

Pediatric Pain Letter

Abstracts and Commentaries on Pain in Infants, Children and Adolescents

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Commentary

An Underused Resource: The Contributions of Developmental Psychology to Pediatric Pain

Developmental psychology is an underused resource for clinicians and researchers aiming to better understand, assess and treat children in pain. Developmental psychologists track the process of human cognitive, emotional and social development from conception to death. The constant give and take of environmental and biological influences that generate each unique and dynamic individual is the focus of developmental psychology. Recognizing the delicate transience of development is necessary to best help a child in pain because children at different levels of psychological development have very different abilities and skills that may influence their expression of pain. For example, knowledge of developmental milestones is important in choosing pain assessment measures to use with

children. While a 0-10 Numerical Rating Scale may be appropriate for use with a 10-year-old child, a 6-year-old is unlikely to possess sufficient numerical understanding to appropriately use this measure.

"...children at different levels of psychological development have very different abilities and skills that may influence their expression of pain..."

Pediatric pain research has begun to tap into developmental theory as a means of better understanding childhood pain. It is hoped that this knowledge will be synthesized into clinical tools that are an integral part of the actual pain assessment and management process. In line with the research of Gaffney and Dunne (1986), Harbeck and Peterson (1992) found a Piagetian framework well suited to describe the stages of change seen in children's expression of pain experience. Piaget emphasized that child development unfolds in a series of stages, with a critical stage occurring around 7 years, when children attain the ability to think logically about an event's causes and effects, and understand the difference between abstract internal and external forces. As children age, their concept of the pain experience evolves from a concrete, present-time, physical understanding to one that is abstract and includes external causal forces (Harbeck & Peterson, 1992). Harbeck and Peterson (1992) demonstrate that pain understanding does not develop as a single unidimensional concept, which suggests that a complete understanding of the pain experience across development has yet to be fully described.

Emotion is a powerful feature of pain, so theories of emotional development have great relevance in understanding how to better assess and manage pain. Zeman and Garber (1996) found that older children rely on display rules, means of expressing emotion that are deemed socially acceptable, to express emotions and pain. The ability to regulate emotional displays is dependent on the development of the ability to reason about the causes and effects of emotional expressions, the ability to tell self

from other and the ability to implement knowledge in fitting emotional situations. Chambers and Johnston (2002) found that age impacts on children's abilities to express pain using pain assessment measures; young children tend to make extreme responses on scales when rating emotional states on Likert-type scales. In order to account for developmental factors in assessment, Crow (1997) designed and validated the Children's Pain Perspectives Inventory (CPPI), a Piagetian-based measure that assesses the cognitive level at which children understand pain. These studies indicate that age and developmental level of the child is critical in guiding clinicians' understanding of children's pain expression and in their choice of appropriate pain assessment tools.

Researchers must build on previous research by exploring beyond Piaget's theory of cognitive development and testing other areas of development, such as language and communication, memory, physical, attachment and later social-emotional development. Clearly, the complexities of pain are compounded by the equally complex nature of developing children. Until a multi-dimensional developmental perspective can be applied to pain comprehension and pain assessment in children, pediatric pain researchers will lack the foundations to best design and implement developmentally sensitive treatments for children in pain. In the meanwhile, clinicians who work with children in pain are encouraged to educate themselves regarding developmental milestones and consider how this information might apply to the assessment and management of pediatric pain.

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A bstracts

Chambers CT, Johnston C. Developmental differences in children's use of rating scales. *Journal of Pediatric Psychology* 2002;27(1):27-36.

Objective. To examine the effects of age and the number of available choices on children's use of Likert-type rating scales.

Design. Randomized between-groups study.

Setting. Community, British Columbia, Canada.

Participants. Healthy children (n=60; 29 males; mean age=8.07 years, age range 5-12 years) were recruited through advertisements at libraries, children's groups and in community newspapers and stratified by age: 5-6 years old (n=20; 10 males), 7-9 years old (n=20; 8 males) and 10-12 years old (n=20; 11 males). Participants were randomly assigned to a 3-choice group (n=30; 12 males) or a 5-choice group (n=30; 17 males), balanced among the 3 age groups.

Main Outcome Measures. Children were verbally presented with 18 brief stories, 6 belonging to each of three tasks: evaluating physical characteristics (physical task), evaluating the feelings of others (social objective task) and evaluating their own feelings (subjective task). Children were then asked to respond to questions regarding the stories using either a 3-choice or 5-choice Likert rating scale, according to their assigned group. The stories regarding the physical task were read to the children and cartoons were included as visual clues. The stories regarding the social objective task and subjective task were read to the children without any additional visual clues. Of the 6 stories per task, 4 were test items where the "correct" response should fall into the middle of the rating scale and 2 were filler items where the "correct" response should fall at the extremes of the rating scale. Children also completed a self-report questionnaire, using the same 3-choice or 5-choice scale, to report their feelings on the day they completed these measures. Responses on the tasks or the questionnaire were categorized as "extreme" if the children chose the first or last response of the 3 or 5 responses available. Children's "extreme" scores could range from 0-4 on each of the three tasks or 0-7 on the 7 items of the feelings questionnaire.

