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Pediatric Pain Letter

Abstracts and Commentaries on Pain in Infants, Children and Adolescents

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Editorial

Pain is unpleasant but it is the interference that pain causes with activities (disability), with social roles (handicap) and its effects on quality of life that make chronic pain important. Thus, measurement of pain disability, pain handicap and pain related quality of life is critically important. Our adult colleagues are quite clear that multi-disciplinary treatment for chronic pain primarily changes, not pain, but disability, handicap and quality of life.

In the clinic, I am constantly amazed at the resiliency that many of my adolescent patients have. In spite of significant pain, they alter some of their activities (i.e., show some disability), but many show little impact on their social roles as students, friends and members of their families (i.e., show little handicap). Unfortunately, a small group are severely disabled and handicapped. Often, these adolescents have no more pain than the less affected. Without measurement, advancement of our understanding in these areas is impossible. Palermo, in this issue, does us all a service by reviewing the scant literature on measurement in these areas.

Patrick J. McGrath, Ph.D.

Commentary

Assessment of functional status and disability in pediatric chronic and recurrent pain

Children with chronic or recurrent pain may miss school, restrict participation in athletic and social activities, and experience disturbances in their sleep in response to uncontrolled pain. Because there is not a linear relationship between disease severity and children's daily functioning, emerging research on comprehensive assessment of functional status and disability in children with recurrent and chronic pain is important for obtaining a better understanding of this variability in functional outcomes. Ideally these studies will lead to the development of effective treatment intervention strategies to enhance children's everyday functioning.

While disability assessment has become standard in the evaluation of adult pain outcomes, scarce research attention has been directed to the assessment of functional limitations in pediatric patients with chronic or recurrent pain (Palermo, 2000). The impact of pain on school functioning has been considered in several of the abstracted studies. Children with sickle cell disease (Fuggle et al., 1996; Shapiro et al., 1995), widespread musculoskeletal pain (Mikkelson et al., 1997) and recurrent abdominal pain (Walker et al., 1998) have been found to have higher rates of school absenteeism compared to control samples.

Similar to the impact on school attendance, recurrent and chronic pain affects children's participation in physical and social activities. Adolescents with headaches (Langeveld et al., 1997) and children with sickle cell disease (Fuggle et al., 1996) have reported a significant impact of pain on the amount of leisure time spent with peers compared to healthy controls. In a study of children with cancer, hemophilia, sickle cell anemia

and juvenile rheumatoid arthritis, moderate degrees of restriction in physical activities were reported (Walters & Williamson, 1999).

Recurrent and chronic pain can also interfere with the quality and quantity of children's sleep. Sleep disturbance is an important outcome that can have far reaching effects on children's daily lives (see recent review on the importance of sleep in the management of pediatric pain by Lewin and Dahl (1999)). Children and adolescents with sickle cell disease reported poor sleep quality and shorter sleep duration on almost half of days with pain (Shapiro et al., 1995) and experienced more night wakings than a group of healthy children (Fuggle et al., 1996). Difficulty sleeping was reported by half of the children with pain-related conditions in the study conducted by Walters and Williamson (1999). The disruption in sleep in some children and adolescents may be a marker for problems with functional disability or may signal the progression into chronic pain syndromes (Lewin & Dahl, 1999).

A broader examination of physical and psychological functioning of children has been undertaken in studies of health related quality of life (QOL) in children with chronic and recurrent pain. In one of the few studies in this area, Langeveld et al. (1997) used a disease specific measure to assess QOL in adolescents with chronic headaches and found that changes in headache activity were significantly related to global areas of well being including satisfaction with life and satisfaction with health.

Children whose chronic pain limits their functioning may also develop lifelong problems with pain and disability. In a study of widespread musculoskeletal pain, Mikkelsson et al. (1997) found the highest disability indices in children with musculoskeletal pain symptoms in more than one area of the body, which persisted over 1 year. Walker et al. (1998) found that children with a history of recurrent abdominal pain had higher levels of functional disability and more school absences due to abdominal pain than control subjects even five years after initial clinical presentation. These data are compelling for demonstrating that not only pain symptoms but also functional disturbances can be maintained over an extended time.

To interrupt a potentially chronic cycle of pain and disability, studies of factors that impact disability are important for understanding the variability in children's daily functioning. For example, Walters and Williamson (1999) found partial support for their predictive model indicating that activity restriction mediated the relationship between pain and depressive symptoms in younger children. Individual difference studies such as these may help identify processes and bi-directional relationships that explain why some children are at increased risk for disability due to chronic and recurrent pain.

Well-designed research studies on the prevalence and severity of pain-related disability in children with recurrent and chronic pain are needed to help articulate the scope of the problem and needs for clinical management. Although several validated questionnaire measures of functional disability and health-related quality of life are available such as the Functional Disability Inventory (Walker & Greene, 1991), Functional Status II (R) (Stein, 1990) and the Child Health Questionnaire (Landgraf et al., 1996), their use in samples of children with chronic or recurrent pain remains limited. Subjective measures of functional disability are important for initial descriptions of the problems in daily functioning encountered by children with recurrent and chronic pain; however, they can be unduly influenced by parent or child reporting biases and high distress level. A promising supplement to questionnaire measures of disability are behavioural observation methods such as the Juvenile Arthritis Functional Assessment Scale (JAFAS; Lovell et al., 1989), a measure developed specifically to assess functional disability in children with juvenile rheumatoid arthritis. The JAFAS requires observation of a child performing 10 simple tasks of daily functioning involving use of all joints and muscle groups. Future research is needed to examine the feasibility and validity of using behavioural observation methods to measure functional disability in children with other recurrent and chronic pain syndromes.

