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Pediatric Pain Letter

Abstracts and Commentaries on Pain in Infants, Children, and Adolescents

Editorial Board

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Table of Contents

Introduction

Welcome to the fourth issue of the *Pediatric Pain Letter*. Although this is a quarterly publication, the first volume of the *Letter* will contain five issues, so that Volume 2, Number 1 will be released in January, 1998. We continue to gather abstracts and commentaries on a wide range of topics. Upcoming topics include composite measures of pain in infants and children, acetaminophen for pain, pain sensitization, chronic and recurrent pain. If there is a particular subject that you would like to see reviewed, we invite you to contact us.

Chronic pain in children has been ignored by many physicians, and is still not well covered in medical school curricula, although other disciplines may provide somewhat better training for their students. The effect of adult chronic pain on workplace productivity has been extensively studied, but the social consequences of chronic pain in children have been generally overlooked. In this issue we present commentaries on the impact of sickle cell disease pain and on the prevalence of migraine in children. There is also a review of a new book on pain and distress in the newborn.

After a year of activity, it is also time for us to ask you your opinion of our work. We strive to make this an interesting and useful production, but we need your comments

and suggestions to make it better. We have enclosed a reader survey with a self-addressed return envelope, and we sincerely hope you will complete it and return it to us as soon as possible.

Abstracts

The Impact of Sickle Cell Disease Pain

Fuggle, P., Shand, P.A.X., Gill, L.J., & Davies, S.C. (1996). Pain, quality of life, and coping in sickle cell disease. *Archives of Disease in Childhood, 75*, 199-203.

Objective. To investigate the frequency, severity, and impact of sickle cell pain, and to describe coping strategies for pain.
Design. Prospective, case-control survey.
Setting. Central Middlesex Hospital and public schools.
Participants. 25 6- to 16-year-olds (28% male) with sickle cell disease matched on age, sex, ethnicity, and education to 25 healthy controls (36% male). 60% of the patients were African compared to 56% of controls and remaining participants in both groups were Afro-Caribbean. No significant differences were noted between groups on age, sex, ethnicity, or social class.
Main Outcome Measure. Children completed the Central Middlesex Hospital Children's Health Diary daily for 4 weeks. The diary asked about the presence of 24 common childhood symptoms (e.g., fatigue, headache), the intensity, location, duration of each pain incident and its impact on daily functioning, whether the pain was disease-related (for children with sickle cell disease), and how the child coped with the pain incident.
Results. Children with sickle cell disease reported pain on 240/700 diary days, compared to 182/700 days in controls; the mean total number of pains reported did not differ between groups. Relative to pain events reported by controls, the combination of the greater frequency and longer duration of pain in children with sickle cell disease resulted in significantly more severe sickle cell-related pains. Patients and controls reported similar incidences of headache, back, chest and abdominal pains. Children with sickle cell disease were 7 times more likely to miss school due to pain than controls. Talking to a parent was the most common method used to cope with pain for both groups. Patients and controls did not differ on quality of day ratings and number of common childhood symptoms.
Conclusions. Although sickle cell disease pain results in frequent school absence, the impact of every day pains and common symptoms of illness in children with sickle cell disease appears to be similar to that of healthy children.

Gil, K. M., Thompson, R. J., Jr., Keith, B. R., Tota-Faucette, M., Noll, S., & Kinney, T. R. (1993). Sickle cell disease pain in children and adolescents: Change in pain frequency and coping strategies over time. *Journal of Pediatric Psychology, 18(5)*, 621-637.

Objective. To determine whether pain coping strategies used by children and adolescents with sickle cell disease are related to subsequent adjustment, and to determine the stability of number of pain episodes, disease severity, and pain-coping strategies over a 9-month follow-up period.
Design. Prospective, longitudinal survey (follow-up=9 months).
Setting. Sickle cell disease clinics, university hospital.
Participants. 87 African-American children and their parents were recruited to participate. A final sample of 70 children (33 girls; mean age=11.8 years, range=7-18 years) and 70 parents (66 mothers) completed follow-up evaluations.
Main Outcome Measures. Children completed the Coping Strategies Questionnaire (Rosenstiel & Keefe, 1983) at baseline and follow-up. Information about disease severity was obtained by the parent and from medical records. Pain status, activity pattern, and health care use were assessed using the Structured Pain Interview (Gil et al., 1991). A painful episode was defined as pain in any body location of at least 30 minutes duration caused by vasoocculsion.
Results. Painful episodes requiring health care contact occurred about once every six weeks, resulting in decreased social, academic, and household activity. Positive, yet moderate, correlations suggest that adjustment over the follow-up period was variable. A significant predictor of health care use and emergency room visits was the frequency of painful episodes. Children high on "passive adherence" coping had more health care contact, while children high on "coping attempts" had less frequent contact and were more active across a range of activities, even after controlling for pain frequency. Older children with sickle cell disease had more hospitalizations than younger participants.
Conclusions. Individual differences in coping with sickle cell disease pain may be more predictive of adjustment than pain frequency or other medical variables. Future research should evaluate cognitive-behavioural approaches to enhance active

coping with this disease.

Shapiro, B. S., Dinges, D. F., Orne, E. C., Bauer., N., Reilly, L. B., Whitehouse, W. G., Ohene-Frempong, K., and Orne, M. T. (1995). Home management of sickle cell-related pain in children and adolescents: natural history and impact on school attendance. *Pain, 61*, 139-144.