Results. For the tasks, a $2 \times 3 \times 3$ (choice group \times age group \times task) analysis of variance showed significant main effects for age group and task (both $p < 0.01$) on

children's "extreme" scores. The younger children (5-6 years) had higher "extreme" scores across tasks and across choice groups than the two older age groups. All children had higher "extreme" scores on the subjective task compared to the social objective task and on the social objective task compared to the physical task. The number of available responses (3 or 5) had no effect on children's "extreme" scores. For the feelings questionnaire, a 2×3 (choice group \times age group) analysis of variance showed a significant main effect for age group ($p < 0.01$) on children's "extreme" scores. Again, younger children (5-6 years) displayed higher "extreme" scores than the older age groups. As well, the number of available responses (3 or 5) did not affect this tendency of younger children to select "extreme" responses. Comparing the tasks and the feelings questionnaire, "extreme" scores on the tasks were significantly correlated to "extreme" scores on the feelings questionnaire.

Conclusions. Younger children may respond in an extreme way when using Likert-type rating scales, particularly when rating emotional states. This finding is consistent with child developmental theories. Surprisingly, the number of available rating choices does not affect the tendency for young children to give extreme responses. These findings could be taken into account when researchers and clinicians utilize children's self-reports.

Crow CS. Children's Pain Perspectives Inventory (CPPI): Developmental assessment. Pain 1997;72(1-2):33-40.

Objective. To develop an instrument to assess the developmental progression of children's pain perspectives and to evaluate its psychometric properties.

Design. Descriptive correlational cross-sectional study.

Setting. Orthopedic outpatient clinics, USA.

Participants. A convenience sample of children between 5 and 13 years of age with a non-life threatening orthopedic condition involving pain. The pilot phase of this study involved 30 children (16 males; mean age=9.2 years, SD=2.3 years). The second phase of this study involved 48 children (24 males; mean age=9.6 years, SD=2.3 years).

Main Outcome Measures. Seventeen items for the Children's Pain Perspectives Inventory (CPPI) were generated from previous investigations on children's pain perspectives and evaluated for content validity by two pediatric pain experts. For the pilot phase of this study, participants were interviewed using the CPPI and completed the Cartoon Conservation Scale (CCS), a measure of cognitive development. Randomly selected interviews were independently coded by the investigator and a research assistant to assess interrater and intrarater reliability.

Internal consistency was also evaluated and scores on the CPPI and CCS were examined for correlations. Correlations between each item on the CPPI and the total CPPI score were also examined. For the second phase of this study, the same measures were used.

Results. For the pilot phase, participants had a mean CPPI score of 43 (SD=7.9). Interrater and intrarater reliability were 0.94 and 0.87, respectively. Internal consistency was 0.83 and item-total correlations ranged from 0.007 to 0.59, with 3 items not contributing to the Inventory as a whole. The CPPI scores were correlated with CCS scores ($r=0.61$; $p=0.0004$). For the second phase, participants had a mean CPPI score of 52 (SD=4.73). Interrater and intrarater reliability were 0.94 and 0.93, respectively. Internal consistency was 0.86 and item-total correlations ranged from 0.06 to 0.77, with 3 items not contributing to the Inventory as a whole. The CPPI scores were correlated with CCS scores ($r=0.67$; $p=0.0001$).

Conclusions. Cognitive development is highly correlated to children's pain perspectives and these pain perspectives progress developmentally. The CPPI shows acceptable interrater reliability, intrarater reliability, internal consistency and criterion validity. This study has limited generalizability due to a small convenience sample. Additional studies using this instrument with larger groups of children with a wide range of pain experiences are recommended.

Harbeck C, Peterson L. Elephants dancing in my head: A developmental approach to children's concepts of specific pains. Child Development 1992;63(1):138-149.

Objective. To identify and describe differing developmental levels of children's conceptualization of pain and to determine if a child's conceptualization of pain is influenced by the frequency of experienced or parental pains.

Design. Semistructured interview study.

Setting. Preschool, public school and a public university, USA.

Participants. Children and adolescents ($n=100$; 50 males) from 5 age groups: preschool (aged 3-4), first grade (aged 6-7), third grade (aged 8-10), sixth grade (aged 11-12) and college freshman (aged 18-23) were randomly selected.

Main Outcome Measures. Children underwent a 30-40 minute audiotaped interview which consisted of open-ended questions in 4 sections: experienced pain, understanding of pain, pain experienced by family members and general cognitive development. For the first section, children reported experienced pains and then

were prompted with a list of pains to tell which they had experienced. For the second section, children were given three vignettes with different types of pain (headache, skinned knee, injection) and asked to describe the pain, explain why the pain hurt and indicate the value of the pain. For the third section, children reported their parents' pains and then were prompted with a list of pains to tell which they remember their parents experiencing. For the final section, physical conservation-identity tasks were used to assess the child's developmental level. Children's responses were categorized by raters blind to study hypothesis, child age and gender. The categories created were sent to pain experts to be ordered developmentally.

Results. Interrater reliability was acceptable (mean Cohen's kappa=0.75). The children's descriptions of pain were categorized from 1 (unresponsive) to 7 (specific label, e.g., burning). With increased age, the children used more complex descriptors of pain. Age interacted with type of pain. The children's explanations of why pain hurts were categorized from 1 (don't know/nonsense verbalization) to 7 (physiological/neurological explanation). With increased age, the children gave more complex reasons. The type of pain impacted the results, i.e., most children, regardless of age group, had the least understanding of why a headache hurts and the best understanding of why an injection hurt. The children's indications of the value of pain were categorized from 1 (don't know/no value) to 6 (diagnostic value). The type of pain impacted the results, i.e., most children, regardless of age group, least understood the value of a headache and best understood the value of an injection. Age interacted with type of pain. All three aspects of understanding pain were correlated to the child's pain experience. There was a moderate correlation between spontaneously remembered parental pains and their own spontaneously remembered pains (Pearson correlation coefficient $r=0.56$). Total reported parental pains (both spontaneously remembered and prompted) was strongly correlated to total reported experienced pains ($r=0.66$). Age and general cognitive developmental level were strongly correlated ($r=0.72$).