Future studies are needed with longitudinal designs to examine the maintenance versus recovery of problems in functioning over time with the inclusion of individual difference factors (e.g., coping, distress) that may predict these changes. Because functional disability is an outcome that is potentially amenable to intervention, future research on treatment interventions to enhance children's functioning is an important area of clinical investigation (Palermo, 2000). This will require investigators to target specific functional outcomes (e.g., physical activity, school attendance) rather than focussing solely on pain reduction as the primary treatment goal.

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Lovell DJ, Howe S, Shear E, Hartner S, McGirr G, Schulte M, Levinson J. Development of a disability measurement tool for juvenile rheumatoid arthritis: the Juvenile Arthritis Functional Assessment Scale. *Arthritis & Rheumatism* 1989;32:1390-1395.

Palermo TM. Impact of recurrent and chronic pain on child and family daily functioning: a critical review of the literature. *Journal of Developmental & Behavioural Pediatrics* 2000;21:58-69.

Stein REK, Jessop D. Functional Status II (R): a measure of child health status. *Medical Care* 1990;28:1041-1055.

Walker LS, Greene JW. The Functional Disability Inventory: measuring a neglected dimension of child health status. *Journal of Pediatric Psychology* 1991;16:39-58.

Abstracts

Fuggle P, Shand PAX, Gill LJ, Davies SC. Pain, quality of life, and coping in sickle cell disease. *Archives of Disease in Childhood* 1996;75:199-203.

Previously abstracted in the *Pediatric Pain Letter*, Vol. 1, No. 4; p. 38. **www.dal.ca/~pedpain/pplet/v1n4c.PDF**

Langeveld JH, Koot HM, Passchier J. Headache intensity and quality of life in adolescents: how are changes in headache intensity in adolescents related to changes in experienced quality of life? *Headache* 1997;37:37-42.

Objective. To study whether changes in the frequency and intensity of headache are related to changes in experienced quality of life (QOL) in adolescents.
Design. Longitudinal survey.
Setting. Adolescents' homes, Norway.
Participants. From a group of 1566 adolescents from 2 schools, 64 (42 girls; mean age=14.4 years, SD=1.5) met the following inclusion criteria: between 12 and 18 years of age; headache symptoms present that were never diagnosed as migraine by a physician nor were considered by the adolescent to resemble migraine symptoms; 2 headaches per month; and headaches were present for at least a year.
Main Outcome Measures. Over 4 weeks adolescents recorded headache duration and intensity (5-point Likert scale) four times a day using the Quality of Life Headache-Youth (QLH-Y) Headache and Migraine Diary and completed the QLH-Y Questionnaire (psychological function, functional status, physical functioning and social functioning) weekly.
Results. Partial correlations between headache intensity and QOL subscales (harmony, cheerful mood, social interaction with siblings, satisfaction with life in general and satisfaction with health) while controlling for QOL during the previous week ranged from -0.28 to -0.42 (p's<0.05). For fatigue, headache impact on daily activities and headache impact on leisure activities (r's$=0.24$ to 0.46). Headache impact on daily activities was consistently correlated with headache intensity on all assessments (r's$=0.46$ to 0.32). Compliance in diary completion was low in weeks 2 and 3.
Conclusions. Higher headache intensity was related to compromised self-reported QOL. The data indicate a relationship between actual presence of headache and QOL, however conclusions around causality cannot be drawn. Variables that may have mediated the relationship (e.g., medication use) were not included in the analyses, age trends and sex differences were not reported and statistical analyses which may have provided information about the direction of causality between headache intensity and QOL (e.g., cross-lag panel correlations) were not used.

Mikkelsson M, Salminen JJ, Kautiainen H. Non-specific musculoskeletal pain in preadolescents. Prevalence and 1-year persistence. *Pain* 1997;73:29-35.

Previously abstracted in the *Pediatric Pain Letter*, Vol. 3, No. 1; p. 5. **www.dal.ca/~pedpain/pplet/v3n1c.PDF**

Shapiro BS, Dinges DF, Orne EC, Bauer N, Reilly LB, Whitehouse WG, Ohene-Frempong K, Orne MT. Home management of sickle cell-related pain in children and adolescents: natural history and impact on school attendance. *Pain* 1995;61:139-144.

Previously abstracted in the *Pediatric Pain Letter*, Vol. 1, No. 4; p. 39. **www.dal.ca/~pedpain/pplet/v1n4c.PDF**

Walker LS, Guite MS, Duke M, Barnard JA, Greene JW. Recurrent abdominal pain: a potential precursor of irritable bowel syndrome in adolescents and young adults. *Journal of Pediatrics* 1998;132:1010-1015.

Objective. To evaluate if recurrent abdominal pain (RAP) is predictive of the development of irritable bowel syndrome (IBS) and to evaluate if life and psychological stress results in more IBS symptoms.
Design. Five-year longitudinal.
Setting. Pediatric Gastroenterology Clinic, USA.
Participants. Patients (n=76; 51 female; mean age=15.7 years, SD=3.2) referred to the clinic 5 years previously with abdominal pain from an unidentified source for at least 3 months. Exclusion criteria were chronic illness, physical disability or mental retardation, an initial diagnosis of organic causes, IBS or constipation. Controls were 49 healthy patients (23 female; mean age=16.2 years, SD=3.2) who had been treated for a minor illness or injury from which they had recovered.
Main Outcome Measures. Telephone interviews were used to administer the: Bowel Disease Questionnaire (IBS symptoms); self and parental report forms of the Functional Disability Inventory (difficulty in physical and psychosocial functioning); Life Events Questionnaire (patient); Family Inventory of Life Events (mother); Academic and Social subscales of the Self-Perception Profile for Adolescents; patient and parent report forms from the Centre for Epidemiologic Studies Depression Scale; Academic Competence and Peer Relations factors of the Health Resources Inventory. All measures were carried out in reference to the previous year.
Results. Patients with RAP: reported more frequent abdominal pain ($p<0.01$); had higher levels of functional disability on patient ($p<0.01$) and mother ($p<0.02$) reports; had higher levels of activity interference ($p<0.05$) and school absence ($p<0.02$) on mother reports; had more clinic visits for abdominal symptoms ($p<0.05$); and had IBS scores that positively correlated with all life stress measures ($r=0.27$ to 0.42) and all psychosocial adjustment measures ($r=-0.25$ to 0.37). IBS was also correlated with all disability measures ($r=0.36$ to 0.53) except for school absences and clinical visits related to symptoms other than IBS. Correlations between scores on IBS criteria and psychosocial variables were significantly greater in the RAP group than controls for functional disability, interference with activities, clinic visits, life stress, depression and social competence (p's=0.05). Females with RAP were more likely to have IBS criteria than controls ($p<0.03$).
Conclusions. RAP is associated with greater incidence of IBS and female patients with a history of RAP may be particularly susceptible to IBS. The severity of IBS is predictive of psychosocial adjustment and traumatic life events.