Objective. To investigate the impact of sickle cell-related pain on sleep and school attendance.
Design. Prospective, longitudinal survey (range of follow-up =2-15 months; mean=10 months).
Setting. Sickle cell disease clinic, children's hospital.
Participants. Children were recruited from part of an ongoing study on the natural history of sickle cell-related pain and efficacy of self-hypnosis. Inclusion criteria: sickle cell hemoglobinopathy diagnosis; between 7-17 years old; presence of 4 painful episodes in previous year; patient/family considered pain significant. Exclusion criteria: regular red blood cell transfusions; comorbid chronic illness; mental retardation; emotional/family problems requiring psychotherapy. Of 380 patients followed by the clinic, 66 were eligible, 39 could not be contacted and 9 refused, leaving a final sample of 18 children (mean age= 13 years, range=8-17 years; 7 girls).
Main Outcome Measures. Each morning, children recorded the presence and intensity of sickle cell-related pain, and whether it interfered with their sleep. Each evening, the presence and intensity of pain, school attendance, and medication use were recorded. Children completed measures daily during the study (duration=2-11 months).
Results. 89% of pain episodes were managed at home, but considerable variability was noted in hospital contact for pain. Hospitalized children reported significantly more painful episodes than non-hospitalized children, but did not differ in proportion of days with pain, or on demographic or activity variables. Older children reported longer painful episodes, but age was not related to frequency, intensity, or number of painful episodes. Sleep quality and school attendance were negatively affected by pain.
Conclusions. The impact of sickle cell pain on sleep may affect pain coping and attention at school. The importance of including pain managed at home when assessing the impact of pain on psychosocial functioning was discussed. The impact of school absences on achievement in children with sickle cell-related pain should be evaluated.

Barbarin, O. A., Whitten, C. F., & Bonds, S. M. (1994). Estimating rates of psychosocial problems in urban and poor children with sickle cell anemia. *Health and Social Work, 19*, 112-119.

Objective. To examine the factors related to psychological, social, academic, and medical adjustment in a poor, urban sample of children with sickle cell anemia.
Design. Retrospective survey.
Setting. Sickle cell disease clinic, urban children's hospital.
Participants. 327 children with sickle cell anemia (range: 4-17 years; 56% male) and their parents (96% mothers) attending an annual medical examination. Median annual family income was below $6000.
Main Outcome Measures. A structured psychosocial interview (no psychometric information reported) assessed children's illness, social, academic, psychological, and family adjustment.
Results. Activity disruption (23%) and teasing (32%) were common problems associated with illness adjustment. Frequent social problems were shyness (42%), loneliness (26%), and lack of close friendships (23%). Problems at school (34%), and retention in grade (23%) were common academic adjustment problems. The child's psychological adjustment frequently involved the presence of fear (38%), anger (33%), moodiness (41%), hopelessness (26%), and depression (26%). Parental fear (56%), and worry (38%) about the child were common family adjustment problems, but problems with family relations and functioning were not. Children with serious pain episodes were more likely to experience activity disruption and teasing than those without, and were more likely to be angry, hopeless, depressed, and ashamed.
Conclusions. Adjustment problems were commonly reported in areas of social and academic functioning. More serious pain episodes increased the risk of teasing and psychological symptoms. Social skills training for children and preventative psychosocial interventions were recommended as potential avenues for intervention.

Eaton, M. L., Haye, J. S., Armstrong, F. D., Pegelow, C. H., & Thomas, M. (1995). Hospitalizations for painful episodes: Association with school absenteeism and academic performance in children and adolescents with sickle cell anemia. *Issues in Comprehensive Pediatric Nursing, 18*, 1-9.

Objective. To examine the relation between hospitalization for sickle cell pain and academic performance.
Design. Retrospective chart review.

Setting. Pediatric sickle cell clinic, urban medical center.
Participants. 22 8- to 18-year-old children with sickle cell anemia (HbSS) were selected to participate based on hospitalization frequency. All agreed but one child was excluded because of relocation prior to study completion. Children were selected if they had 4 or more hospitalizations for pain during a 22 month period (n=10) or if they were hospitalized no more than once for pain (n=11) and were matched on age, gender, and ethnicity. All children were of similar socioeconomic backgrounds, had no developmental or learning disabilities, and no history of seizures or cerebrovascular accidents.
Main Outcome Measures. Wide Range Achievement Test-Revised scores, school attendance records, and grades for the 22 month study period were obtained.
Results. High frequency hospitalization group was absent from school significantly more than the low frequency hospitalized group ($p<.01$), although both groups reported frequent absences. No significant differences were noted between groups on school grades or achievement test scores, but average grades were below a "C", and test scores ranged from 1-1.5 standard deviations below those for the standardization sample.
Conclusions. Factors other than school absenteeism may negatively affect school performance in children with sickle cell anemia. Differences in coping between children with high and low frequency hospitalization should be examined.

Commentary

Sickle cell disease is an inherited blood disorder which results in significant pain from vaso-occlusion. Several researchers have documented the severe impact of pain on the lives of children with sickle cell disease. Fuggle et al. (1996) showed that, according to diaries kept by children and adolescents, sickle cell pain was intense, long-lasting, and interruptive of sleep. Pain was reported on 34% of diary days and resulted in three times more disruption in daily activities than in a group without sickle cell disease. Gil et al. (1993) reported that a variety of activities were restricted as a result of pain from sickle cell disease, including school, household, and social activities; "uptime" averaged only 7 hours per day. Shapiro et al. (1995) studied more severely affected children who were absent from school 21% of all school days. On average, pain occurred on 30% of all diary days; 81% of the days with pain were managed at home, and 50% of school absences occurred on the days with pain. Children missed 6 to 8 weeks of school per year and reported poor sleep on 43% of the days with pain. These three studies showed that pain is a common and highly disruptive symptom of sickle cell disease.