Conclusions. Developmental differences in children's conceptualization of pain exist and run from simple, current, sensory information about pain to future-oriented, abstract reasoning about pain. The developmental sequence is related to age. Future research is needed, particularly on the correlation of child and parental pain.

Zeman J, Garber J. Display rules for anger, sadness, and pain: It depends on who is watching. *Child Development* 1996;67(3):957-973.

Objective. To examine how age, gender, audience and emotion type (anger, sadness, physical pain) influence children to express or control their emotions.

Design. Between-groups (gender \times school grade \times audience) and within-subjects (emotion type) study.

Setting. Public schools, USA.

Participants. Children ($n=192$; 96 males) attending public schools in first ($n=64$; 32 males, $M=7.25$ years), third ($n=64$; 32 males, $M=9.33$ years) and fifth ($n=64$; 32 males, $M=11.75$ years) grades. The children were randomly assigned to one of four audience groups: mother, father, peer or alone.

Main Outcome Measures. Twelve stories were created, each describing one of the three emotions (anger, sadness and pain) and one of four scenarios (birthday party, gift exchange, sporting event, favourite toy). For each child, interviewers read each of the 12 stories to the child, including information about their audience figure. The interviewers then asked the children questions about whether they would express or mask their emotions, why and how they would express or mask their emotions and the degree to which their audience figure (if applicable) would be accepting and understanding of their expression of emotion. Some of the questions were forced-choice while others were open-ended and coded into categories. Each child's score across the 4 stories for each emotion was summed to obtain a value between 4 and 16.

Results. Younger children were more likely to express sadness (mean score=12.22 versus 11.08 for third graders and 10.97 for fifth graders) and anger (mean score=13.25 versus 11.98 for third graders and 12.41 for fifth graders) than older children. Girls were more likely than boys to express sadness (mean score=11.97 versus 10.88 for boys) and pain (mean score=13.53 versus 12.63 for boys). All children were more likely to mask all three expressions, anger (mean score=11.31 versus 13.56 for alone, 12.75 for mother and 12.56 for father), sadness (mean score=9.60 versus 12.50 for alone, 11.90 for mother and 11.60 for father) and pain (mean score=11.56 versus 13.52 for alone, 14.02 for mother and 13.21 for father), in the presence of a peer. Regarding their audience figures, girls were more likely than boys to expect others to be accepting (mean score=40.61 versus 38.54 for boys) and understanding (mean score=41.76 versus 39.43 for boys) of emotional displays. All children thought that mothers were more accepting of emotional displays than peers (mean score=41.06 versus 38.23 for peers) and both mothers and fathers were thought to be more understanding of emotional displays than peers (mean score=42.98 for mothers, 40.60 for fathers versus 37.65 for peers). The expression of pain was perceived to be

more acceptable to others (mean score=13.77 versus 12.96 for sadness, 12.85 for anger) and understood by others (mean score=14.08 versus 13.19 for sadness, 13.32 for anger) than displays of anger or sadness. An audience \times emotion interaction indicated that children thought mothers would be more accepting of sadness than peers and both parents would be more accepting and understanding of pain than peers. Children cited the expectation of a negative interpersonal consequence as the most common reason for not expressing anger (60.2%), sadness (54.9%) and pain (40.9%). Children reported the expectation of receiving help as the most common reason (37.8%) for expressing anger, the expectation of a positive interpersonal interaction as the most common reason (36.7%) for expressing sadness and the pain intensity as the most common reason (48.8%) for expressing pain. The most common way (72.9%) children expressed or masked their emotions was through the use or control of facial cues.

Conclusions. Children's decisions to display or mask emotions are influenced by an observer and by the type of emotion. These influencing factors vary between girls and boys and between age groups. One limiting factor of this study was the uncertainty to what extent children's reports of their emotionally expressive behaviour would correspond to their actual behaviour.

Recent Articles

André M, Hagelberg S, Stenström CH. Education in the management of juvenile chronic arthritis. *Scandinavian Journal of Rheumatology* 2001; 30(6):323-327.

Objective. To evaluate changes in self-reported competencies following an education program among parents of children with juvenile chronic arthritis and among adolescents with juvenile chronic arthritis.

Design. Consecutive sample questionnaire study.

Setting. Pediatric hospital departments, Sweden.

Participants. Families with a child or adolescent (n=89; 57% females; median age=7.0 years, age range 2-19 years) diagnosed with juvenile chronic arthritis were consecutively recruited from pediatric hospital departments. The education group consisted of 55 parents of children with juvenile chronic arthritis and 11 adolescents with juvenile chronic arthritis. The control group consisted of 18 parents of children with juvenile chronic arthritis and 5 adolescents with juvenile chronic arthritis.

Main Outcome Measures. Participants in the education group underwent an 8-hour education program on juvenile chronic arthritis and completed the Medical, Exercise, Pain, and Social Support questionnaire before training, immediately after training and 4 months later. Participants in the control group did not attend the education program and completed the questionnaire at the beginning of this study and 4 months later.

Results. Parents in the education group improved significantly concerning their self-reported competencies on medical, exercise, pain and social support issues and these improvements were largely maintained after 4 months. Parents in the control group did not improve significantly in any of the self-reported competencies over 4 months. Adolescents in the education group improved significantly on only 2 questions (out of 23) while the adolescents in the control group improved significantly on 2 other questions.

Conclusions. Education programs for parents provided significant advantages and should be implemented in treatment of juvenile chronic arthritis. Limitations of this study include a nonrandomized sample, exclusive reliance on self-reported competencies and a small adolescent sample.