Walters AS, Williamson GM. The role of activity restriction in the association between pain and depression: a study of pediatric patients with chronic pain. *Childrens Health Care* 1999;28(1):33-50.

Objective. To examine associations between pain, activity restriction and depression.
Design. Interview.
Setting. Outpatient pediatric clinic, USA.
Participants. Children (n=73; 62% males; mean age=11.4 years, range 5-18 years) with recurrent pain as a concomitant of a chronic disorder who were receiving outpatient therapy for pain and illness management, and their caregivers. Of the participants, 27 had cancer, 16 had sickle cell anemia, 15 had hemophilia or a rare blood disorder, 9 had juvenile rheumatoid arthritis and 6 had bone or muscle disorders.
Main Outcome Measures. Children and caregivers were interviewed separately. They completed the Pediatric Pain Questionnaire, the Child Depression Inventory and visual analogue scales for current and chronic pain. Caregivers and adolescent children rated the extent to which illness restricted activity on a 5-point Likert scale.
Results. Participants had a low degree of current pain, a substantially higher amount of chronic pain and a level of depressive symptomology that was similar to normal populations. Caregiver ratings indicated 90% of children were restricted in routine activities (i.e., eating, sleeping, attending school, doing homework) in the 3 months prior to the interview and 92% of children reported limitations or restrictions in sport activities. Analyses for mediational effects revealed that chronic pain affected activity restriction ($p=0.03$) and symptoms of depression ($p=0.01$). For preadolescents activity restriction increased symptoms of depression ($p=0.05$).
Conclusions. Activity restriction mediated, to some extent, the association between chronic pain and depression in pediatric patients. Activity restriction is a strong predictor of depression in preadolescents but does not mediate the association between pain and depression in older adolescents.

Recent Articles

Aromaa M, Sillanpää M, Rautava P, Helenius H. Pain experience of children with headache and their families: a controlled study. *Pediatrics* 2000;106(2):207-275.

Objective. To examine pain sensitivity of children with headaches and their families and to investigate their psychosocial life, family environment and prevalence of other aches.
Design. Prospective follow-up cohort study using a stratified, randomized and clustered population sample.
Setting. Maternity health and well-baby clinics, Finland.
Participants. Families (1132 of 1443) completed a headache screening questionnaire when their first child reached the age of 6 years. Children who reported suffering from headache underwent a clinical examination and interview (106 of 144). Those with primary headache (HA; n=96; 51% male; 58 with migraine and 38 with tension-type headache; mean age at examination=7 years) and matched (age, sex and degree of urbanization) controls (n=96) underwent further examinations accompanied by a parent (HA , 92% mothers; control, 84% mothers).
Main Outcome Measures. Children and/or parents were asked questions about: pain sensitivity of all family members; child's headache and stomachache pain (10 cm visual analog scale (VAS)); child rearing practices (protectiveness, comfort methods for pain, parental agreement); family dynamics and conflict resolution; child's coping mechanisms, depressive symptoms, social life and activity level. Migraine and tension-type headache children were compared for all variables.
Results. Versus controls HA children were: judged by parents to be more sensitive to pain ($p=0.001$); more afraid of doctor visits and physical exams ($p's<0.02$); more prone to cry during blood sampling or vaccination ($p<0.001$); more likely to use avoidance reactions during play due to fear of pain ($p<0.001$); experiencing more recurrent abdominal and growing pains ($p's<0.001$); more likely to react to stressful situations with somatic symptoms (pain or functional intestinal disorders) ($p's<0.002$); more tired ($p<0.001$); more likely to have had thoughts of death during the previous month ($p<0.001$); more likely to have day-care problems and have fewer hobbies ($p's<0.03$). Fathers of HA children were more likely to be extremely sensitive to pain ($p=0.006$). Versus parents of HA children, parents of controls: more often talked to comfort their child when in pain; more often felt anxious, frightened, excited and nervous in reaction to their child's pain ($p's<0.002$); less often tried to hold the child or divert their attention during a temper tantrum ($p<0.01$). Control mothers more often forbade their children from playing because of fear of injury ($p<0.04$). Versus migraine children tension-type children: had mothers who more often reported a considerable sensitivity to pain ($p<0.03$); reported less family happiness ($p<0.04$); reported a more distant relationship between parents ($p<0.01$).
Conclusion. Childhood headache is a complex problem which requires studying pain sensitivity, coping strategies to stressful events and family functioning in addition to somatic factors. Parental information and actions influence children's coping mechanisms. Headaches can be an indicator of problems in the life of the child or family, therefore, school entry is an ideal time to investigate occurrence and provide general and management information.

Barrera M. Brief clinical report: procedural pain and anxiety management with mother and sibling as co-therapists. *Journal of Pediatric Psychology* 2000;25(2):117-121.