At lease two sources (Barbarin et al., 1994; Eaton et al. 1995) suggested some long-term effects from the disruption of sickle cell disease. Eaton et al. (1995) did not detect differences between low versus high frequency hospitalization groups on course grades and standardized achievement tests; their sample may have been too small. However, they revealed that achievement test scores for their sample were one standard deviation below normal for the population. Frequent absences from school and fatigue during school hours may place children at risk for a variety of physical, psychological, intellectual, and social problems. Barbarin et al. (1994) focused on the results of the disrupted lifestyles of 327 children and adolescents pain from sickle cell disease. They revealed an array of adjustment problems (e.g., illness, social, academic, psychological, and family). Children with sickle cell disease pain showed poor adjustment, including more course failures, activity disruption, depression, loneliness, isolation, anger, fear, moodiness, hopelessness, and shame. School failure was twice as high for children with sickle cell disease with or without pain when compared to a national sample of African-American children. The causes of school failure are unclear. Social, psychological, or neuropsychological factors may be involved. Clearly, the disruption of sickle cell disease puts children and adolescents at great risk for severe achievement and adjustment problems.

These studies demonstrate that in spite of treatment in specialized centres, children with sickle cell disease are experiencing significant pain, disability (i.e., interference with activities), and handicap (i.e., interference with social role). More attention should be paid to pharmacological approaches to managing pain at home, as it appears that standard analgesic regimens (acetaminophen, codeine, and ibuprofen in various combinations) are insufficient to treat the severe pain from sickle cell disease. Fuggle et al. (1996) reported that of 25 children with sickle cell disease, 20 received only acetaminophen, 4 received acetaminophen and codeine, and 1 received opioids during hospitalization. Cognitive-behavioral interventions should also be investigated in conjunction with analgesics to examine their efficacy for facilitating coping, and minimizing pain-related disability and handicap. The negative and far-reaching consequences of sickle cell disease pain in children and adolescents are serious enough to warrant more thorough pain assessment and more aggressive pain relief measures.

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New Trends in Studying the Prevalence of Migraine in Children

Seshia, S.S., Wolstein, J.R., Adams, C., Booth, F.A. & Reggin, J.D. (1994). International Headache Society criteria and childhood headache, *Developmental Medicine and Child Neurology*, *36*, 419-428.

Objectives. To determine whether clinical diagnoses of headache types in children are similar when International Headache Society (IHS) criteria are applied.
Design. Survey.
Setting. Pediatric neurology clinic, children's hospital.
Participants. 77 children with recurrent headache who were referred to pediatric neurology clinic were eligible; complete data were available on 72 children (30 males; median age=11 years; age range=4-18 years).
Main Outcome Measures. Children alone (n=36), parents and child (n=24) and parents (n=12; in this group, median age of child=7 years) answered questions about headache characteristics during a clinical interview. Agreement between the initial clinical diagnosis made by the pediatric neurologist and IHS criteria was calculated.
Main Results. All children met minimum requirements of IHS criteria for number of attacks. The clinical diagnoses of 44 of 72 (61%) cases were in complete agreement with IHS criteria. 22 cases (31%) had partial agreement. Absolute disagreement was found in 6 cases (8%). Factors that lowered agreement levels included ability of child or parent to describe the headache, not meeting the minium duration criterion, or lacking particular characteristics required for diagnosis.
Conclusions. Clinical diagnoses were fairly concordant with IHS criteria diagnoses, suggesting that they are applicable to the majority of children with recurrent headache. The authors suggested minor revisions to IHS criteria to reflect that many children only have headaches that last a 30 minutes, not the 2 hours required for IHS diagnosis, and are often unable to use precise key descriptors.

Wöber-Bingöl, C., Wöber, C., Karwautz, A., Veseley, C., Wagner-Ennsgraber, C., Amminger, G. P., Zebenholzer, K., Geldner, J., Baischer, W., & Schuch, B. (1995). Diagnosis of headache in childhood and adolescence: a study in 437 patients. *Cephalalgia, 15,* 13-21.

Objective. To examine the specificity and sensitivity of the IHS headache diagnostic criteria and to compare the IHS criteria with the Vahlquist (1955) criteria.
Design. Criterion standard, survey.
Setting. Outpatient headache clinic.
Participants. 437 children and adolescents with recurrent headache consecutively referred to an outpatient headache clinic were targeted to participate. Of these, 26 were excluded because of underlying pathology and 2 had headaches which were unclassifiable. The remaining 409 children (223 females; age=3-19 years, mean age=11.1 years) participated.
Main Outcome Measures. Children and mothers provided answers to a semi-structured questionnaire which was detailed enough to allow classification of headache according to both the IHS (1988) criteria and the Vahlquist (1955) criteria.
Results. 64.1% (262/409) of children fulfilled IHS criteria for migraine and 38.1% (156/409) of children fulfilled IHS criteria for tension-type headache (note: 9 children had both migraine and tension-type headache). Specificity was > 0.70 in all the IHS migraine criteria, but only in 2 criteria of tension headaches. Sensitivity was > 0.70 in almost all criteria of tension headaches, but only in 4 criteria of migraines. The overall agreement between the IHS criteria and Vahlquist criteria was moderate (kappa = 0.57).
Conclusions. IHS criteria is accurate in classifying headaches, but for children and adolescents the duration of pain criteria should be reduced from 2 hours to 1 hour. These criteria should be modified to increase the sensitivity for classifying migraine and to increase the specificity for identifying tension-type headache.

Raieli, V., Raimondo, D., Cammalleri, R., & Camarda, R. (1995) Migraine headaches in adolescents: a student population-based study in Monreale. *Cephalalgia, 15,* 5-12.