Breau LM, Finley GA, McGrath PJ, Camfield CS. Validation of the Non-communicating Children's Pain Checklist-Postoperative Version. *Anesthesiology* 2002;96(3):528-535.

Objective. To investigate the psychometric properties of a pain assessment tool, the Non-communicating Children's Pain Checklist-Postoperative Version (NCCPC-PV) when used with children with severe intellectual disabilities after surgery.

Design. Repeated measures observational study.

Setting. Tertiary children's care centre, Canada.

Participants. Children (n=24; 18 males; mean age=11.5 years, age range 3.7-19.6 years) with severe intellectual disabilities who were enrolled in a longitudinal study of pain in nonverbal children and who required surgery. One of the child's caregivers also took part in this study.

Main Outcome Measures. Each child was observed by their caregiver, a researcher and a nurse for two 10-minute periods: presurgery (30 minutes before surgery) and postsurgery (20-60 minutes after leaving the recovery room after surgery). Based on these observations, the caregiver and researcher independently completed the NCCPC-PV and rated the child's pain using a 100 mm visual analogue scale (VAS) and the nurse rated the child's pain using the same 100 mm VAS. The

NCCPC-PV is adapted from the Non-communicating Children's Pain Checklist (NCCPC) by removing one of the seven subscales of the tool, the Eating-Sleeping subscale.

Results. The NCCPC-PV demonstrated excellent internal consistency among caregivers (Cronbach's alpha = 0.91) and satisfactory internal consistency among researchers (Cronbach's alpha = 0.71). Good interrater reliability was also demonstrated for total NCCPC-PV scores (intraclass correlation coefficient=0.82 presurgery and 0.78 postsurgery) and for subscale scores (intraclass correlation coefficient ranged from 0.45 for Body and Limb subscale to 0.81 for Facial subscale). Construct validity of the NCCPC-PV was supported because both subscale and total NCCPC-PV scores were higher postsurgery than presurgery for both caregivers ($p=0.003$) and researchers ($p=0.01$) and did not differ for observer. Caregiver and researcher VAS ratings postsurgery were higher than presurgery ($p=0.001$, $p < 0.001$, respectively). Postsurgery NCCPC-PV total scores correlated with VAS scores for caregivers and researchers, but not nurses. Scores on the NCCPC-PV did not differ for child gender, presence of cerebral palsy, whether the child lived with their family or in a residential centre or other personal characteristics. Scores on the NCCPC-PV were not correlated to length of surgery, time in recovery room, administration of IV opioids during surgery or being admitted postsurgery. A score of 11 on the NCCPC-PV as rated by caregivers provided a sensitivity of 0.88 and a specificity of 0.81 for identifying children with moderate to severe pain.

Conclusions. The NCCPC-PV displayed good psychometric properties when used in the postsurgery condition with children with severe intellectual disabilities. This pain assessment tool may be useful in a clinical setting, as it appears that familiarity with a child is not necessary to use the NCCPC-PV. A limitation of this study is its small sample size.

Gil KM, Anthony KK, Carson JW, Redding-Lallinger R, Daeschner CW, Ware RE. Daily coping practice predicts treatment effects in children with sickle cell disease. *Journal of Pediatric Psychology* 2001;26(3):163-173.

Objective. To evaluate 1-month follow-up effects of coping skills training for children and adolescents with sickle cell disease.

Design. Randomized controlled study.

Setting. Outpatient sickle cell clinics, USA.

Participants. Forty-six African American children (22 males; mean age=11.96 years, age range 8-17 years) with sickle cell disease were randomly assigned to a coping skills group ($n=26$) who were taught to use three coping strategies

(i.e., deep breathing relaxation, pleasant imagery, calming self-talk) or a control group ($n=20$) who received standard medical care.

Main Outcome Measures. Participants in both groups kept diaries of pain intensity, medication use, activity reduction and health care use. Participants in the coping skills group also monitored their practice with coping skills. Additional measures included pain sensitivity using the Forgiene-Barber focal pressure stimulator, Coping Strategies Questionnaire, Children's Depression Inventory, Revised Children's Manifest Anxiety Scale and a structured pain interview.

Results. Participants in the coping skills group reported they were more active in managing their pain than participants in the control group. On high pain days, when coping strategies were practiced, there were fewer health care contacts, school absences and activity interference. There were no differences between groups with respect to negative thinking or lab pain sensitivity, an effect that had been apparent 1 month previously, where participants in the coping skills group exhibited significantly less negative thinking and pain sensitivity than participants in the control group.

Conclusions. Some benefits of coping skills training were apparent. Children with sickle cell disease can benefit from coping skills training when given the opportunities to practice those skills on a daily basis.

Hanas R, Adolfsson P, Elfvin-Åkesson K, Hammarén L, Ilvered R, Jansson I, Johansson C, Kroon M, Lindgren J, Lindh A, Ludvigsson J, Sigström L, Wilk A, Åman J. Indwelling catheters used from the onset of diabetes decrease injection pain and pre-injection anxiety. *Journal of Pediatrics* 2002;140(3):315-320.

Objective. To investigate the effect of indwelling catheters on pre-injection anxiety and injection pain in children and adolescents newly diagnosed with diabetes.

Design. Randomized controlled study.

Setting. Five pediatric centres, Sweden.