Objective. To describe a multidimensional empirically supported psychological intervention for a preschool child undergoing port-access to acute lymphoblastic leukemia (ALL) treatment and to identify cultural and linguistic factors relevant to the intervention.
Design. Case Report.
Setting. Pediatric cancer clinic, Canada.
Participants. A Spanish speaking preschool child (4 years old), near the end of a 3 year chemotherapy protocol for ALL, referred for psychological intervention because of severely disruptive behaviour during port-access.
Intervention. The goals of the intervention were to reduce the child's anxiety and disruptive behaviour, to reduce mother's anxiety and enhance her confidence in her parenting skills and to reduce sibling distress. The intervention consisted of two training sessions; in session one the mother and child were present; in session two, the sibling was seen alone first and mother and child joined later. Maternal training involved learning specific behaviours, learning to use reinforcement for appropriate behaviour, learning to induce the child's relaxation and learning to coach him in a distraction technique (bubble making). Relaxation practices were used to reduce maternal anxiety. The treatment protocol and its side effects were explained to the older sibling and he was also trained in the same behaviours as the mother.
Results. Prior to the intervention, the child had to be restrained during the port-access and the procedure lasted about double the usual time. The child was highly anxious

and fearful during outpatient clinic visits as well. Following the intervention, the child was somewhat apprehensive before the procedure but was able to keep his attention on the bubble making. The procedure lasted 6 minutes compared to the 20 minutes before the intervention.
Conclusions. The intervention supports the importance of family centred care. The results support the notion that greater utilization of family personal resources is possible in psychological interventions planned for the ill child. Also highlighted the need to develop culturally sensitive interventions.

Chen E, Craske MG, Katz ER, Schwartz E, Zeltzer LK. Pain-sensitive temperament: does it predict procedural distress and response to psychological treatment among children with cancer? *Journal of Pediatric Psychology* 2000;25(4):269-278.

Objective. To evaluate the relationship between children's pain sensitivity (PS) and distress during lumbar puncture (LP) and determine if PS moderates responses to a psychological intervention aimed at reducing distress.
Design. Randomized control trial.
Setting. Pediatric oncology centre in a children's hospital, USA.
Participants. Children (n=55; 67% male; mean age=7.3 years, range 3-18; outpatients; 4% African American, 11% Asian, 25% Caucasian, 61% Hispanic; 29% spoke only Spanish) diagnosed with acute lymphoblastic leukemia and their parents (33% spoke only Spanish).
Intervention. Children underwent 3 LP's (baseline, post-treatment and follow-up); all received EMLA and 5 received oral midazolam. Immediately after the first, and prior to the second LP, half the children discussed their memories of their baseline LP with a therapist who had observed it. Therapists helped children: strengthen their beliefs in the efficacy of their coping strategies; realistically appraise their responses; and improve the accuracy of their pain and anxiety memories.
Main Outcome Measures. On a day the child was not having an LP, parent and child versions of the Sensitivity Temperament Inventory for Pain (STIP-P and STIP-C) were used to assess child's PS. Before and after each LP: children and parents rated child's anticipatory and procedural pain and anxiety (visual analogue scales (VAS)); parents rated their anxiety (VAS); blood pressure (BP), heart rate (HR) and salivary cortisol levels were recorded. Child's procedural distress was also rated by the physician assistant performing the LP (VAS) and by trained observers viewing videotapes of the LP (Procedure Behavior Check List (PBCL)).
Results. Younger children had higher levels for anticipatory anxiety ($p<0.01$), pre-LP HR ($p=0.05$), PBCL ($p<0.001$), PA VAS ($p<0.05$) and parent procedural VAS's ($p's<0.03$). Older children had higher pre- and post-LP BP ($p's<0.01$). For the STIP-P and STIP-C girls were rated as more sensitive to pain ($p's=0.05$). Girls also reported more procedural pain and had lower post-LP BP ($p's<0.01$). Higher STIP-P scores were associated with: higher child anticipatory and procedural pain ($p's<0.05$); higher procedural anxiety ($p<0.05$); and lower pre and post-LP BP ($p's<0.05$). Higher STIP-C scores were associated with: higher child procedural pain ($p<0.01$); and higher anticipatory and procedural anxiety ($p's<0.05$). Regressions of distress change scores against STIP, treatment condition and interaction of STIP and treatment revealed: STIP-P interactions with physician assistant VAS and post-LP BP ($p's\leq0.05$; positive association for control and negative for treatment) at follow-up; STIP-C interactions with parent anticipatory anxiety ($p<0.05$; positive association for control and negative for treatment) at post-treatment.
Conclusions. Children with higher parent-rated PS showed greater increases in distress when not treated and greater decreases in distress when treated. Parents of children with higher child-rated PS showed greater increases in anxiety when not treated and greater decreases in anxiety when treated. Measurement of PS may be useful in pediatric oncology to identify children who would benefit most from an empirically-supported psychological intervention to reduce procedural distress.

Felt BT, Mollen E, Diaz S, Renaud E, Zeglis M, Wheatcroft G, Mendelow D. Behavioral interventions reduce infant distress at immunization. *Archives of Pediatrics & Adolescent Medicine* 2000;154(7):719-724.