Objective. To determine the prevalence of migraine headaches occurring during the previous 12 months among adolescent students using the 1988 International Headache Society (IHS) criteria.
Design. Retrospective epidemiologic survey.
Setting. Public schools in Monreale, Italy
Participants. All students, aged between 11-14 years (n=1445; 738 males) residing in Monreale on June 1, 1989 were eligible to participate.
Main Outcome Measures. A screening questionnaire was used to determine the occurrence of recurrent headache, and their frequency, duration, location, pain characteristics, type of onset, and accompanying characteristics. Children who met IHS criteria for migraine were administered a second, more detailed questionnaire to ensure accurate diagnosis.
Results. A total of 345 students (23.9%) reported headache in the previous year. A diagnosis of migraine was given to

2.98% (43/1445). Of these, 2.35% (34/1445) had migraine without aura (IHS 1.1) and 0.62% (9/1445) had migraine with aura (IHS 1.2). An additional 1.52% (22/1445) had probable migraine, meeting all criteria except the duration of pain criteria. The prevalence of migraine increased with age in females, whereas it remained constant in males.
Conclusions. It appears that the prevalence of migraine in this study may have been underestimated, given that it was lower than in previous research. A more accurate estimate of prevalence may be obtained upon reducing the duration of pain criteria from 2 hours to 1 hour.

Maytal, J., Young, M., Shechter, A., Lipton, R. B. (1997). Pediatric migraine and the International Headache Society (IHS) criteria. *Neurology*. *48*, 602-607.

Objective. To assess the validity of the IHS criteria for migraine without aura in children by examining the agreement of clinical headache diagnoses assigned by pediatric neurologists and symptom-based diagnoses using these criteria.
Design. Criterion standard using retrospective chart review.
Setting. Headache clinic of a tertiary care hospital.
Participants. 167 children and adolescents evaluated by pediatric neurologists at the Montefiore Headache Unit from 1987 to 1991 (mean age=13.1 years; range=6-18 years).
Main Outcome Measures. For migraine without aura and all other headache diagnoses: sensitivity, specificity, positive predictive value, and positive likelihood ratio of IHS diagnoses using the pediatric neurologist's diagnosis as the gold standard. Sensitivity, specificity, and likelihood ratios of individual symptom features and alternative symptom-based case definitions were also examined.
Results. Less than 30% of patients diagnosed by the pediatric neurologist as having migraine without aura met the IHS definition for pediatric migraine (sensitivity=27.3%; specificity=92.4%; positive predictive value=80%). Poor sensitivity was attributed to the rarity of certain features in children clinically diagnosed with migraine: duration of 2 hours or longer, unilateral pain, vomiting, and phonophobia. An alternative symptom-based case definition was proposed: at least five headache attacks separated by a symptom-free interval; lasting 1 to 48 hours; attacks had to be unilateral and/or pulsating and/or moderate to severe; and accompanied by nausea and/or vomiting and/or photophobia and/or phonophobia. This definition produced a higher level of sensitivity compared to the gold standard (sensitivity=71.6%, specificity=72.2%, positive predictive value=74.1%).
Conclusions. The IHS criteria for migraine without aura used with children and adolescents have poor sensitivity but high specificity using a clinical diagnoses as the criterion standard. The IHS criteria should be modified to better reflect developmental differences in headache and current pediatric clinical practice.

Abu-Arefeh, I. & Russell, G. (1994). Prevalence of headache and migraine in schoolchildren. *BMJ*, *309*, 765-769.

Objective. To determine the prevalence of migraine and tension headache in children using IHS (1988) criteria. The effect of headache on school absenteeism was also assessed.
Design. Retrospective epidemiologic survey.
Setting. 67 primary and secondary schools in Aberdeen, Scotland.
Participants. A random sample of 2165 children attending public schools selected from class lists (10% of students aged 5-15 years) were given screening questionnaires to be completed by a parent. 1754 (50.6% (n=888) male; mean age=10.2 years) questionnaires were returned; 30 of these were refusals, leaving a final sample of 1724.
Main Outcome Measures. Parents were asked about whether the child had a headache in past year, whether any headache was disruptive of activities, the frequency of severe (i.e., disruptive) headache, and the cause. A subsample of 206 (out of an eligible 241; 85%) children who reported severe recurrent headache attended a detailed interview about medical and headache history to determine occurrence of migraine and other types of headache based on IHS criteria, and the number of days per school year missed.
Results. It was estimated that 10.6 % of children fulfilled diagnostic criteria for migraine (range= 3.4%-19.1%); 7.8% had migraine without aura, 2.8% had migraine with aura, and 0.7% had headaches that fit the classification of migraine but did not last the full 2 hours required for diagnosis. 0.9% were diagnosed with tension headaches and 1.3% had non-specific recurrent headache. Migraine was more prevalent among older children, among boys under 12 years, and among girls older than 12 years. Children with migraine were absent 7.8 days per school year due to illness while non-migraine matched children were absent 3.7 days. It was estimated that of the 7.8 days missed, 2.8 were for headache. 10 children did not meet IHS criteria for migraine because of the duration limit.

Conclusions. Migraine is a common type of headache in children and causes significant absence from school. It appears that the prevalence of migraine has increased over the past 30 years.

Barea, I. M., Tannhauser, M. & Rotta, N. T. (1996). An epidemiologic study of headache among children and adolescents of southern Brazil. *Cephalalgia, 16,* 545-549.