Participants. A consecutive sample of children and adolescents ($n=41$; 19 males; mean age=8.1 years, age range 1-15 years) recently diagnosed with diabetes were randomly assigned to a catheter group ($n=20$; 10 males; mean age=7.7 years, $SD=3.9$ years) or a control group ($n=21$; 9 males; mean age=8.5 years, $SD=3.5$ years). Children in the catheter group received EMLA® (lidocaine-prilocaine cream) as a topical anesthetic and then had a subcutaneous indwelling catheter inserted through which they received all their insulin injections. Catheters were replaced every 5 days for as long as the

catheter was in place. Children in the control group received their insulin through regular injections with an insulin pen. Parents of the children also participated in this study.

Main Outcome Measures. After one week using the indwelling catheter, children in the catheter group were given the option of continuing with the catheter or switching to regular insulin injections. Pre-injection anxiety and injection pain were scored using a 10 cm visual analogue scale (VAS) with faces. Anxiety was scored by parents only while pain was scored by parents (when children <13 years), children (when children >6 years) and nurses. For the first 2 weeks, both anxiety and pain were scored every other day at each insulin injection. For the remainder of this 6-month study, anxiety and pain were scored every other day at each injection during 1 week per month.

Results. Sixteen of the 20 children in the catheter group chose to continue using the indwelling catheter after 2 weeks and 9 of 20 chose to continue using the catheter after 6 months. For the first 2 weeks, children in the catheter group had significantly lower injection pain scores as measured by parents (median VAS score=1.2 cm versus 2.7 cm), nurses (median VAS score=1.4 cm versus 3.0 cm) or themselves (median VAS score=0.8 cm versus 1.5 cm) and significantly lower preinjection anxiety (median VAS score=1.2 cm versus 2.9 cm) than the control group. During the 6-month follow-up, there was still a significant difference in pre-injection anxiety and injection pain between children who chose to continue with the indwelling catheter and the control group. No differences in overall mean pain scores or anxiety scores were detected when comparing boys and girls. Side effects in the catheter group included eczema, insulin leakage, sore skin and lipohypertrophy.

Conclusions. Pre-injection anxiety and injection pain in children newly diagnosed with diabetes can be lessened with the use of an indwelling catheter for insulin injections. Minor side effects may occur with catheter use.

Maikler VE, Broome ME, Bailey P, Lea G. Children's and adolescents' use of diaries for sickle cell pain. *Journal of the Society of Pediatric Nurses* 2001; 6(4):161-169.

Objective. To evaluate the characteristics of painful vaso-occlusive episodes experienced by children and adolescents with sickle cell disease, the impact of these episodes on the children's daily activities, the management of these episodes at home and the usefulness of a daily diary to collect information on these episodes.

Design. Self-report study.

Setting. Four tertiary care centres, USA.

Participants. Children (n=75; mean age=9.2, age range

6-13.5 years) and adolescents (n=46; mean age=15.3 years, age range 14-18.5 years) with sickle cell disease who took part in a larger self-care psychoeducational intervention study. Fifty-one percent of the participants were male.

Main Outcome Measures. Children were asked to complete a short daily diary for 7 weeks while adolescents were asked to complete the same daily diary for 5 weeks. Seven daily diaries were combined in booklet form that each participant was to hand in before receiving another booklet of diaries. Information recorded in the daily diary included the presence of pain, pain intensity, pain localization, children's participation in certain activities and any pharmacologic or nonpharmacologic interventions used to manage their pain.

Results. At least one diary booklet was submitted by 61.3% of children and 64.7% of adolescents. Of the children, 72% experienced painful vaso-occlusive episodes lasting 1 to 10 days (mean=2.0 days) while 84% of adolescents experienced painful episodes lasting 1 to 27 days (mean=2.2 days). Of all painful episodes (n=141) experienced, 95% were self-rated as mild (pain level of 1-3 on a 0-10 scale), 3% were rated as moderate (pain level of 4-6) and 1% were rated as severe (pain level \geq 7). The most frequent sites of pain were the abdomen (32.5%) and chest/back (30.0%) for children and the chest/back (22.9%), legs (21.9%) and head (20.2%) for adolescents. During mild painful episodes, 80% of all participants continued school, social and chore activities and 49% continued play and sports activities. However, during severe painful episodes, 38% to 49% continued school, social and chore activities and 46% continued play and sports activities. Children used pharmacological interventions 9% of the time and nonpharmacologic interventions 51% of the time they experienced pain. Adolescents used pharmacologic interventions 100% of the time and nonpharmacologic interventions 86% of the time they experienced pain.

Conclusions. Painful episodes in sickle cell disease are frequent, generally mild and variable in location. This study does not support the common belief that children with sickle cell disease report more pain in extremities and adolescents report more abdominal pain. The opposite was seen in this study. Painful episodes affect the daily activities of children and adolescents with sickle cell disease. The increased use of pharmacologic interventions by adolescents may be due to their ability to self-medicate. Diaries are useful in the collection of complete and rich data about the pain experiences of children.

Moore J. No more tears: A randomized controlled double-blind trial of Amethocaine gel vs. placebo in the management of procedural pain in neonates. *Journal of Advanced Nursing* 2001; 34(4):475-482.

Objective. To determine the efficacy of the local anesthetic gel, amethocaine, in reducing pain response in neonates during cannulation.

Design. Randomized controlled double-blind trial.

Setting. Neonatal unit, United Kingdom.

Participants. Forty infants (≥ 32 weeks gestation) admitted to a neonatal unit were randomly assigned to an amethocaine group ($n=20$) or a control group ($n=20$).

Intervention. Thirty minutes before cannulation with a 24-gauge cannula, amethocaine gel or a placebo gel was applied to the skin and covered.

