-mail cps@ucalgary.ca.

June 18-21, 2000: *ISPP2000, The 5th International Symposium on Paediatric Pain, London, United Kingdom.* The theme of the 2000 Symposium will be *From Basic Research to Clinical Care*. The meeting will bring together an international delegation of clinical experts and neuroscientists to integrate the clinical management of children's pain with underlying developmental biology. For further information contact Meeting Makers, Jordan Hill Campus, 76 Southbrae Drive, Glasgow G13 1PP, Scotland UK, tel +44 (0) 141-434-1500, fax +44 (0) 141-434-1519, e-mail ispp2000@meetingmakers.co.uk, or visit the web site at <http://www.ich.ucl.ac.uk/pain2000>.

September 3-7, 2000: *Headache World 2000, London, UK.* Organized in association with the British Association for the Study of Headache. The conference aims to be a gathering of professionals from various disciplines as well as individuals who suffer from headache, including migraine, in order to address issues in the widest possible perspective. Topics to be covered include acute and preventative treatments, epidemiology, women and headache, genetics and children and headache. For further information contact the Headache World 2000 Congress Secretariat at MediTech Media Ltd., 125 High Holborn, London, WC1V 6QA, UK, tel +44 (0) 171 404 7151, fax +44 (0) 171 404 6946, e-mail secretariat@headache2000.com, or visit the web site at <http://www.headache2000.com>.

September 28-October 1, 2000: *3rd Biennial International Forum on Pediatric Pain, White Point Beach Resort, Nova Scotia, Canada.* The topic of the meeting will be acute and procedural pain. For further information contact Kate Finlayson of Conventional Wisdom, tel 902-453-4664, fax 902-423-5232, or e-mail katefin@chebucto.ns.ca.

October 28 & 29, 2000: *Inaugural Meeting of Asian Society of Paediatric Anaesthesiologists, Kandang Kerbau Women's and Children's Hospital, Singapore.* The meeting is open to all working in pediatric anesthesia or interested in any aspect of pediatric anesthesia. The scientific program will include plenary sessions and symposia on various topics in the field (e.g., regionals, pharmacology, acute resuscitation, etc.). For further information, please contact Dr. Choo Shu May, fax +65-291-2661 or e-mail aspa@kkh.com.sg.

Events

National Pediatric Pain Awareness Week (PPAW) is recognized during the third week of April every year. PPAW originated at Children's Hospital of Pittsburgh, Pittsburgh, PA (USA) in 1994 under the direction of Tracy Pasek, RN, MSN, CCRN. Numerous activities could be planned for your institution during PPAW, being careful to tailor them to you and your patients' needs. Educational programming, policy revision and/or public awareness campaigns are just a few activities that could be the focus of this week. Making sure these "foci" are carried out the remainder of the year then becomes the challenge! **Helpful Hints & Ideas:** To avoid room scheduling and space problems, "plug" in to already existing programs with pain education. Have the weekly trauma conference be devoted to pain management, for example. Is your organization affiliated with a university school of nursing? Meet with the faculty during PPAW to reevaluate the undergraduate pain curriculum. Maybe this could be the week that a new pediatric or neonatal pain study goes to your internal review board. The possibilities are endless! For more info on how to bring PPAW to your institution, please contact Tracy Pasek, Advanced Practice RN, Critical Care at Children's Hospital of Pittsburgh, One Children's Place, Fifth Ave. at DeSoto, Pittsburgh, PA 15230, tel (412) 692-5897, email pasekt@chplink.chp.edu.

A valuable resource

The Blood & Marrow Transplant Newsletter is a valuable resource for all families and patients (adult and child) that

face a bone marrow or stem cell transplant. Pain is only one of the many important issues that this newsletter deals with. Reach the newsletter at: 2900 Skokie Valley Road, Highland Park IL 60035, USA, tel 847-433-3313, fax 847-433-4599, toll-free 888-597-7674, email help@mmtnews.org, web-site www.bmtnews.org.

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

If you would like to participate

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. An Author's Kit can be obtained from Jill Hatchette, Managing Editor, *Pediatric Pain Letter*, Psychology Department, Dalhousie University, Halifax, Nova Scotia, B3H 4J1; email jhatchet@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.

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