Objective. To determine the prevalence of headache and headache types in a sample of Brazilian children and adolescents, and to identify risk factors.
Design. Retrospective, cross-sectional, epidemiologic survey.
Setting. Participants were interviewed in their schools' infirmary in Porto Alegre, Brazil.
Participants. 538 children (272 males; aged 10-18 years; predominantly Caucasian) enrolled in grades 5 - 8 in public and private schools were randomly selected from the 91,400 students enrolled in those grades.
Main Outcome Measures. Structured interviews conducted by a physician with each child asked about the factors related to headache and whether the child had a headache with the past year, past week, past 24 hours, or ever in her or his lifetime. Questions were asked about the child's two most frequent types of headache to determine a diagnosis according to the International Headache Society (1988) criteria.
Results. 82.9% of children reported headaches in the past year, 31.4% in the past week, and 8.9% in the past 24 hours; within all of these time periods, the prevalence of headaches was significantly greater in females than males. Lifetime prevalence of headache was 93.3% (males=92.3%; females=94.4%, *ns*). In the past year, 9.9% of children reported headache that fulfilled criteria for migraine type headache (males=9.6%; females=10.3%, *ns*). Migraine was reported by 5.7% of children in the past week. 25.6% of children reported tension-type headache in the past week, with more females reporting this type of headache than males (35.3% vs. 16.1%, $p<.001$). Gender, father not living with the child, positive family history of headache, and type of headache were significantly related to the prevalence of headaches for the past week.
Conclusions. Prevalence rates are similar to those reported in previous research, and confirm that headache and migraine are a relatively common, painful experience in childhood. Young females and children older than 13 years appear to be at higher risk for headaches than others.

Sillanpää, M. & Anttila, P. (1996). Increasing prevalence of headache in 7-year-old schoolchildren. *Headache, 36,* 366-370.

Objective. To examine temporal trends in children with migraine and other headache.
Design. Prospective, epidemiologic survey in 1974 and 1992.
Setting. All community schools in Turku, Finland
Participants. In 1974, 1927 children starting school (90.3% of all eligible children, all 7 years old, 52% boys). In 1992, 1436 children starting school (95.5% of all eligible children, all 7 years old, 52).
Main Outcome Measures. Parents of participating children and children reported on past headache, present headache, frequency of headache, headache secondary to other condition (e.g., sinusitis), and symptoms associated with migraine (e.g., aura, nausea and/or vomiting, etc.). Migraine was diagnosed using criteria established by Vahlquist (1955).
Results. Prevalence of present headache in 7-year-old children was higher in 1992 than in 1974 (1974: 14.4%, 1992: 51.5%, $p<0.0001$), particularly in the group having headache of less than once a month (1974: 9.7%, 1992: 39.8%). Prevalence of past headache in 7-year-old children was higher in 1992 than in 1974 (1974: 23.4%, 1992: 71.1%, $p<0.0001$), with the most marked increase of headache in the category of "seldom headache" (1974: 21.1%, 1992: 65.1%). The precipitating factor was equally often fever, tiredness, head trauma, or refractive error. The precipitating effect of sinusitis was significantly higher in 1992 than in 1974 (1974: 1.1%, 1992: 5.7%, $p=0.0001$). The cumulative prevalence of headache showed an increasing trend with age. Prevalence of migraine in 7-year-old children was higher in 1992 than in 1974 (1974: 1.4%, 1992: 5.6%). There was a significant increase in paroxysmal pattern of headache (1974: 10.7%, 1992: 21.0%, $p<0.0001$) and unilaterality of location (1974: 4.0%, 1992: 8.4%, $p=0.0014$), whereas positive family history of migraine and nausea/vomiting occurred equally often. No significant differences found in sex distribution. No significant differences were noted due to environmental factors (percentage of council houses in different city districts).
Conclusions. There was a marked increase in the prevalence of both migraine and other headaches in children observed in the present study. Further research should examine factors related to this increase.

Commentary

The comparison of studies on migraine prevalence used to be difficult as there was no uniform definition of migraine. The International Headache Society published the criteria for classification of migraine and other headache in 1988 and since then, they have been used extensively in research on the prevalence of adult and childhood migraine (Headache Classification Committee of the IHS, 1988). The publication of these criteria has also contributed to standardizing diagnosis and has assisted in comparing results from different studies.

Diagnosis of migraine is based on the report of symptoms, and as such, is influenced by the subjective impression of the patient and the subjective judgement of the clinician. Some of the problems associated with diagnosis are even more prominent in children compared to adults. For example, it may be more difficult for children to describe their headache than for adults. Migraine in children may have a slightly different manifestation than in adults. Some research has suggested that the IHS criteria are not ideal for children. In particular, the minimum duration of migraine in the IHS criteria of two hours has been criticized as too restrictive for children and should be lowered (Metsähonkala & Sillanpää, 1994; Seshia et al., 1994; Wöber-Bingöl et al., 1995; Raieli et al., 1995). In a recent study by Maytal et al. (1996), the sensitivity of the IHS criteria of migraine was poor when using clinical diagnoses made by pediatric neurologists as the gold standard. Again, the minimum duration of two hours was criticized. Based on these studies, it appears that a diagnosis made according to the IHS criteria is not equivalent to the traditional and clinical diagnosis of pediatric migraine and that evidence supports the lowering of the minimum duration limit for children.

The prevalence of migraine in published epidemiologic surveys has ranged from 2.5% to 22.1%, depending on the age and gender of respondents and the time frame for recall of symptoms (see Goodman & McGrath (1991) for review). Most of these studies used criteria established by Vahlquist (1955), and samples were from Nordic countries or Great Britain. The more recent studies of migraine prevalence using the IHS criteria come from Aberdeen, Great Britain (Abu-Arefeh et al., 1994; prevalence=10.6%), Palermo, Italy (Raieli et al., 1995; prevalence=2.97%) , and the most recent from Porto Alegre, Brazil (Barea et al., 1996; prevalence=9.9%). It is difficult to compare these recent studies with those previously published because of the differences in diagnostic criteria. However, when comparing the more recent studies to the older ones from Nordic countries, it appears that the prevalence of migraine has increased. An interesting detail in the study by Barea et al. was that there was no difference between boys and girls in the prevalence of migraine. In the other studies, a higher prevalence of migraine, especially prevalence of migraine without aura, has been found in girls, a trend which begins in prepuberty (Abu-Arefeh et al.,1994; Raieli et al., 1995).