Main Outcome Measures. For each infant, gestational age, weight, site of cannulation, previous experience with cannulation, person performing cannulation and baseline heart rate were recorded. After cannulation, infants were scored for pain using a four-point pain assessment tool developed by the investigator that included facial expression, cry, heart rate and ease of cannulation.

Results. Pain scores for the amethocaine group were significantly lower than for the control group ($p < 0.01$). There was no correlation between pain scores and any of the following variables; gestational age, weight, previous cannulation experience, person performing cannulation and ease of cannulation. One of the 20 infants who received amethocaine gel developed an erythematous rash.

Conclusions. Amethocaine gel is an effective local anesthetic in the management of pain caused by cannulation in neonates. All infants, regardless of experience with a painful procedure, maturity or weight, experience a similar degree of pain during cannulation and should receive appropriate analgesic intervention.

Muris P, Vlaeyen J, Meesters C. The relationship between anxiety sensitivity and fear of pain in healthy adolescents. *Behaviour Research & Therapy* 2001; 39(11):1357-1368.

Objective. To examine the relationship between anxiety sensitivity and fear of pain in healthy adolescents after controlling for other potential predictors of fear of pain (i.e., pain symptoms, somatization symptoms, trait anxiety and panic disorder symptoms).

Design. Survey.

Setting. Secondary school, Belgium.

Participants. Healthy adolescents ($n=200$; 86 males; mean age=13.0 years, age range 11-15 years).

Main Outcome Measures. During regular classes, participants completed the Childhood Anxiety Sensitivity Index for Children-Revised (CASI-R), a simplified version of the Pain Anxiety Symptoms Scale (PASS), the Children's Somatization Inventory (CSI), the trait anxiety version of the State-Trait Anxiety Inventory for Children (STAIC) and the panic disorder subscale of the Revised Children's Anxiety and Depression Scale (RCADS).

Results. Total score on the Childhood Anxiety Sensitivity Index-Revised was positively and significantly related to the total score, somatic anxiety score, cognitive anxiety score and fear score on the Pain Anxiety Symptoms Scale (correlation coefficient range 0.61-0.65). The total score on the Pain Anxiety Symptoms Scale was also positively and significantly related to the Children's Somatization Inventory's pain symptoms scale and somatization symptoms scale, the State-Trait Anxiety Inventory for Children's trait anxiety scale and the Revised Children's Anxiety and Depression Scale's panic disorder symptoms scale (correlation coefficients range 0.40-0.50). Regression analyses showed that, after controlling for the other predictor variables (i.e., Children's Somatization Inventory's pain symptoms scale and other somatization symptoms scale, the State-Trait Anxiety Inventory for Children's trait anxiety scale and the Revised Children's Anxiety and Depression Scale's panic disorder symptoms scale), only the Childhood Anxiety Sensitivity Index for Children-Revised total score accounted for a unique proportion of the variance in the Pain Anxiety Symptoms Scale's total score (regression coefficient=0.55), somatic anxiety score (regression coefficient=0.48), cognitive anxiety score (regression coefficient=0.51), fear score (regression coefficient=0.45) and escape/avoidance score (regression coefficient=0.35).

Conclusions. In line with adult studies, childhood anxiety sensitivity is one of the factors that mediate fear of pain in healthy adolescents. Limitations of this study include a complete reliance on self-report and the inability to identify a causal relationship between anxiety sensitivity and fear of pain due to the cross-sectional study design.

Pakalnis A, Greenberg G, Drake Jr. ME, Paolicchi J. Pediatric migraine prophylaxis with divalproex. *Journal of Child Neurology* 2001; 16(10):731-734.

Objective. To assess the efficacy of daily doses of divalproex for pediatric migraine prophylaxis.

Design. Retrospective chart review study.

Setting. Headache clinic and children's hospital, USA.

Participants. A convenience sample of children and adolescents ($n=23$; 10 male; mean age=12.4 years, age

range 7-17 years) who had been diagnosed with migraine according to International Headache Society criteria. Seven of the children had comorbid psychiatric or behavioural disorders, 6 others had comorbid epilepsy and the remaining 10 had migraines only.

Intervention. Children received divalproex sodium doses ranging from 3.1-32.9 mg/kg/day.

Main Outcome Measures. Medical charts of the children were retrospectively reviewed and age, gender, frequency of migraine, severity of migraine, migraine duration and responses to preventative therapy were noted. As well, the presence or absence of epilepsy or psychiatric/behavioural disorders was also noted. The authors considered a >50% reduction in headache frequency compared to a 3-month baseline average to be a favourable response to drug therapy.

Results. The children suffered migraine attacks 3-24 times per month. The average monthly headache frequency before taking divalproex did not differ between the migraine only, migraine with comorbid psychiatric disorder and migraine with comorbid epilepsy groups. With divalproex, 15 children (65%) experienced >50% reduction in migraine frequency, with 6 (26%) becoming headache free. A favourable response was seen in both the migraine only and migraine with comorbid epilepsy groups ($p=0.002$). No improvement was seen in the migraine with comorbid psychiatric disorder group. Four patients discontinued divalproex due to side effects such as weight gain, lethargy, anorexia and alopecia.

Conclusions. Divalproex is selectively effective in preventing migraines in a pediatric population with or without comorbid epilepsy. This study is severely limited by its retrospective non-controlled design, a small sample size and a heterogeneous group of behavioural disorders.

Perquin CW, Hunfeld JAM, Hazebroek-Kampschreur AAJM, van Suijlekom-Smit LWA, Passchier J, Koes BW, van der Wouden JC. Insights in the use of health care services in chronic benign pain in childhood and adolescence. *Pain* 2001;94(2):205-213.