Objective. To assess the effectiveness of simple behavioural interventions during immunization on behavioural, as well as biochemical, indicators of distress in infants and parents.
Design. Randomized control trial.
Setting. Urban pediatric practice, USA.
Participants. Infant-parent dyads (n=114) were consecutively enrolled in either a standard care group (n=45; infants: 60% male, mean age=6.5 months, SD=4.5; parents: 82% female, mean age=30.8 years, SD=4.5) or an intervention group (n=57; infants: 54% female, mean age=8.6 months, SD=5.0; parents: 93% female, mean age=30.9 years, SD=5.5). All infants were presenting at the practice for a health supervision visit.
Intervention. Parents in the intervention group received information sheets describing techniques they could employ with their infant during the procedure (e.g. toys,

speaking, pacifier, rocking). Parents in the standard care group (control) were given no instructions with respect to soothing techniques to employ during immunization.
Main Outcome Measures. Behavioural assessments of infant and parental distress, as well as the parents' use of intervention strategies were assessed via videotape recordings of the time periods prior to, during and after immunization. Biochemical assessments were made from parent and infant salivary cortisol levels obtained from saliva samples given prior to immunization and at 15, 30 and 60 minutes following immunization.
Results. The greatest behavioural differences between groups were seen prior to immunization. Intervention parents were more likely to initiate an intervention than control parents ($p<0.04$) and were more likely to use positive/neutral language prior to immunization ($p<0.03$). Total infant distress (cry duration) was shorter in duration for intervention infants than control infants ($p<0.05$). Immediately following immunization, intervention parents rated their infants more comfortable than control parents ($p<0.001$). Salivary cortisol levels were lower for intervention infants than control infants at 15, 30 and 60 minutes following immunization ($p's<0.05$). Parental salivary cortisol levels did not differ by group.
Conclusions. Behavioural interventions for immunization can reduce both behavioural and biochemical indicators of distress in infants. Parents are more likely to employ techniques when they are given suggestions to do so. However, a complex interaction exists between parental, child, staff and contextual factors that may preclude the effectiveness of these techniques.

Gilbert-Macleod CA, Craig KD, Rocha EM, Mathias MD. Everyday pain responses in children with and without developmental delays. *Journal of Pediatric Psychology* 2000;25(5):301-308.

Objective. To compare the pain behaviour displayed by children with and without developmental delays during everyday pain experienced at a daycare.
Design. Observational study in daycare.
Setting. Daycare centres, Canada.
Participants. Children with (n=24; mean age=3.7 years) and without (n=36; mean age=3.7 years) developmental delays.
Main Outcome Measures. Six observers watched up to 12 children simultaneously for up to 3 hours completing the Dalhousie Everyday Pain Scale for each painful event observed. All parents of delayed children and 89% of parents of non-delayed children completed the Illness Encouragement Questionnaire and provided demographic information.
Results. Rate of injury did not differ between groups and was approximately once per 4 hours. The activity level of the children, tone of activity, number of participants, cause of pain and severity of pain did not differ between groups. Children with delays were more likely to display no response to pain, less crying, less screaming and less help-seeking behaviour. There were no significant differences between groups in duration of pain or anger responses and use of or duration of protective behaviours.
Conclusions. Children with developmental delays displayed a less vigorous pain response which could reflect social-communicative deficits. However, there were few significant differences in observed behaviour, observers were not blind to the children's group membership, there was no reliability analyses of the observations made and the multiple statistical tests performed were not corrected for error rate. It is difficult to know if the results are generalizable since the actual degree of children's developmental delay was not recorded. This study provides some descriptive information regarding the pain response of delayed children, but the results should be regarded cautiously.

Goodenough TB, Perrott DA, Champion GD, Thomas W. Painful pricks and prickle pains: is there a relation between children's ratings of venipuncture pain and parental assessments of usual reaction to other pains? *Clinical Journal of Pain* 2000;16(2):135-143.

Objective. To investigate whether self-reports of venipuncture pain intensity from children aged 3 to 12 years can be usefully predicted by the mother's assessment of the child's typical behavioural reaction to everyday pain.
Design. Survey.
Setting Blood collection centre, Australia.
Participants. Children (n=88; 44 male) who had participated in a larger study investigating whether children could use visual analogue scales (VAS) to rate intensity versus unpleasantness of needle pain. Equal number of boys and girls were selected from two age levels (3-7 years and 8-12 years) who were scheduled for blood collection via venipuncture. Inclusion criteria: accompanied by their mother who remained during the procedure; family's first language was English; no topical anesthetic applied to the needle site; and the child and parent were not coached through venipuncture with coping techniques.
Main Outcome Measures. The FACES pain scale was given to the child to measure the level of pain intensity. An ordinal scale (0 (nothing) to 3 (severe)) was used to code the intensity of each child's facial, vocal, verbal and

motor reactions to needle pain (by trained independent rater). The focus was on the degree of relative change in reaction rather then on an absolute criteria. The mother completed a standardized questionnaire about how anxious she thought her child was about the needle and the FACES scale for how much she thought the needle would hurt her child and for ratings of her child's usual reaction to 6 different painful events.

Results. Only 12 of the 88 children reported that the needle did not hurt and they tended to be in the older group ($p=0.0005$). Children in the younger group had higher ratings than older children ($p<0.02$). Parent and child needle pain ratings at the time of venipuncture were moderately correlated ($r=0.6$). Overall, 39% of children reported that the needle hurt less then expected (less pain group), 23% said the needle hurt more then expected (more pain group) and 31% indicated that the needle hurt the same as expected (same pain group). For children in the same pain group and less pain group, 24% and 16% (respectively) of the variance could be accounted for by the parental estimates of reactions to other pain. For the more pain group, 88% of the total variance could be accounted for by parental estimates of reactions to other pain. Forty-five percent of parents indicated that their child's facial reaction was the most important indicator of pain, 27% relied on verbal reaction, 18% on motor reaction and 10% on vocal response. There were low to moderate positive correlations between the child's self report and observer ratings of the child's reaction.

Conclusions. The results suggest that a knowledge of the child's usual reaction to other painful events may assist in identifying those children likely to report the most needle pain and distress. The results also suggest that mother's reports can be a reliable measure of these usual reactions.

Lindh V, Wiklund U, Hakansson S. Assessment of the effect of EMLA during venipuncture in the newborn by analysis of heart rate variability. *Pain* 2000;86(3):247-254.

Objective. To determine if application of EMLA (eutectic mixture of local anesthetics) reduces pain response to venipuncture in neonates.

Design. Randomised, double-blind, control trial.

Setting. Maternity ward, Sweden.