Additional evidence of the increasing prevalence of migraine in children was found by Sillanpää and Anttila (1996) in a prospective, methodologically sound study of secular trends in the prevalence of childhood migraine. The Vahlquist (1955) criteria were used instead of the IHS criteria because the first phase of the study was conducted before the IHS criteria were available. A significant increase in the prevalence of migraine in 7-year-old Finnish children was observed between 1974 (prevalence=1.4%) and 1992 (prevalence=5.6%). The authors attributed the increase to increased stress and ill-being. When comparable data from different countries and different time periods are obtained, it will be possible to determine whether cultural, social, and environmental differences which influence the occurrence of migraine in children exist.

Our next step in the study of migraine prevalence in children could be to verify the changes by time and to compare more closely the differences between countries and continents. The IHS criteria make these comparisons possible, but they need revision when applied to children. The most evident revision is to include migraine attacks which last less than two hours. This revision is necessary to better capture the variable presentation of childhood migraine.

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Metsähonkala L. & Sillanpää, M. (1994). Migraine in children - an evaluation of the IHS criteria. *Cephalalgia*, *14*, 285-290.

Vahlquist B. (1955). Migraine in children. *International Archives of Allergy*, *7*, 348-355.

Recent Articles

Taddio, A., Stevens, B., Craig, K., Rastogi, P., Ben-David, S., Shennan, A., Mulligan, P., & Koren, G. (1997). Efficacy and safety of lidocaine-prilocaine cream for pain during circumcision. ***New England Journal of Medicine, 336*****(17), 1197-1201.**

Objective. To determine the efficacy and safety of 5% lidocaine-prilocaine cream (EMLA) in reducing neonatal pain from circumcision.
Design. Randomized, double-blind, placebo-controlled trial.
Setting. A pediatric hospital and a woman's hospital.
Participants. 68 full-term, Caucasian, male neonates scheduled for circumcision.
Interventions. Infants were randomly assigned to one of two groups: 38 infants received 1g of lidocaine-prilocaine cream, and 30 infants received 1g of placebo. All cream was applied to the penis under an occlusive dressing for 60-80 minutes prior to circumcision. Infants were circumcised according to standard procedures. A heparin-treated blood sample was collected from each neonate 1.25, 2, 4, 6, 10, or 18 hours after the cream was applied.
Main Outcome Measures. From videotape, a blinded trained investigator rated infant pain using the Neonatal Facial Coding System, over 2-second intervals for the first 20 seconds of each phase of circumcision. Duration of cry and mean heart rate were recorded during each phase of circumcision and blood pressure was recorded during baseline and during the lysis of adhesions.
Results. Neonates who received lidocaine-prilocaine had significantly lower facial-activity scores, spent significantly less time crying, and had significantly smaller increases in heart rate than controls. No infant had any clinical signs of methemoglobinemia, and there were no differences between groups at any time during blood sampling.
Conclusion. Lidocaine-prilocaine cream (EMLA) was found to be safe and effective in reducing the pain of circumcision in neonates, as indicated by facial activity, cry duration and heart-rate changes.

Miller, D. (1996). Comparisons of pain ratings from postoperative children, their mothers, and their nurses. ***Pediatric Nursing, 22*****(2), 145-149.**

Objective. To compare nurses' and mothers' pain intensity ratings with pediatric patients' self-report pain ratings.
Design. Survey.
Setting. Pediatric teaching hospital.
Participants. A convenience sample of 20 postoperative children (age range=7-11 years), their mothers, and their nurses. Surgeries included: general, orthopedic, plastic, or urologic surgery under general anesthesia.
Main Outcome Measures. Postoperative child pain was rated by children, mothers, and nurses, using a 100-mm visual analogue scale ranging from "no hurt" (smiling face) to the "biggest hurt you could ever have" (frowning face). In the first 48 hours after surgery, pain ratings were obtained at 3 intervals. Intervals were randomly selected from any of the following times during which the child was awakened for vital signs: 0800, 1200, 1600, or 2000. Intervals between assessments ranged from 4-20 hours, and all occurred within a 28-hour period.
Results. Pearson r correlations for the mother/child dyad were significant during the first 2 observations (r=0.71; r=0.83). Correlations for the child/nurse dyad were significant during the first 2 observations (r=0.50; r=0.54). Correlations for the mother/nurse dyad were significant during only the first observation (r=0.55). No other correlation was significant. The strongest correlations found were in the mother/child dyad.
Conclusions. Mothers' and nurses' perceptions of child pain were strongly to moderately correlated with the children's own ratings during the first and second post-surgical observations. Mothers may serve as a valuable source of information in the assessment of their children's pain.

Goodenough, B., Addicoat, L., Champion, G. D., McIerney, M., Young, B., Juniper, K., & Ziegler, J. B. (1997). Pain in 4- to 6- year-old children receiving intramuscular injections: A comparison of the Faces Pain Scale with other self-report and behavioural measures. ***Clinical Journal of Pain, 13*****, 60-73.**

Objective. To compare the use, and frequency distributions of four self-report measures of pain intensity and to evaluate how well behavioral measures and nurses global judgements correlate with self-reports of pain intensity.
Design. Survey.
Setting. Children's hospital clinic.
Participants. A consecutive sample of 50 children (27 male) aged 4 to 6 years (median age = 5 years, 1 month) receiving routine immunization and 60 pediatric nurses.
Main Outcome Measures. Children completed four measures of pain both before and immediately following immunization: the Faces Pain Scale (FPS - 7 line drawings of faces ranging from happy to distressed), the Poker Chip Tool (4 plastic

chips representing "pieces of hurt"), a Visual Analogue Toy (VAT - toy koala on a 20 cm wooden pole anchored with "no hurt" on the bottom and "most hurt you could ever have" on the top), a Verbal Rating Scale (VRS - "not at all, a little bit, quite a lot, the most hurt possible"). During immunization, a rating of overall behavioural reaction (0 = nil to 3 = severe) and a rating of children's comprehension of the 4 scales was made by an investigator. The frequency, intensity and duration of facial, vocal, motor, and verbal behaviour was rated from video. Nurses viewed 10 tapes selected to represent a broad range of reactions. They provided pain ratings for each tape using the FPS and VAT. They also reported: their confidence in their ratings, the cues they used, and the categories (facial, vocal, motor, verbal) of the behavioural checklist they had relied on when rating pain with the FPS and VAT.