Objective. To examine health care utilization and medication use in children and adolescents with chronic benign pain and to determine differences between those using health care services (consulters) and those not using health care services (nonconsulters).

Design. Prospective diary study.

Setting. Urban community, the Netherlands.

Participants. Children and adolescents ($n=254$; mean age=11.1 years, $SD=4.3$ years) reporting chronic pain for at least 3 months and their parents. This sample came from a larger sample used for another study

Main Outcome Measures. A child demographic

questionnaire, the Health Care Use Questionnaire and the Pain List were completed using parent ratings for children aged 0-11 and self-reports for children aged 12-18. Adolescents also completed the Quality of Life Headache-Youth Questionnaire (adapted for chronic pain). Parents of the children aged 0-11 completed the Postoperative Pain Measure for Parents (adapted for chronic pain) 3 times per day for 3 weeks. All parents completed a parental demographic questionnaire, the Functional Status II (Dutch version), the Impact on Family Scale (Dutch version) and the Dartmouth COOP Functional Health Assessment Chart.

Results. In a 3-month period, 43% of children and adolescents had consulted some form of health care service and 53.4% had used medications for their pain. In the preceding year, 6.4% had been hospitalized for their pain. Consulters and nonconsulters did not differ in background characteristics. After excluding 0-4 year olds, girls were significantly more likely to use health care services than boys (48% versus 33%). Consulters had more comorbid chronic disease than nonconsulters, more often continuous pain (22.7% versus 11.1%), more frequent pain (80.8% versus 62.1% reporting pain at least once a week), more intense pain (53.5 mm mean Visual Analogue Scale (VAS) versus 47.7 mm mean VAS), more interference with daily activities (42.0 mm mean VAS versus 25.3 mm mean VAS) and more school absenteeism (31.4% versus 20.4%). The physical fitness and satisfaction with health were lower in the adolescent consulters than the nonconsulters. The families of consulters were better able to deal with the stress of the pain but had a higher financial burden as compared to the families of nonconsulters.

Conclusions. Results provided a preliminary but comprehensive snapshot of health care utilization by children with chronic pain. Pain severity is a more important factor in seeking health care than background factors such as parental education. Study limitations include a possible selection bias and the use of parent ratings rather than self-reports in children aged 0-11 years. The authors recommend further prospective studies on the determinants of health care-seeking behaviour.

Pölkki T. Nurses' perceptions of parental guidance in pediatric surgical pain relief. *International Journal of Nursing Studies* 2002; 39(3):319-327.

Objective. To examine nurses' self-perceptions of how they guide pain relief with parents of children with postoperative pain and investigate nurse-related factors that influence the provision of this guidance.

Design. Survey.

Setting. Pediatric surgical units at 5 university hospitals, Finland.

Participants. A convenience sample of 162 nurses (3 males; mean age=40.8 years, range 22-59 years) took part in this study. The average health care experience of these participants was 16.7 years (range 3 months-37 years). These nurses were clinical specialist nurses (48%), children's or practical nurses (32%) or specialists in internal or surgical nursing (19%).

Main Outcome Measures. A questionnaire was developed for this study that included a survey of nurses' demographic and work-related backgrounds. It also surveyed how nurses guided parents in the relief of their children's postoperative pain, including the preparatory information given and the types of non-pharmacological methods provided by the nurses.

Results. Nurses reported always or nearly always providing preparatory information to parents regarding preoperational procedures (98% of respondents), postoperative placement (96%), postoperative limitations (92%) and observation of children's condition (91%). Nurses reported sometimes, very seldom or never providing preparatory information regarding non-pharmacological pain relief methods (39% of respondents), sensations the child could be expected to experience preoperatively such as anxiety and fear (29%), and sensations the child could be expected to experience during the procedure, such as pain (45%). Nurses with more education and more personal experiences with hospitalization of their own children were found to report giving more preparatory information to parents ($p=0.009$, $p=0.006$, respectively). These two factors were also correlated with the provision of information regarding postoperative pain medication and non-pharmacological pain management techniques.

Conclusions. Preoperative preparation of parents and postoperative pain management guidance to parents for their children tends to be provided less frequently by less experienced nurses. These findings have important implications for the training of nurses, particularly early in their careers. This study is limited by the retrospective, self-reporting of data that may have been influenced by social desirability.

Negrini S, Carabona R. Backpacks on! Schoolchildren's perceptions of load, associations with back pain and factors determining the load. *Spine* 2002;27(2):187-195.

Objective. To evaluate children's perceptions of their daily backpack loads, to identify any associations between these

perceptions and back pain and to identify family, school or personal factors that determine the backpack load.

Design. Cross-sectional, observational study.

Setting. Elementary schools, Italy.

Participants. All year 6 students in a single school district ($n=237$; 118 males; mean age=11.6 years, $SD=0.34$ years).

Main Outcome Measures. The backpacks of all the children were weighed at school 6 days per week for 3 weeks but children and teachers were blinded to which days were included in the evaluations. Of the entire group, 202 children were assessed for isokinetic and isometric trunk strength, trunk mobility, posture, gait and balance. Of these 202 children, 115 children (54 males; mean age=11.7 years, $SD=0.33$ years; mean weight=43 kg, $SD=9.2$ kg; mean height=149.8 cm, $SD=8.1$ cm) completed a questionnaire about their perceptions of their backpack loads and their experiences with back pain.