Participants. Newborn infants (n=60) were recruited if they met inclusion criteria (full term; vaginal delivery; 5 minute APGAR score >7; normal birth weight (within ±2 SD); healthy and without injuries caused by delivery) and randomly assigned to the EMLA (n=28; 16 female; mean gestational age=39 weeks, SD=1; mean birth weight=3676 g, SD=410; APGAR score=9, SD=0; mean postnatal age=80 hours, SD=11) or placebo group (n=28; 15 female; mean gestational age=40 weeks, SD=1; mean birth weight=3699 g, SD=432; APGAR score=9, SD=0; mean postnatal age=84 hours, SD=16).

Intervention. EMLA or placebo cream (1 ml with 1 g dose) was applied to a 4 cm^2 area on the dorsal side of the left hand and covered with Tegaderm (3M®) for 60 minutes. Ten minutes after Tegaderm removal the hand was warmed with a water filled glove (37 °C) for 2 minutes. A 20-gauge needle was then used to puncture a vein in the treated area. Breast-feeding occurred within 1 hour before and the mother or father held the baby during the procedure.

Main Outcome Measures. Electrocardiogram (ECG) and crying was recorded simultaneously in a computer using a cardioscope and a tape recorder. ECG was divided into 3 sequences (baseline (5 minutes); hand warming (2 minutes); venipuncture and blood sampling (80 seconds)). Spectral analysis of heart rate variability (HRV) was conducted for 80 seconds of each sequence and the power in the low (LF; 0.012-0.15 Hz) and high (HF; 0.15-2.0 Hz) frequency bands was calculated. Crying was categorized as instant (occurred within 30 seconds of venipuncture), delayed (began 30-80 seconds after) or silent (no crying). Sleep/wake state was assessed during baseline.

Results. Four babies were excluded due to technical problems, ECG recording artifacts or excessive crying during baseline. Placebo group was older than the EMLA group ($p=0.02$). There were no significant differences in crying between groups. During venipuncture the EMLA group had lower mean heart rate (130 vs. 144 beats/minute; $p=0.01$), higher total HRV ($p=0.02$) and higher LF power ($p=0.01$).

Conclusions. In previous studies lower HRV levels have been associated with stressful events (i.e., circumcision, illness, respiratory distress). The results of this study indicate that EMLA decreases the stress response to venipuncture in neonates.

Litman RS. Conscious sedation with remifentanil during painful medical procedures. *Journal of Pain & Symptom Management* 2000;19(6):468-471.

Objective. To describe the efficacy and complications associated with a remifentanil and benzodiazepine combination for analgesia and anxiolysis, while maintaining consciousness during painful procedures.

Design. Retrospective chart review.

Setting. University affiliated hospital, USA.

Participants. Records of patients (n=30; 17 male; age range 1-25 years) who had underwent 40 procedures

(bone marrow aspiration or biopsy, bone marrow harvest, bronchoscopy, burn debridement, chest tube insertion, closed fracture reduction, endoscopy, colonoscopy, steroid injection in hips, lumbar puncture, renal biopsy).

Intervention. Administration of remifentanil as part of the conscious sedation process.

Main Outcome Measures. Information extracted from charts included: age, weight, gender, procedure type and duration, remifentanil dose, other anesthetics used, time to discharge, sedation complications, heart rate, oxygen saturation, blood pressure (recorded every 3 minutes) and respiration rate (from visual or tactile inspection).

Results. Patients were premedicated with midazolam (n=28; orally at 0.5 mg/kg; IV route at 0.05 mg/kg); additional benzodiazepines were not administered. For 31 procedures, remifentanil was the sole analgesic (0.5-0.3 g/kg/min). Of these, 10 patients developed hypoxemia ($Sp0_2$ 48-89%) requiring verbal or physical stimulation. Of the 20 patients that did not develop hypoxemia, 15 developed apnea requiring verbal prompts to breath. Nine patients required cessation of remifentanil due to lack of analgesia at doses causing apnea; these patients were administered propofol or ketamine. Sedation lasted 12.6 to 22.5 minutes with discharge ranging from 4.7 to 11.3 minutes.

Conclusions. The combination of a benzodiazepine and remifentanil appears not to be a useful conscious sedation technique due to the high incidence of respiratory depression at doses that are sub-therapeutic. This is of particular concern where verbal prompts to breathe may be insufficient (e.g., with children <5 years old or cognitively/verbally impaired patients). A propofol-based technique is more favourable since it rarely results in apnea or hypoxemia at therapeutic doses.

McCarty EC, Mencio GA, Walker LA, Green NE. Ketamine sedation for the reduction of children's fractures in the emergency department. *Journal of Bone & Joint Surgery* 2000;82A(7):912-918.

Objective. To investigate the safety and efficacy of ketamine sedation for children undergoing fracture reduction in emergency departments.

Design. Consecutive cohort, prospective survey.

Setting. Emergency department (ED), USA.

Participants. Children (n=114; 64 male; mean age=5.3 years, range 1-10.8; mean weight=21.7 kg, range 10.0-46.8) with a closed extremity fracture (n=109) or dislocation (n=5) whose parents provided consent for ketamine sedation. Most injuries (75%) involved the upper extremity. Exclusion criteria were presence of contraindications to ketamine sedation and ingestion of a meal within 3 hours prior to planned sedation. Parents who were present during fracture reduction (n=69) also participated.

Intervention. Ketamine was administered intravenously (IV; n=99; 2 mg/kg) or intramuscularly (IM; n=15; 4 mg/kg). For 13 children it was administered a second time due to the length of the procedure. Midazolam (n=41; 0.05 mg/kg) was given after reduction to prevent dysphoric reactions and at physician's discretion to some of the older children at risk of emergent reactions. Glycopyrrolate (n=45; 2 mg/kg) was given to decrease secretions. The American Academy of Pediatrics (AAP) guidelines for monitoring and equipment were adhered to.