Results. Most children's pain ratings ranged from low to moderate on all self-report scales; correlations between scales ranged from r = .74 to r = .80. The FPS and VRS were skewed towards no/low pain. The VAT was the most difficult to understand, the VRS was the easiest. Correlations between the self-reports and behavioural items were significant for the facial, vocal and motor categories (all $r \geq .36$). Nurses' pain ratings did not correlate significantly with children's ratings; they also underestimated pain when using the VAT. Nurses who rated pain low relied most on facial behaviour, while those who rated pain high relied most on vocal behavior. Nurses were more confident when their pain ratings were low; their confidence was unrelated to their accuracy or the behaviours they relied upon.

Conclusions. Although ratings by children on the Faces Pain Scale were skewed towards low pain and did not correlate with nurses' ratings on the same scale, they did correlated with other self-report measures of pain and ratings of facial, vocal and motor behaviour during injection. The Faces Pain Scale was easily understood by children aged 4 to 6 reporting short, sharp pain.

Forward, S. P., Brown, T. L., & McGrath, P. J. (1996). Mothers' attitudes and behavior toward medicating children's pain. *Pain, 67*, 469-474.

Objective. To develop a scale to measure mothers' attitudes toward using medication for children's pain and to examine the relation between attitudes and actual and intended behavior.

Design. Structured telephone interview survey.

Participants. 298 mothers (age range=21-49 years, mean=35.7) of children aged 5 to 12 years.

Main Outcome Measures. A 20-item attitude scale was constructed, with 5 intended subscales measuring attitudes toward Addiction, Side Effects, Tolerance, Stoicism, and Drug Abuse. Participants responded on a 7 point Likert scale (strongly agree - strongly disagree). Three questions regarding a list of over-the-counter medications were used to measure actual behaviour: 1) How many were routinely kept in the home? 2) Had any been used in the past month? 3) How often? Intended behaviour was assessed by asking mothers whether they would give a child medication for earache, headache, muscle pain, minor injury pain, and stomachache, and if yes, the severity of pain at which they would medicate.

Results. The internal reliability coefficients of the five subscales ranged from a high of .75 (Side Effects) to a low of .32 (Stoicism). After dropping unreliable items, four factors representing Side Effects, Drug Abuse, Tolerance, and Addiction accounted for over 59% of the variance in responses. The mean number of medications kept in a household was 4, and the number of medications kept correlated positively with the number of medications given to a child in the preceding month. Over 85% of mothers would give medication for headache or earache, but only 39% to 55% would medicate for the three other pains. The lowest pain severity at which mothers would medicate was for earache (mean = 4.42), the highest was for minor injury (mean = 5.94). Mothers' attitudes towards side effects and tolerance were positively associated with the number of medications kept in the home and doses of medication given to children in the past month, respectively. Mothers with positive attitudes towards tolerance were more likely to medicate at lower pain levels for all five pain types.

Conclusions: Although further refinement of the attitude scale is necessary, these preliminary results indicate that it has the potential to be a valid measure of mothers' attitudes towards medicating children, and an indicator of their actual and intended behaviour in relation to medicating children.

Book review

Sparshott, M. (1997). *Pain, distress and the newborn baby,* Oxford: Blackwell Science. ISBN 0-632-04077-7

This book evolved out of concern about the effects of stress and pain on the hospitalized newborn infant. In this book, Sparshott acknowledges the stress and pain of infants as well as the impact of this stress on parents and health care professionals. The underlying assumption is that

acknowledgment and recognition of stress and pain is the first step to effective management and preventing later consequences. Sparshott incorporates the work of behavioral developmental theorists in viewing the baby as an active partner who can effectively communicate clear cues about stress and pain to care givers in an interactive communication process.

The first part of the book lays a foundation for understanding the normal developmental processes of the infant including cognitive and emotional development and the evolution of memory. This section addresses the importance of the environment into which the infant emerges. Here, the author contrasts "awakening to suffering" and the resulting helplessness, fear, depression and persecution to a more positive environment that can evolve through meaningful and consistent involvement of parents and care givers who carefully observe the infant's behavioral cues and responses and decrease environmental stimuli accordingly. The author describes behavioral development in infants and methods of evaluating infant behaviour in both term and preterm neonates highlighting assessment approaches by Brazelton, Als, and Sparshott. Responses specific to pain and distress are reviewed and both individual physiologic and behavioral pain indicators and composite pain scoring systems are evaluated. Of particular interest, is the Distress Scale for Ventilated Newborn Infants (DSVNI), developed by Sparshott to assess pain and distress in a group of infants that are amongst the most difficult to assess due to behavioral and personal resource restrictions.

The second part of the book focuses on the influence of the invasive environment and the relationship between negative symptoms and responses and potential sources of intervention within the environmental context. The author uniquely pairs pain and therapy (Chapter 6), discomfort and consolation (Chapter 7) and disturbance and cherishment (Chapter 8) as sources of stress and resolution. In this section, Sparshott critically evaluates pharmacologic, nonpharmacologic and developmentally sensitive behavioral and cognitive interventions for reducing or eliminating pain, comfort and disturbance. The importance of prevention of pain and distress is also acknowledged.