Results. Back pain at least sometimes was reported by 47.7% of children completing the questionnaire. Average daily backpack load was 9.3 kg (range 4.4-12.5 kg) and maximum daily backpack load was 11.5 kg (range 6.8-16.3 kg). Backpacks are carried on both shoulders by 94.5% of the children for 5-15 minutes (48.2%) or longer (37.3%). Backpacks were perceived as heavy by 79.1% of children, reported to cause fatigue by 65.7% and reported to cause back pain by 46.1%. Back pain was associated with fatigue during backpack carrying and with time spent carrying the backpack. Back pain was not associated with backpack weight, perceptions of heaviness or anthropometric characteristics of the children. Factors that determine backpack load are classes, days of the week and students but not individual schools.

Conclusions. Backpacks are a frequent source of discomfort for children and this study supports the hypothesis that back pain and backpack carrying are related. Because of the unclear association between back pain and backpack load, the authors recommend the investigation of personal physical and psychological factors. Teachers, parents and students should strive to reduce the backpack loads of schoolchildren because of this study's results and the fact that the loads measured proportionally exceed legal load limits for adults.

Review Articles

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

Ballas SK. Sick cell anaemia: Progress in pathogenesis and treatment. *Drugs* 2002;62(8):1143-1172.

Dr. Ballas, one of the world leaders in research and treatment of sickle cell, has produced an up-to-date comprehensive review of the literature on sickle cell disease. The review is scholarly and accessible and should be read by anyone who may treat sickle cell patients.

Campo JV, Fritz G. A management model for pediatric somatization. *Psychosomatics* 2001;42(6):467-476.

The psychiatric approach to children with pain that is not directly related to physical findings is to diagnose somatization disorder. Campo and Fritz have done a good job of providing a model of management from a psychiatric perspective.

Hussain SZ, Di Lorenzo C. Motility disorders: Diagnosis and treatment for the pediatric patient. *Pediatric Clinics of North America* 2002;49(1):27-51.

Motility disorders are a common cause of pain in children. This is an excellent review of the recent literature on this topic that discusses both extant and developing diagnostic and treatment approaches.

Kuppenheimer WG, Brown RT. Painful procedures in pediatric cancer: A comparison of interventions. *Clinical Psychology Review* 2002;22:753-786.

This is a thoughtful and balanced review of psychological and pharmacological methods for managing painful procedures in pediatric cancer.

Announcements

Meetings

October 11, 2002: 16th Annual Meeting of the Society for Pediatric Anesthesia, Rosen Centre, Orlando, Florida, USA. For more information or to register online, go to: www.pedsanesthesia.org.

November 7-10, 2002: American Society of Regional Anesthesia & Pain Medicine's Annual Fall Pain Meeting and Workshops, Pointe Hilton at Squaw Peak, Phoenix, Arizona, USA. For more information or to register online, go to: www.asra.com.

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Positions

Pain in Child Health is a Canadian Institutes of Health Research Strategic Training Program that links five Canadian research centres (Vancouver, Saskatoon, Toronto, Montréal and Halifax). There are opportunities for training at each of these centres at the **undergraduate, graduate, postdoctoral and fellowship levels** in a wide range of disciplines. For further information, see our website at www.dal.ca/~pich or contact Barbara Brown, Project Manager, at 902-494-1586.

The University of Washington School of Medicine Department of Anesthesiology at Children's Hospital and Regional Medical Center is currently seeking a **Pediatric Anesthesiologist** with training and/or experience in both inpatient and outpatient pain management. Academic rank and compensation are

dependent upon qualifications and experience. A minimum of one year completed fellowship training in pediatric anesthesiology or equivalent experience required. Must be BC/BE in Anesthesiology and BC/BE in pain management is preferred. Must obtain state of Washington medical license. This outstanding opportunity will allow you to become part of an expanding pain program. You will be involved in the teaching of anesthesiology residents and fellows. We are looking for a physician with excellent communication and interpersonal skills. The Children's Hospital and Regional Medical Center Pain Medicine Program has an active interdisciplinary service that works with rehabilitative medicine physicians and nurses, psychologists, physical and occupational therapists and psychiatrists. The program currently has an acute care service that consists of four physicians and two advanced nurse practitioners. The program is expanding to fill the needs of the community of the Northwest for an outpatient pediatric pain clinic. The University of Washington and Children's Hospital are building a culturally diverse faculty and strongly encourages applications from female and non-majority candidates. If you are interested in this exciting opportunity, send your curriculum vitae and inquiries to: Corrie Anderson, M.D., Director, Pain Medicine Program, Professor of Anesthesiology and Professor of Pediatrics Anesthesiology, CH-05, Children's Hospital and Regional Medical Center, 4800 Sand Point Way, N.E., Seattle, WA 98105-0371 or phone 206-528-2704, fax 206-527-3935 or email cande3@chmc.org.

The Pain Treatment Service at Children's Hospital in Boston is recruiting an additional **Attending Physician** with expertise and interest in pediatric acute and chronic pain management. This multidisciplinary program (including physicians, psychologists, nurses and physical therapists) is sponsored by the Department of Anesthesia, and the majority of the physician faculty members are pediatric anesthesiologists, but consideration will also be given to pediatric neurologists, pediatric psychiatrists, pediatric rheumatologists, or clinicians in other subspecialties with extensive experience in pain management. Appointment may be at the Instructor, Assistant Professor or Associate Professor rank, according to the applicant's qualifications. Children's Hospital encourages applications from women and minorities. Interested applicants should contact: Charles Berde, MD, PhD, Director, Pain Treatment Service, Children's Hospital, 333 Longwood Avenue, Rm 555, Boston, MA 02115, email: charles.berde@tch.harvard.edu, fax: 617-812-3089 and phone: 617-355-5015.

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

Assistants for this issue: Sheldon Choo, Alyson Currie, Bruce Dick, Jill Hatchette 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.

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