Main Outcome Measures. Oxygen saturation (pulse oximeter), medication dosages, time of ketamine administration and time to initiation of fracture reduction were recorded. Children's pain was rated by the physician performing the reduction using the Children's Hospital of Eastern Ontario Pain Scale (CHEOPS). Parents completed a questionnaire at first follow-up to determine perception of their child's pain during reduction (1 (no pain) to 4 (severe pain)), their overall satisfaction with the procedure (1 (not satisfied) to 4 (extremely satisfied)) and their willingness to allow use of ketamine in a future reduction.

Results. Average time from ketamine administration to injury manipulation was less for the IV group (1.6 minutes (range 0.33-5) vs. 4.7 minutes (range 1-15)) as was the average procedure duration (IV, 17.8 minutes (range 5-56) vs. IM, 19.7 minutes (range 10-50)) and the average time to discharge (IV, 84 minutes (range 22-215) vs. IM, 90.3 minutes (range 60-130)). Oxygen saturation averaged 98% (range 78-100%). Average CHEOPS score was 6.4 (range 5-10) with 75% of scores equal to or below 6, indicating minimal or no pain. Parents' pain ratings averaged 1.8 and their satisfaction ratings averaged 3.8. All but one parent indicated they would allow ketamine use in a similar future situation. Three reductions were unsuccessful and required closed reduction with general anesthesia or intramedullary fixation. Twelve children required further procedures (open reduction or intramedullary fixation) at first or second follow-up due to unsatisfactory alignment or instability. Side effects observed in the ED or at home included nausea (n=13), clumsiness (n=10) and dysphoria (n=1). No nightmares or hallucinations were reported.

Conclusions. With very close monitoring from staff, ketamine facilitated fracture reduction. Adequate sedation was achieved quickly, reliably and safely with strong parental acceptance of the method. IV administration is preferable if obtainable. The results indicate that, when

the AAP's guidelines are strictly adhered to, ketamine is effective for sedation and analgesia for fracture reduction in this age group, however, the n is too small to generalize about its safety.

Perquin CW, Hazebroek-Kampschreur AAJM, Hunfeld JAM, Bohnen AM, Suijlekom-smit LWA, Passchier J, van der Wouden JC. Pain in children and adolescents: a common experience. *Pain* 2000;87(1):51-58.

Objective. To generate new etiologic hypotheses regarding the origin of chronic pain in children and adolescents.
Design. Cross-sectional population survey.
Setting. Participants' homes, the Netherlands.
Participants. Children (n=5423; 2770 girls) ranging in age from 0 to 18 years were randomly sampled from the register of population (0-3 years) or recruited through schools (4-18 years). In order to obtain a representative sample, inclusion criteria required that 70% of the children in the school were of Dutch origin. Schools were geographically spread throughout the region, distribution of students across school year and education level reflected the general population distribution.
Main Outcome Measures. A structured pain questionnaire was adapted for 3 age groups (0-4 years, 5-11 years, 12-18 years) assessing demographic information as well as questions about pain presence, location, frequency, duration and intensity. Questionnaires for children aged 0-7 years were completed by a parent; children 8-18 years completed their own.
Results. A majority of respondents (53.7%) reported pain in the previous 3 months. Twenty-five percent of respondents, most frequently 12-15 years, reported chronic pain which increased with age (boys and girls, p's<0.001). In older age groups, girls reported more chronic pain than boys (p<0.001). Duration of pain ranged from less than 4 weeks (32%), to between 4 weeks and 3 months (18%) and longer than 3 months (50%). Higher frequencies of weekly pain were apparent for chronic pain (49%) than non-chronic pain (39%)(p<0.001), for girls (48%) than boys (37%) (p<0.001) and in older children (p<0.001). Half the children reported single location pain; mean number of locations was 1.87 (SD=1.11). Girls were more likely to report abdominal pain; boys were more likely to report limb pain. Prevalence of multiple pain sites increased with age and girls reported twice as many multiple instances as boys (p<0.001).
Conclusions. Pain is quite prevalent among Dutch children. In addition, chronic pain among older children, particularly girls, warrants follow-up investigations assessing biopsychosocial factors that may be related.

Announcements

Meetings

April 19-22, 2001: *20th Annual Scientific Meeting of the American Pain Society, Phoenix Civic Plaza Convention Centre, Phoenix, Arizona, USA.* For more information contact the American Pain Society, 4700 W. Lake Avenue, Glenview, IL, 60025, tel 847-375-4715, fax 847-375-6315, web-site **www.ampainsoc.org/meeting/**.

May 10-12, 2001: *Canadian Pain Society Annual Conference: An Odyssey of Discoveries, DELTA Montreal Hotel, Montreal, Quebec, Canada.* A Pain Education Day with pediatric pain, cancer pain, impact of pain and evidenced-based practice as tentative topics. Keynote speaker for the scientific program will be Jean-Marie Besson. Topics to be covered in the plenary sessions include: pain and brain imaging; update on opioid therapy; update on pediatric pain; basic research on ion channels; clinical research on evidenced-based decision making for pain treatment; update on cancer pain/ palliative care. For more information contact Marie-Christine Bournaki, Ph.D., Chair, Local Arrangements Committee, tel 514-343-7181, fax 514-343-2306, email **Marie.Christine.Bournaki@umontreal.ca**, web-site **www.medicine.dal.ca/cps/montreal2001/**.

May 19-24, 2001: *2nd European Course on Palliative Care for Children, Warsaw, Poland.* For more information contact Marek Karwacki, Warsaw Hospice for Children, 03-680 Warsaw, ul.Agatowa 10, tel +48-22-678-16-11, fax +48-22-678-99-32, email **marekwk@astercity.net**, web-site **www.hospicjum.waw.pl/kurs/kurs.htm**.