The final part of the book emphasizes the importance of the "holding environment". This section not only addressed the environment of the hospitalized infant but also highlights the importance of caring for the family and care givers. Special attention is paid to infants who die and how death can be borne with dignity, compassion and meaningful memories. The final chapter proposes the "all-embracing harmony" with the environment and within the infant, family and health care team.

This book provides a refreshing look at pain and discomfort in neonates. The author stresses the importance of the environment and the harmony between the infant, family, health professionals and the "home" where the infant hospitalized in the neonatal unit will spend the first days and months of life. Although this book will be most useful to frontline care givers of hospitalized infants, it should also be of interest to all who care for or care about infants.

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Announcements

Meetings

October 23 - 26, 1997: *American Pain Society 16th Annual Scientific Meeting. Pain Management: Opportunities, Obstacles, and Outcomes.* Join the leaders in pain research and treatment at a most important scientific meeting. Hyatt Regency New Orleans, New Orleans, Lousiana. Contact: American Pain Society, 4700 W. Lake Avenue, Glenview, IL, 60025-1485, USA. (Tel) 847-375-4715; (Fax) 847-375-4777.

September 24 - 27, 1998: *2nd International Forum on Pediatric Pain*: *Chronic and Recurrent Pain*. Further details will be forthcoming in subsequent issues. White Point Beach Resort, White Point, Nova Scotia, Canada. Contact: Dr. Allen Finley, Paediatric Anaesthesia, IWK Grace Health Centre, 5850 University Ave., Halifax, NS, B3J 3G9, Canada (Tel) 902-428-8251; email: allen.finley@dal.ca

Other

PEDIATRIC-PAIN electronic mail list: The PEDIATRIC-PAIN electronic mail list is an international Internet forum for informal discussion of pain in children. There are currently over 560 members on 6 continents. Appropriate subjects include: clinical problems or questions, research problems or proposals, announcements of meetings, book reviews, and political or administrative aspects of children's pain management and prevention. To subscribe to the list, send an e-mail message to: **MAILSERV@ac.dal.ca**. The first line of the body of the message should read **subscribe**

PEDIATRIC-PAIN. If you have questions or problems relating to the list, please contact us at: **owner-pediatric-pain@ac.dal.ca** or **allen.finley@dal.ca**.

Post-Doctoral Fellowship: Any area of pediatric pain. Date can be negotiated. Competitive salary. Contact: Patrick J. McGrath, Ph.D., Psychology Department, Dalhousie University, Halifax, NS, B3H 4J1, Canada. (Tel) 902-494-1580; (fax) 902-494-6585; email: patrick.mcgrath@dal.ca

Newsletter: *The Network News*, Editor-in-Chief William Breitbart, MD, presents literature abstracts, education resource materials, journal announcements, internet resources, and meetings on issues related to oncology, pain, palliative care, and HIV/AIDS. To order contact Noelle Wootten, Managing Editor, *The Network News*, Memorial Sloan-Kettering Cancer Center, Box 421, 1275 New York Ave, New York, NY, 10021, USA. Tel: (212) 583-3042; Fax: (212) 230-1953.

Teaching Module: The Network Project Teaching Module on the Management of Cancer Pain in Children. Prepared by John J. Collins, Charles B. Berde, & Maura E. Byrnes, these educational materials contain a comprehensive lecture with references and over 50 colour slides. Cost: $225 (US dollars; make cheque payable to "The Network Project, CC5112/F7062"). For further information contact the Network Project, Memorial Sloan-Kettering Cancer Center, Box 421, 1275 New York Ave, New York, NY, 10021, USA. Tel: (212) 583-3042; Fax: (212) 230-1953.

Treatment for Fibromyalgia: An exercise videotape designed specifically for children and adolescents with fibromyalgia is now available. This videotape includes warm up, aerobic, and cool down sections, with intermittent heart rate checks. The video can be purchased for individual use ($19.99 per copy, includes shipping) and institutional use (Preview #604001 $45; Purchase #294001 $89 first copy, then $15 for each additional copy). Contact: Dr. Lynn Rusy, Pediatric Pain Clinic, Children's Hospital of Wisconsin, 9000 W. Wisconsin Ave., PO Box 1997, Milwaukee, WI, 53201, USA. (Tel) 414-266-2507 or 1-800-444-7747 or email: maxishare@chw.org. A review of this exercise program will be featured in the next issue of the *Pediatric Pain Letter*.

Websites

Visit the Pediatric Pain Research Laboratory, Dalhousie University, Halifax, Canada us on the World Wide Web. http://is.dal.ca/~pedpain/pedpain.html

The International Association for the Study of Pain (IASP) has a website with links to other IASP chapters on the WWW. http://weber.u.washington.edu/~crc/iasp.html

The American Pain Society has a website with information about their organization, publication information, resource information, and links to many other related sites. http://www.ampainsoc.org/

Short announcements on pediatric pain will be published gratis.

If you would like to participate

Your participation in abstracting and writing commentaries for the *Pediatric Pain Letter* is welcomed. Please send submissions according to the specifications outlined in our Author's Kit. An Author's Kit can be obtained from Julie Goodman, Managing Editor, *Pediatric Pain Letter*, Psychology Department, Dalhousie University, Halifax, Nova Scotia, B3H 4J1; email jgoodman@is2.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.

Contributors to this issue: Lynn Breau, Mary Ann Campbell, Beth Currie, Lilli Ju, Chloé Smith, Susan Sweet, Krista Wilkins.