June 8-12, 2001: *Canadian Anesthesiologist's Society Annual Meeting, Halifax, Nova Scotia, Canada.* For more information contact CAS Meeting Coordinator, 1 Eglinton Avenue East, Suite 208, Toronto, Ontario Canada, M4P 3A1, tel 416-480-0602, fax 416-480-0320, email **meetings@cas.ca**.

June 26-29, 2001: *2nd World Congress of the World Institute of Pain: Pain Management in the 21st Century, Istanbul Convention and Exhibition Centre, Istanbul, Turkey.* For further information contact Cengiz Topel Mah, Dilan Tur Congress International, Dereyolu Sok.

Umut - 2 Apt., 80630 Etiler, Istanbul, Turkey, tel +90-212 257-86-67 (PBX), fax +90-212-265-54-74, email **info@dilan.com.tr**, web-site **www.dilan.com.tr/wip2001**.

Positions

UCLA Pediatric Pain Program has two positions for a **pediatric pain management fellowship** which can be one or more years and has a strong research training component. The fellowship is geared to the **Pediatrician** or **Family Medicine** physician who has an interest in developing an academic career in pediatric pain management. As there becomes a shortage of anesthesiologists to cover the OR, there is a growing need for non-anesthesiology-trained physicians to teach, run clinical services, and carry out research in pediatric pain, especially chronic pain. This fellowship is not intended to replace anesthesiologists in pain management (impossible and not desired!) but to add to the pool in an integrative way.

From the clinical training perspective, while the fellow will get training and experience in acute pain management, there will be a heavier emphasis on chronic pain evaluation and management. The clinical program is an integrative one that includes not only psychology and psychiatry but also a strong CAM component (acupuncture, massage, PT, biofeedback, hypnotherapy, yoga, meditation, art therapy, movement therapy, Chinese herbs).

Clinical research is an integral part of the program. We have a psychophysiology laboratory where we learn about children's pain responses and the developmental trajectory of pain vulnerability. Currently we have a large NIH-funded study of the relationship between gender, puberty, and laboratory pain responses, as the first step in understanding the gender differences in chronic pain syndromes that appear to emerge during adolescence and continue during adulthood. We also study chronic pain syndromes in children and are involved in a study of recurrent abdominal pain with Bruce Compas (U of Vermont) and Lynn Walker (Vanderbilt). We also have completed or have submitted to NIH studies of CAM in pediatric pain (acupuncture, massage, yoga, meditation). The fellow will get extensive training in research methodology, statistics, grant preparation, and manuscript writing, and will work closely with the 1-3 PhD post-doctoral research fellows in the pain program each year. A masters of science degree in health outcomes or clinical research is also offered through the UCLA School of Public Health if desired during the fellowship. The positions are available beginning as early as January 1, 2001 or could begin July 1, 2001. For more information, contact Lonnie Zeltzer, M.D., Professor of Pediatrics, Anesthesiology, Psychiatry and Biobehavioural Sciences Director, UCLA Pediatric Pain Program UCLA School of Medicine, 22-464 MDCC, 10833 Le Conte Avenue, Los Angeles, CA, 90095-1752, tel 310-825-0731, fax 310-794-2104, email **lzeltzer@mednet.ucla.edu**. Interested candidates should send their personal statement about why they are interested in this fellowship, a CV, and three letters of recommendation.

The Pediatric Chronic Pain Management Program, Department of Anesthesia at the Hospital for Sick Children, Toronto is advertising for a **Fellowship** commencing July 2001. Applications are invited from Board eligible (CA-3 completed or fellowship qualification outside of North America) candidates. It would be expected that applicants would have some prior experience of management of pain in children. Individuals trained in anesthesia or other pain allied specialties will be considered. For further information, please contact Stephen Brown MD FRCPC, email **stephen.brown@sickkids.on.ca** or Hana Zita, email **hana.zita@sickkids.on.ca**, tel 416-813-7240, fax 416-813-7543.

A full-time **postdoctoral research position** is available immediately at the **UCLA Pediatric Pain Research Program** to assist Lonnie Zeltzer, M.D. (Director and PI), and Jennie Tsao, Ph.D. (Research Psychologist), with the conduct of a large NIH-funded study examining puberty and gender differences in pain responsivity among healthy adolescents (aged 8-17). The study is a laboratory-based investigation incorporating behavioural, hormonal (e.g., cortisol), and psychophysiological parameters (e.g., cardiac vagal tone).The position requires a strong background in psychophysiological measurement, biostatistical analyses, and applied experimental research.

The successful applicant must be willing to oversee the day-to-day running of the project, including hands-on supervision of data collection, and to provide oversight of the overall research laboratory. The position provides opportunities to develop independent projects, write grants, and co-author manuscripts from new and existing data sets. The position is for one year but there is the possibility of extension. Salary will depend upon experience and qualifications. Candidates should send curriculum vitae, letter of interest, and list of three references to: Jennie Tsao, Ph.D., UCLA Pediatric Pain Research Program, 10940 Wilshire Blvd., Suite 1450, Los Angeles, CA, 90024, email **jtsao@mednet.ucla.edu**.

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

We need your help

Your participation in abstracting and writing commentaries for the *Pediatric Pain Letter* is welcomed. Please send submissions according to the specifications outlined in our Author's Kit which can be obtained from 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.

Assistants for this issue: Lynn Breau, Alyson Currie, Frank Elgar, Andrea Gregory, Michael Houlihan, Isabel Redondo and Trudi Walsh.

Correction: In our last issue, Vol. 4 No. 3, we mistakenly cited only 4 of the 6 authors in the abstract for McGrath, et al. (1990) on page 27. The correct citation is:

McGrath PJ, Hsu E, Cappelli M, Luke B, Goodman JT, Dunn-Geier J. Pain from pediatric cancer: a survey of an outpatient oncology clinic. *Journal of Psychosocial Oncology* 1990;8(2/3):109-124.

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